

ECOHEALTH 2014

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The 5th Biennial Conference of the International Association for Ecology and Health

ABSTRACT BOOK

Conference detailed programme

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Connections for health ecosystems and society
Tisser des liens pour la santé, les écosystèmes et la société



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ABSTRACTS : Oral presentations

A8 - Child and maternal health

A8.1: Environmental pesticide exposure in 12 schools in Matina County, Costa Rica: results from the Infants' Environmental Health Program (ISA)

Leonel Cordoba, Universidad Nacional, Costa Rica; Berna van Wendel de Joode, Universidad Nacional; Karla Solano, Universidad Nacional, Clemens Ruepert, Universidad Nacional

Introduction Several schools in Matina County, Costa Rica, are nearby large-scale banana plantations with high pesticide use. This study aimed to determine whether environmental air of these schools was contaminated with pesticides. **Methods** Using Geographical Information Systems (GIS), we selected ten schools that were within 100 meters (exposed) and two educational centers at more than 1.5 kilometers of a banana plantation (referent). From June 2010 to August 2011, we took repeat passive environmental air samples (n=48) in these 12 educational centers; each sampling period was between six and 12 weeks. Subsequently, we analyzed samples for pesticide content using liquid chromatography mass spectrometry. **Results** We detected 11 different pesticides, of which ten and two are used in banana and pineapple production, respectively. Four out of 11 were organophosphate pesticides. Chlorpyrifos, an insecticide used in bags to protect banana fruits, was detected in all samples (n=48); concentrations were almost five times higher in exposed compared to referent schools (median 9.4 versus 2.0 ng/m³ (p 0.2 ng/m³) in 21 samples (50%) from exposed, but also in four samples (67%) from referent schools. Diazinon, a pesticide used at pineapple plantations, was detected (>0.3 ng/m³) in four samples (67%) from the referent and six samples (14%) from the exposed schools. **Conclusions** Environmental air of the schools was contaminated with pesticides and forms a potential health risk for children and personnel attending these schools. The concentrations of detected pesticides were related to banana, but also pineapple, cultivation. To reduce exposures, we recommend revision of current Costa Rican regulation of pesticide applications near schools and residential areas.

A8.2: Effects of Cadmium, Lead and Manganese on the Serotonin System in Mussel and Human Placenta

Marc Fraser, INRS-Institut Armand-Frappier, Canada; Mélanie Viau, INRS – Institut Armand-Frappier and Centre de recherche BioMed; Julie Lafond, Département des sciences biologiques, UQAM and Centre de recherche BioMed, Donna Mergler, Département des sciences biologiques, UQAM; Michel Fournier, INRS – Institut Armand-Frappier; Céline Surette, Université de Moncton; Cathy Vaillancourt, INRS-Institut Armand Frappier and Cinbiose

In studying ecosystem dynamics and the complex relation between social and biological consequences of environmental degradation and contamination, sentinel species can serve to better understand the biological underpinnings of these relations. To elucidate the mechanisms by which heavy metals, such as cadmium (Cd), manganese (Mn) and lead (Pb), affect placental and fetal development in human, serotonin regulation in mussels was examined. Non-invasive and accessible models, *in vivo* (mussel), *in vitro* (placental cell line) and *ex vivo* (human placenta), were used to study the effect of heavy metal on mussel and placental serotonin system and the relationships existing between those models. Serotonin regulates spawning in mussels and, in human, is essential for pregnancy well-being, placental function and fetal development. *Mytilus edulis* and human placental BeWo cell line have been exposed to low environmental concentrations (0,01-2000 nM) of Cd, Mn and Pb. Serotonin transporter (SERT) expression, serotonin concentrations and monoamine oxidase (MAO) activity were determined. In parallel, heavy metal concentrations in maternal blood, cord blood, and placentas of a cohort of

pregnant women were dosed and placental SERT expression was determined. Environmental concentrations of heavy metal disrupt the serotonin system in mussels and human placenta with more incidences on male than female (fetus and mussels). In BeWo cells and mussels exposed to low Cd and Pb concentrations, a decrease of SERT protein expression and serotonin concentrations and an increase of MAO activity are observed. A negative correlation between SERT expression in placenta and Pb and Mn cord blood concentrations is found in the cohort study. Similar effects of metals on the serotonin system of the three studied models are another opportunity to demonstrate the close links that share the environment, wildlife and humans.

A8.3: Health risk assessment of environmental lead exposure among children in four villages in Santa Rosa City, Laguna, Philippines

Lynn Crisanta Panganiban, Department of Pharmacology and Toxicology, College of Medicine, University of the Philippines Manila, Philippines; Amiel Nazer Bermudez, Health Futures Foundation, Inc.

Environmental pollutants, such as heavy metals, pose significant impacts on public health, especially among vulnerable populations. Humans are exposed to environmental pollutants through air, soil, drinking water and food sources. This paper aims to assess the extent of exposure from heavy metals, particularly lead, and characterize the risk to development of disease among children from four villages in Santa Rosa City, Laguna, Philippines. Data on environmental exposure and biomarkers were analyzed from a cross-sectional study involving mother-child pairs. Laboratory test results showed that all water samples have non-detectable lead levels. All soil samples have lead levels above the US-EPA regional screening levels for lead in residential soil for carcinogenic target risk (1.7 mg/kg) but below the non-carcinogenic target risk (400 mg/kg). Soil samples from villages Aplaya, Caingin and Sinalhan recorded higher lead levels. The lead levels in 16 fish samples of tilapia (*Oreochromis niloticus*) and bangus (*Chanos chanos*) were below the FAO-WHO maximum level in fish (0.3 mg/kg). Twenty-two of 100 child-participants had blood lead levels >5 ug/dL with a mean of 8.6 ug/dL. Exposure rates to lead were higher with intake of tilapia compared with bangus. The highest exposure rates for soil were observed in children from village Caingin. Literature has shown that the neurobehavioral effects of lead exposure have been observed at levels as low as 2.4 ug/dL such that at present, no blood lead threshold has been identified in children. The hazard quotient cannot be computed because there is no reference dose for inorganic lead set by US-EPA. But based on the observations of JECFA on the association between dietary intake of lead and intelligence quotient (IQ) points, the computed exposure rates are approaching levels that pose a risk in lowering the IQ points of the children from villages Aplaya, Caingin and Santo Domingo.

A8.4: The Arctic Char Distribution Program for pregnant women in Nunavik (Quebec): Research-evaluation methodological opportunities and challenges

Catherine Pirkle, Université Laval, Canada; Eric Dewailly, Université Laval; Gina Muckle, Université Laval, Pierre Ayotte, Université Laval; Suzanne Côté, Université Laval; Mélanie Lemire, Université Laval; Michel Lucas, Université Laval

Background: High concentrations of environmental contaminants, poor nutrition and elevated food insecurity are important public health concerns in Nunavik (Quebec). Pregnant women, foetuses and newborns are particularly vulnerable. In September 2011, regional health officials began the Arctic Char Distribution Program. This program promotes the consumption of Arctic Char, a locally-available fish that is rich in nutrients and low in environmental contaminants. Weekly, fishermen from northern Nunavik villages provide Arctic Char to the program that in turn, supplies fish to pregnant women living in Hudson Bay villages. In May 2013, the authors received funding to evaluate the Arctic Char Distribution Program's effectiveness and identify factors supportive of successful implementation, while considering equity and unintended consequences. Presentation Objectives: Describe the Arctic Char Distribution Program and the methods being used to comprehensively evaluate it. Discuss methodological opportunities and challenges. Approach and methods: Evaluation of the Arctic Char

Distribution Program is ongoing until February 2015 and employs mixed-methods and an interdisciplinary approach. Program effectiveness on health outcomes (e.g. contaminant burden, food security) is being assessed with an epidemiological study, using a quasi-experimental longitudinal study design. In-depth key informant interviews are being held with program participants and implementers to examine program acceptability, implementation and operational challenges, and equity. Administrative data on resource availability, distribution and utilization patterns have also been collected. Relevance: The Arctic Char Distribution Program is an innovative natural resource distribution initiative aiming to address regional public health concerns, but requires a complex, interdisciplinary evaluation approach to guide further program development and assess effectiveness. Details of the evaluative approach may be informative to other research-evaluation activities examining “out of the box” initiatives. Finally, if the program is successful, information from this program evaluation could guide other resource distribution programs across the Arctic.

A8.5: Pregnant Women's Perceptions of Brominated Flame Retardant Exposure

Alyssa Lane, Schulich School of Medicine & Dentistry, Western University, Canada; Justin Ashley, Schulich School of Medicine & Dentistry, Western University; Sapna Sharma, Schulich School of Medicine & Dentistry, Western University, Alexandra Hodgson, Schulich School of Medicine & Dentistry, Western University; Jeff Nisker, Schulich School of Medicine & Dentistry, Western University

Purpose: To explore the perceptions of pregnant women regarding brominated flame retardant (BFR) exposure in pregnancy. Methods: Pregnant women from Southwestern Ontario were recruited through the use of posters and pamphlets in prenatal clinics, prenatal fairs and community centres. Semi-structured interviews were audiotaped and transcribed verbatim. Qualitative analysis began with line-by-line coding and re-coding using constant comparison, acknowledging that concepts, subthemes and themes were co-constructed (Charmaz 2006). Analysis was supported by NVIVO 10™ software. The study was approved by the Health Science Research Ethics Board at Western University. Results: Theoretical sufficiency was reached after twenty-two pregnant women had been interviewed and their transcripts analyzed. Four themes were co-constructed from the data: Theme I - Lack of Awareness of BFRs, Theme II - Feeling Responsible, Theme III - Exposure Unavoidable and Theme IV - Expectations. Many research participants felt responsible to manage their exposure to BFRs but worried that their financial means would make it impossible for them to avoid BFRs. In the future, research participants wanted to have better communication from their clinicians and governments, and regulations that would promote decreased exposure to BFRs. Conclusion: Research participant's believed that as long as Canadians continue to be exposed to BFRs there is a responsibility of clinicians and governments to inform individuals about the potential health risks. Health Canada, The Society of Obstetricians and Gynaecologists of Canada and other professional organizations should provide educational materials for clinicians to discuss BFRs in pregnancy and encourage that exposure to BFRs are discussed with their patients. In addition, these organizations should raise public awareness through multiple strategies. The Canadian government should re-think current regulatory policy to fulfill their responsibility to pregnant women and women planning pregnancy about the potential health effects of BFRs.

A8.6: Baby Bear Care: A user-friendly technology for informing infant consumer health choices with Medical Geology

Heather Dawn Gingerich, International Medical Geology Association, Canada

The concept of ecosystem health has long been the mainstay of indigenous science and Hippocrates made the connection between water chemistry and health 2,500 years ago, yet modern public health initiatives virtually ignore chemical contamination of drinking water supplies. This is poor risk management because many chemicals are known to cross the placental barrier and/or are transmitted via infant formula to cause genetic and widespread systems damage that contribute to pregnancy complications, poor childhood health and chronic

disease in adults - all of which destabilize society and hinder healthy, sustainable economic development. Medical Geology combines the qualitative strength of indigenous traditional water wisdom with the quantitative precision of modern geoscience. A strategy of "two-eyed seeing" in public health and environmental protection is proposed through the implementation of consumer decision support tools designed for users at the grass-roots level that both protect individual children (and their ecosystems) and drive policy change from the bottom up. Baby Bear Care is the flagship in a series of real-time, data-driven smartphone-internet applications that functions as an individual dose calculator for fluorine (F) within the format of well-known children's stories that represent the intersection of indigenous and colonial narratives. It is hypothesized that ecotoxicity at all scales may be avoided or reduced by informing "upstream" individual infant feeding consumer choices via familiar technologies. Science translation, communication, education and collaboration are further promoted through mediated interaction with scientific experts, local health- and childcare workers and policy makers. A case study of fluoride toxicity (fluorosis) that correlates water chemistry data with key human health indicators (ex. infant mortality) and/or fresh water aquatic health indicators (ex. indigenous turtle populations) from selected locations in Canada will be presented, basic Medical Geology methodology will be explained, and the future of similar Big Data consumer products will be explored.

A9 - Land use and socio-ecological connections

A9.1: Assessment of ecosystem health at the regional scale in Shunyi District of Beijing, China

Xuehua Liu, School of Environment, Tsinghua University, China; Xiaoming Shao, College of Resources and Environmental Sciences, China Agricultural University

Ecosystem health is one of the most important concerning in the studies of regional ecological quality and safety. It also shows a great meaning on urban development and ecological conservation. However, the method for quantitatively and spatially evaluating the ecosystem health is still lack of maturity. This study focused on assessing the health status of five types of ecosystem, (i.e., forest, wetland, grassland, agriculture and urban) and their spatial distributions in Shunyi District of Beijing, China. The various indices were integratedly calculated to assess the different ecosystems. Based on our field survey and collected data for total 26 indices, the assessing index system containing three health factors (i.e., vigor, organization and resilience) were developed to measure the ecosystem health. Each factor contained its indices for calculation. AHP method was applied to calculate the weights for three health factors. Results showed that 53% ecosystems have middle-level health, 31% ecosystems have good health and only 6% ecosystems have better health. In this district, the grassland and urban ecosystems' health condition is relatively better and they occupy the high-proportion area. The forest ecosystem ranks second with more area of better health condition. The wetland and agriculture ecosystems rank last and have relative worse health condition. Our approach can be applied for spatial comparison within a region.

A9.2: Shaping zoonoses risk using landscape ecology and landscape attractiveness for people, two case studies in Europe

Caroline Zeimes, Université Catholique de Louvain (UCL), Belgium; Sophie Vanwambeke, Université Catholique de Louvain (UCL), Earth and Life Institute, Georges Lemaître Centre for Earth and Climate Research

The spatial distribution of zoonotic diseases and their potential for spillover in the human population relies on a complex constellation of factors relating to reservoir host species, vector species, and finally human activities bringing them in contact with hosts and vectors. Investigating the distribution of such diseases can be divided in two major components, pertaining to hazard (pathogen circulation in the wild) and exposure (people entering

infected landscapes). We attempted to disentangle both aspects in two spatial empirical studies of human cases, one focusing on hantavirus in Germany, and another on tick-borne encephalitis in Sweden. These diseases have strong links to the surrounding environment. In our studies, using an approach combining geography, ecology, and public health, we investigated the role of land cover, as habitat for hosts and reservoirs, but also of land use, including therefore the intensity of human contact with potentially infectious landscapes, through landscape attractiveness. The main results showed that both hazard and exposure contribute to explain the distribution of human cases. Moreover, the combination of ecology and public health/tourism information improves the predictive power of models. Factors related to the accessibility (amount of roads in forest), landscape components (forest stand types) and landscape structure (forest connectivity) have a high relative importance in our models. While both studies rely on human case records, the method used can help in identifying landscape with higher risks, also for yet undiscovered zoonoses, either from the hazard or exposure point of view. Modeling can help to identify factors that play a role in the complex system human-wildlife-environment and can allow the creation of risk maps, a useful tool for public health.

A9.3: Socio-ecological linkages between HIV/AIDS and forest resources: the Malawian context

Joleen Timko, AFRICAD/UBC Forestry, Canada

In many developing countries, HIV/AIDS is not only a health issue, but also a development problem with complex links to rural livelihoods, human capacity, and forest conservation. In Sub-Saharan Africa where healthcare is predominantly a forest-based service, wild foods or forest resources are used to: improve health, detoxify the effects of AIDS-related drug treatments, and enable an afflicted person and their household to control and adapt to HIV/AIDS. The complex interactions between the health and well-being of an HIV/AIDS-affected population and environmental resources mean that solutions cannot be sought from a purely medical standpoint. Instead, an interdisciplinary approach based on integrating ecological, sociological, and health perspectives is required. In this presentation, I first characterize how household dependence on the most important forest resources (firewood, medicinal plants, etc.) in Malawian study sites changed through three phases: the period before HIV became a problem in the household, the period during HIV-related morbidity, and after AIDS-related mortality. I then explore several of the local forest-related coping strategies and innovations that people are using to help alleviate the HIV/AIDS burden on their rural households. These range from eating less food or eating foods that don't require cooking and walking further to obtain forest resources, to taking grandchildren out of school to collect forest resources or renting out arable land they can no longer cultivate. Some of the most promising agroforestry interventions will also be discussed including planting seedlings of fast-growing species of firewood trees on homesteads, introducing improved firewood stoves, and creating community medicinal plant herbaria.

A9.4: Evidence of Epidemiological Transition in Rural India: Are Modern Agriculture and Changing Ecology Responsible?

Atanu Sarkar, Memorial University, Canada

Background The objective of the study was to explore the impacts of modern agriculture and altered landscapes on changing diseases pattern in rural India. **Methods** The survey was carried out in 2009, in six villages of a southern Indian state. The data were collected by in-depth interviews, focus groups discussion, participant observation, ecological survey, and secondary data (health and agriculture records). **Results** Traditional coarse cereals (carbohydrate with high protein and fiber) and pulses (high protein) were replaced by mill-polished rice (high carbohydrate and low protein), high edible oils and semi-processed high salt containing foods. Extensive mechanization of agriculture activities resulted in far less physical activities, however, fatal accidents and injuries increased considerably. Overweight/obesity had emerged as a new public health challenge. Among the

large farmers, 31.7% and 35% of men and women had high BMI(>25). Moreover, 8.3% of men and women from landless households were overweight/obese. 10% of all the adults (>40yrs) visitors of a local rural hospital either had diabetes or hypertension or both. There was a growing incidence of ischemic heart disease and myocardial infarction. Changing landscape due to stagnation of water and extensive use of nitrogen and phosphate fertilizer have increased in high mosquito population, resulting in more incidence of vector borne diseases, such as Malaria, Japanese encephalitis, Chikungunya and Dengue. Conclusions Output driven and market oriented agriculture practice completely changed the eating pattern of the food growing areas and alteration of landscape. There is a need of proper ecological management and incentive to grow traditional crops.

A9.5: Understanding when and how farmer health and wellbeing is linked to ecosystem disruption: evidence from a study of Australian farmers

Jacki Schirmer, University of Canberra, Australia

It is widely understood that the health and wellbeing of humans and the ecosystems they depend on is strongly interlinked. However, the relationships between human wellbeing and ecosystem health are not always direct or simple. The nature of these linkages needs to be better understood in order to better design policy instruments and other interventions that successfully support both ecosystem and human health. We explore this topic through a case study of Australian farmers surveyed as part of the 'Regional Wellbeing Survey', a large-scale survey of residents living in rural Australia. Given their direct dependence on the land, farmers may be expected to experience relatively direct wellbeing impacts as a result of ecosystem disruption. We explore whether this is the case by examining whether and how farmer health and wellbeing was linked to the types of environmental stress experienced on the land they manage or in the broader region they live in. We then examine whether a number of factors, including farmers' values regarding land management, the environment and farming, mediate the relationship between experience of environmental problems and their wellbeing. Our findings highlight the complexity of the relationship between environmental degradation and wellbeing. They suggest that one of the greatest challenges to addressing degradation is the 'filters' that can either (i) prevent ecosystem disruption having an immediate or direct impact on the wellbeing of farmers, and (ii) in some cases, prevent action being taken to address environmental problems on a farmer's land. We conclude with consideration of implications of our findings for developing policies that more successfully address ecosystem degradation on agricultural land, while also supporting farmer health and wellbeing.

A9.6: Land cover and transhumance routes in Benin, West Africa

Eva De Clercq, Université Catholique de Louvain la Neuve, Belgium; Sophie Vanwambeke, Université Catholique de Louvain (UCL), Earth and Life Institute, Georges Lemaître Centre for Earth and Climate Research

In West-Africa, cattle herders migrate during several months each year in search of water and fodder for their cattle. Although transhumance is part of the cultural heritage of the Peul or Fulani people, this yearly migration has become dangerous. Conflicts between pastoralists and sedentary agriculture farmers are more frequent than before. Cattle movements over large distances can also play a role in the spread of parasites, such as the invasive tick *Rhipicephalus microplus*. Despite the undeniable relevance to the entire West-African society, objective and quantitative data on transhumance and migration routes is difficult to obtain. This presentation studies the predominant transhumance routes for cattle in Benin, West Africa and how these have changed over the last decades. We analyse the variation in the transhumance routes, and how these routes are related to land cover on a national and regional scale. Data on transhumance was obtained from historical and grey literature, and recent information was extracted from questionnaires and interviews with cattle herders, performed during the WECATIC project. Information on land cover was obtained both from existing GIS land cover maps and satellite

data from the MODIS sensor describing vegetation greenness. This allowed to determine in an objective manner whether the agricultural fields are increasing along transhumance corridors, and it highlights the areas where conflicts between farmers and cattle herders are likely to occur.

B8 - Climate change and local knowledge

B8.1: Participatory Assessment of Climate Change Indigenous Health Impacts and Adaptation Measurements Implementation for Waterborne Diseases in Mountainous Ecosystems

Marilyn Silvia Aparicio Effen, Instituto Boliviano de Biología de Altura. Universidad Mayor de San Andrés, Bolivia; James Aparicio, Museo Nacional de Historia Natural (MNHN); Ivar Arana Pardo, Helvetas Swiss Intercooperation

Climate change is one of several drivers of change that affect human health, ecosystems and society in rural areas. It is impacting health, across different spatial scales, ecosystems and resources, as reduced water supply and quality. This situation becomes particularly important for Bolivia, because this driver is operating in a framework of poverty, inequality, mountain ecosystem vulnerability and mining activities. We tried to integrate and understand the global climate change driver, on water availability and indigenous health, for design and implement adaptation measurements at different scales for water-borne diseases. In Ancoraimes Township - located in a mountainous ecosystem since Titicaca Lake at a high altitude to 4400 meters- an ecohealth research initiative was launched, to evaluate 14 rural communities in their: hydrological, health, ecosystem, veterinary, laboratorial and past, current and future climate characteristics. The participatory-based approach incorporate: community and indigenous organizations, local and national health and meteorological services. The evidences show: glacier retraction, reduced water availability, mining water pollution -Aluminum 1280mg/L., Mg, Fe, with human and animals consequences - strong watersheds and ecosystem impact, as result of human activities and global warming. The water-borne transmissible diseases affected to 49% of 1025 people evaluated. The current and historical climate analysis, revealed decreasing trends in precipitation -14% of deficit-, increments in temperatures (0.87 to 1.25° C in relationship to baseline), and is expected for 2020 and 2030, a significant increase in average temperature and modified rainy patterns This experience was useful to design Ancoraimes and La Paz State climate change policies, and adaptation strategies. These included: raising awareness about water and health climate change vulnerability and impacts, increasing investments for water sources protection, establishing systems to compensate and protect watersheds and water springs, capacity building, water-borne diseases prevention actions, and promote clean technologies for mining activities. Is required continuing to adaptation process.

B8.2: ClimBAP: Cartography of the imaginary and the emergence of a local narration and poetics to adapt to climate change health impacts in the Pantanal

Pierre Girard, UFMT / CPP, Brazil; Michèle Sato, Universidade Federal de Mato Grosso; Imara Quadros, Instituto Federal de Mato Grosso, Giselly Rodrigues das Neves Silva Gomes, SEDUC-MT

In the context for elaborating participative climate change adaptation measures, past experiences show most local actors have difficulties with the "future" aspect of climate change, but cope more easily with "present" climate variability. As well, some complex concepts such vulnerability, risk and adaptive capacity are a source of communication confusion between actors and between actors and researchers and are not readily used by the actors-researchers when they discuss adaptations related to health impacts of climate change. In this presentation, we demand to present results from an on-going project called ClimBAP dealing with climate

adaptations in the Pantanal (Brazil). According to IPCC and the Brazilian Panel on Climate Change, most Pantanal inhabitants are vulnerable to climate variability and change. The aim of ClimBAP is to enable economically disadvantaged communities to build strategies or means to address climate change. The locus of this action is the school-community dialog in one rural and one urban neighborhood in the Northern Pantanal. One of prior aspects of ClimBAP is for the researchers to understand/sense how locals perceive climate and how they conceive that they (and their health) may be impacted by climate change/variability. Cartography of the imaginary is a qualitative phenomenological method, create to seek a comprehension of the participants manifest and latent meanings enabling to sense/ experience their knowledge and practices related to climate variability/change (values, meanings, significance, customs, habits, behaviors, jobs, attitudes, observations, knowledge-doings, decisions, choices, conflicts, impacts, designs, art and creations of this place and these people). This dialogue among traditional and scientific knowledge intends to empower the local actors as protagonists of their own climate history. Then, through their particular narration and poetics, besides scientific knowledge as a dialogue way, the participants are led to discuss climate justice, health, education, art or social organization to organize themselves to tackle climate change.

B8.3: Angering the Gods of Nature: Mining, Climate Change and Vulnerability on the Mongolian Steppe

Lesley Johnston, Social Planning Toronto, Canada; Oyuntsetseg Chuluundorj, United Nations Population Fund; Craig Janes, Simon Fraser University

The practice of rural pastoralism, a sustainable livelihood practiced on the Mongolian steppe for a millennium, finds itself facing multiple threats. Tripartite pressures of mining development, transition to a market economy, and the impact of climate change have threatened the security of livestock husbandry in rural Mongolia. Interviews with 31 households in three Mongolian counties where mining is underway reveal the adverse synergistic effects of mining development, economic transition and climate change on Mongolian pastoralists. Mining development and the resultant degradation of the pasture lands have resulted in limited employment and income opportunities, corrupt and weakened systems of governance, loss of traditional pastoral practices, weakened social networks, and deepening inequity. The economic transition and the resulting market reforms have led to changes in the use of the pastoral commons, affecting access to resources for herders, and the loss of traditional institutional supports. Concurrently, the environment has begun to change in unpredictable ways. Water sources are disappearing and grasslands have become drier and less productive. Land degradation and desertification have become serious concerns. Vulnerable to changing conditions, pastoralists experience the vagaries of variability in the daily practice of their livelihood, experiencing poverty and the poorer health outcomes that are a consequence of loss of economic and ecosystem security, leaving the inhabitants of the steppe to ponder old beliefs – the gods of nature are angry and it is they who are being punished for the mistreatment of the land.

B8.4: Social Media and Public Health: A Cross Canada Study of Public Health Practitioners

Cynthia Weijs, University of Guelph, Canada; Shannon Majowicz, University of Waterloo; Jason Coe, Ontario Veterinary College, University of Guelph; Andria Jones-Bitton, Ontario Veterinary College, University of Guelph; Serge Desmarais, Department of Psychology, University of Guelph

Social media offer public health the potential to better communicate health messages and engage the public, yet such media, like Facebook, have both potential benefits and inherent risks. For health professionals, other public health practitioners, and their organizations, risks to image and reputation are of concern, since Facebook facilitates the blending of personal and professional identities. Previous research shows that health practitioners are frequent users of Facebook, and some post content that could be interpreted as unprofessional (e.g., details of client interactions). In light of this, and given the call for a highly competent workforce in public health, our

objective was to explore attitudes towards, beliefs about, and behaviours on Facebook, among Canadian public health practitioners. Members of eight Canadian public health organizations were sent a link to an online questionnaire. The questionnaire assessed Facebook usage factors, sharing behaviours on Facebook, personality dimensions and views about acceptable sharing online. Of 621 respondents, 480 (77%) held Facebook accounts. Facebook account holders reported using Facebook for an average of 5.29 years (median 5.25, SD 1.94, range 0.17 to 10 years), and spent an average of 23 minutes per day on Facebook. Most respondents (78%) reported checking their Facebook profiles at least a few times a week. For Facebook account holders, the odds of agreeing that it is acceptable to vent about the general public online were 1.87 times greater than the odds of those without Facebook accounts. Facebook offers an opportunity for public health to share intended messages, however a key feature of Facebook is the blending of one's personal and professional lives. The findings of this study may serve as a basis for social media training that allows public health practitioners and organizations to maximize the benefits and minimize the potential risks associated with social networking.

B8.5: Health policy and climate change in British Columbia: Who's responsible for building adaptive capacity?

Tim Takaro, Simon Fraser University, Canada; Stacy Barter, BC Healthy Communities; Stephanie Gatto, Faculty of Health Sciences, Simon Fraser University, Sally McBride, Public Health Association of BC; Lindsay Galway, Simon Fraser University

Climate change is already impacting health around the globe, but health systems are often slow to respond. Some have adopted sustainability plans which include green house gas (GHG) reduction strategies but few if any are engaged in the longterm planning needed to face the socio-ecological changes and health impacts expected in the next 50-100 years. We surveyed providers and leaders in health and immigration services in British Columbia, Canada, with two surveys and twenty key-informant interviews asking about preparedness for the health impacts of climate change. Domains included were, level of understanding about climate change and health and related programs, perception of the organizational capacity to respond to climate impacts and preparations for an influx of environmental refugees. In Survey 1 for 436 surveys there was a 20% response representing all of the provincial health authorities and 9 different departmental areas. In Survey 2, 40 frontline immigration providers were surveyed in addition to 10 key-informant interviews. Our findings show a great interest and knowledge about these impacts, but little to no capacity to address them. Only one respondent said their health authority had a climate change adaptation plan though 63% said their region was already experiencing climate impacts or would in the next 20 years (83%). Most health authorities are conducting activities to reduce their carbon footprint. A need for more evidence-based information with regional specificity was identified along with capacity building targeted for health professionals. Despite Canada's role as a major emitter of GHGs with responsibility for its global impacts, Government has not addressed the potential impact of climate migration and current policy does not accommodate such an influx. Local service capacity (housing, health and other services) is inadequate. We provide recommendations for a path forward for public health and immigration services to increase their adaptive capacity.

B9 - Climate change perspectives

B9.1: Disease risk in a dynamic environment: the spread of tick-borne pathogens in Minnesota, USA

Stacie Robinson, University of Minnesota, United States; David Neitzel, Minnesota Department of Health; Ron Moen, University of Minnesota, Clarence Turner, Minnesota Department of Natural Resources; Meggan Craft, University of Minnesota; Katey Pelican, Ecosystem Health Initiative, University of Minnesota

As humans and climate change alter the landscape, novel disease risk scenarios emerge. Understanding the complexities of pathogen emergence and subsequent spread as shaped by landscape heterogeneity is crucial to understanding risks of emerging diseases, pinpointing high risk areas, and mitigating emerging disease risks in a dynamic environment. Lyme disease (LD) is a serious threat to public health, and this tick-vector-borne disease with important links to environmental conditions which affect vector habitat. We used LD case data reported to Minnesota Department of Health (MDH) from 1995 to 2011 to model the spread of LD across Minnesota relative to landscape and climatic factors. Infection rates were strongly associated with forest cover ($r=0.75$), and decreased in agricultural areas, where habitat was less suitable for tick vectors. Increasing temperatures in Minnesota have resulted in increasing frequency of days above the temperature threshold for tick survival (degree days above 30). As climate has become more hospitable, ticks have spread to northern forests of MN allowing increases in LD cases in these areas. Spread of LD from an initial point of origin in eastern Minnesota exceeded 10 km/yr in the first 10 years after the onset of infections, but this rate decreased significantly in the second 10 years as a result of limitations imposed by habitat and temperature. We used risk mapping and spatial simulations to demonstrate that risks of increasing LD will be greatest to northwest Minnesota where suitable tick habitat is plentiful and climate warming continues to increase survival rates of these important disease vectors.

B9.2: One Health Demonstration Site: Community identified health risks in and around Queen Elizabeth National Park

Innocent Rwego, Makerere University, Uganda; Katey Pelican, Ecosystem Health Initiative, University of Minnesota; Benon Asiimwe, Makerere University School of Public Health, William Bazeyo, School of Public Health, Makerere University; Cheryl Robertson, School of Nursing, University of Minnesota; Dominic Travis, University of Minnesota College of Veterinary Medicine

One of the greatest challenges to improving health in Africa has been a lack of long-term and systemic engagement of various stakeholders in vulnerable communities. Interventions are often vertical and intermittent and, often instigated by a crisis. Community capacity is impeded by persistent exposure to complex public health problems not addressed by vertical interventions, including food and water insecurity, the effects of climate change, unsustainable natural resources, and political conflict and mobile populations. Around the globe, universities have implemented long-term partnerships with communities and governments to advance economic growth, community health and agricultural productivity. The One Health Central and Eastern Africa (OHCEA) network of universities is building on this model of long-term engagement to establish a regional network of One Health Demonstration Sites in six countries to address complex health problems faced by communities. One of the Demonstration sites is Queen Elizabeth National Park (QENP) in Uganda. The presentation will show community identified priorities and ranked for future interventions in QENP in Uganda. Priorities were identified using an Ecohealth approach whereby communities participated in identifying, ranking and prioritizing health and environmental challenges in their population(s), as well as the variables that drive poor health in humans and animals and/or contribute to environmental degradation. In QENP, traditional pastoralist communities have been forced to become semi-sedentary and, in some places, completely displaced and forced into national parks and other conservation areas because of lack of pastures, watering points and loss of land to agriculturists. In addition, fishing communities have stayed in and around national parks to exploit lakes within these conservation areas. This has led to a perceived increase in human-wildlife conflict in these areas. Interaction between wildlife-domestic animals and humans is relatively higher within fishing enclaves than in surrounding communities. This scenario leads to increased environmental degradation and global change.

B9.3: An Ecosystem Approach to an environmental health problem in Alpuyecá, México

Urinda Alamo-Hernández, Instituto Nacional de Salud Pública, Mexico; Horacio Riojas Rodriguez, National Institute of Public Health; Nelly Flores-Pacheco, Instituto Nacional de Salud Pública, Hilda Rangel-flores, Instituto Nacional de Salud Pública; Norma Garduño-Salazar, Instituto Nacional de Salud Pública; Ana Cecilia Espinosa-García, Universidad Nacional Autónoma de México

We conducted a Participatory Action Research (PAR) with environmental health (environmental sampling, biomarkers, risk assessment) and health promotion methods (coalitions buildings, PRECEDE-PROCEED model) to identify, quantify and propose integral solutions for a complex environmental health problem in Alpuyecá, Morelos. Results: A participative space was created (CASITA), involving community members, authorities and a multidisciplinary research team for collaboration, activities planning, participatory prioritization, intervention proposals and PAR evaluation. In baseline study, we found fecal contamination evidence (bacteria, enteric virus) in two wells, 3 river sampling points (recreational areas) and 20 houses. In children from 6-12 years old (n=216), we found a Pb blood average of 7.3µg/dl (1.5-36.5; 65%>=5µg/dl). Also, 37% of the participating homes had dirt floor and 48% used cooking lead-glazed pottery, which is the main source of lead in Alpuyecá. After prioritization, the accomplished interventions were: a participatory management plan according to the critical point of potable water flow chart, this allowed us to estimate water loss of 40% in the water supply system; dengue control and comprehensive solid waste management intervention, reducing from 40% to 6.7% and from 50% to 13.3% the house and Breteau indexes, respectively; workshops to reduce lead effects and visits to children with lead levels >=10µg/dl, reducing lead levels from 14.7 to 6.8µg/dl in this children; nutritional workshops to reduce the absorption of lead; risk communications and results diffusion conducted by environmental health promoters (mothers participants), participatory workshop to identify possible solutions, focus groups to evaluate the PAR. The results reflect also an increase in knowledge about dengue, solid waste and food habits related to the absorption of lead and a community strengthening capacity. Conclusions: The Ecosystem Approach turns to a greater impact on complex environmental health issues.

B9.4: Association between extreme weather events, drinking water and acute gastro intestinal illness in the Lower Fraser watershed, British Columbia, Canada, 2000-2012

Bimal Chhetri, BC Centre for Disease Control, Canada; Eleni Galanis, BC Centre for Disease Control; Sunny Mak, BC Centre for Disease Control, Michael Otterstatter, BC Centre for Disease Control; Robert Balshaw, BC Centres for Disease Control; Jordan Brubacher, Simon Fraser University; Tim Takaro, Simon Fraser University

Introduction: The burden of waterborne acute gastrointestinal illness (AGI) could increase with the increase in temperature and precipitation extremes expected due to climate change. Small drinking water systems are particularly vulnerable to such changes. Understanding the relationship between weather, drinking water systems and AGI can help increase their adaptive capacity to climate change. Here, we present initial findings of our study which investigates the relationship between AGI and extreme weather events in drinking water systems and projects the expected burden of waterborne AGI in the future. Methods We included reported cases of campylobacteriosis, salmonellosis, Shiga-toxin producing E. coli, cryptosporidiosis and giardiasis from 2000-2012 in the Lower Fraser watershed, British Columbia. Cases were geocoded by address of residence and the corresponding drinking water system (vulnerable or not) was determined using reference water distribution data. Daily rainfall and temperature measurements were obtained from Environment Canada. Locally weighted scatter plot smoothing, univariate Poisson regression models and cross correlation plots were used to assess seasonality and the relationship between cases and weather.

Results: A total of 15,981 cases were included. The seasonal patterns were similar across drinking water systems with peaks in summer and early fall. Extreme daily rainfall (>19.68 mm) and mean daily temperature were significantly associated with reported cases. There were significant relationships between reported cases and rainfall, as well as mean temperature, for lags up to previous 6 weeks.

Conclusions: These preliminary results indicate the presence of seasonal determinants and that extreme precipitation and temperature may play a role in sporadic AGI. Multivariable models will be used to further investigate these associations and to compare between vulnerable and non vulnerable drinking water systems. Further analyses will include a) seasonal decomposition b) multivariable time series regression modeling, and c) case count prediction based on water system attributes and future climate projections.

B9.5: Changing patterns of disease ecology in Kibale National Park, Uganda

Tony Goldberg, University of Wisconsin-Madison, United States; David O'Connor, University of Wisconsin-Madison; Thomas Friedrich, University of Wisconsin-Madison, David Hyeroba, Makerere University; Michael Lauck, University of Wisconsin-Madison; Colin Chapman, McGill University; Geoffrey Weny, Makerere University

The Kibale EcoHealth Project has embraced the “one health” approach for understanding human, animal, and environmental health in Kibale National Park, Uganda, for over a decade. Here, we describe the discovery and cross-species transmission of a diverse community of new pathogens, from viruses to protozoa to helminths, in wild non-human primates and humans in and near Kibale. Our results demonstrate that the number of wild primate pathogens is far higher than previously appreciated, and that different pathogens respond differently to ecological drivers. Specifically, and counter to some prevailing paradigms, most viruses appear to be highly host-specific and refractory to environmental drivers of cross-species transmission, while certain protozoan and helminth parasites appear to cross species boundaries readily and to respond acutely to environmental drivers. Overall, the basic biology of the pathogen and its evolutionary history with the host appear to be the primary determinants of cross-species transmission, with environmental drivers such as habitat fragmentation and climate change modifying transmission patterns only of certain agents. The combination of deep sequencing for identifying and characterizing novel pathogens (“pathogen discovery”) with methods from the social sciences to catalog transmission pathways (“pathway discovery”) has proven particularly useful in this setting for understanding how pathogens are transmitted among host species today, and how environmental changes may alter such transmission in the future.

C2 - Dengue and socio-ecological systems

C2.1: Why is an Integrated Social-Ecological Systems (ISES) Lens Needed to Explain Causes and Determinants of Disease?: A Case of Dengue in Dhaka, Bangladesh

Emdad Haque, University of Manitoba, Canada; Parnali Dhar-Chowdhury, University of Manitoba; G.U. Ahsan, North South University, Robbin Lindsay, Public Health Agency of Canada

The purpose of this paper is to offer a critical review of conventional theories concerning causes and determinants of diseases. It further intends to examine both theoretical and empirical bases for adopting an Integrated Social-Ecological Systems (ISES) lens to comprehend complexities related to drivers, determinants and causes of diseases, with a focus on dengue. We assessed the theoretical underpinnings of a range of historical and contemporary lenses for viewing disease factors with a view to distinguishing their implications for explaining both personal (i.e., individual) and population health. We examined these issues within the empirical context of the City of Dhaka (Bangladesh) by adopting an ISES lens. Within this study an emphasis has been placed on illustrating how feedback loops and non-linearity-functions in system have a direct bearing upon various aspects of disease occurrences. A brief triumph over microbes during the last century stemmed from our improved understanding of disease causation which was built using disciplinary-specific, monocausal approaches to the study of disease emergence. Subsequently, empirical inquiries into the multi-factorial

aetiology and the “web of causation” of disease emergence within population health have advanced thinking so that new knowledge extends beyond a framework of the causation of disease in individuals. Nonetheless, we are still far behind in comprehending the roles of complex, intertwined, multi-level, social-ecological factors in affecting disease occurrence. A transdisciplinary-oriented, ISES lens is needed to explain the complexities of disease occurrence at various levels. More theoretical and empirical formulations, with evidence from various parts of the world, are required to further the debate. Overall, our study advances the theoretical as well as empirical basis for considering an integrated human-nature systems approach to explaining disease occurrence at all levels so that factors at the individual, household/neighbourhood, local, regional and global levels are not studied in isolation.

C2.2: Spatial analysis of survey variables related to dengue in Guayaquil, Ecuador

Varsovia Cevallos, Instituto Nacional de Investigación en Salud Pública, Ecuador; Emmanuelle Quentin, INSPI; Diego Morales, Instituto Nacional de Investigación en Salud Pública, Rafael Yépez, Instituto Nacional de Investigación en Salud Pública; Patricio Ponce, Universidad de las Américas (UDLA) – Centro de Investigación Traslacional

In Ecuador, dengue fever is endemic since 1988 with some epidemic episodes particularly linked to urban areas and precipitation. With the aim to detect key variables that can predict dengue case apparition, a study covering two complete rainy seasons is taking place in Guayaquil, Ecuador. The survey at household level includes water access data as well as breeding information. A first step consists in georeferencing this information in a Geographical Information System (GIS) and applying correlation analysis between variables. The geodatabase is also complemented with population density map and climatic variables (precipitation, temperature, etc...) from meteorological stations and satellite images. With this information, it is possible to obtain the modeling of the distribution of mosquito population using maximum entropy or multi-regression method, and to relate it with dengue fever cases. The results give the relative sensitivity of the variables included in the modeling and as such allow focus better future studies."

C2.3: Territorial analysis in dengue research through chorems: An ecohealth experience in Colombia

Mauricio Fuentes, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Colombia; Juliana Quintero, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Diana Higuera, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Lucas Alcalá, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Diana García, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Tatiana García, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; David Munévar, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá

Introduction. Interaction between ecosystems, society and human health takes place in geographical space characterized by a history of profound socio-ecologic transformations. A territorial perspective offers new possibilities to understand this changes and their consequences for dengue in urban settings. The objective was to illustrate the contributions of “chorems” methodological framework to ecohealth research, through the experience in assessing the ecological, biological and social factors related to *Aedes aegypti* density in two Colombian cities (Arauca and Armenia). Chorems where originally developed as an application of systems theory, aiming to make schematic representation of territorial processes and dynamics. Methods. We used secondary and primary information. Secondary information about the historic and urban process of study areas was consulted, and primary information regarding biological, ecological, sociodemographic and knowledge, attitudes and practices towards dengue vector was extracted from interviews to local stakeholders, household surveys and entomological inspections. A measure of dengue vector density was used (PPI). Initial chorems were generated for predefined topics (inhabitants mobility, physical and socioeconomic characteristics of the

territory, among others) and then were compared with the distribution of vector density. Relationships were established and analysed from a territorial perspective, then defined and depicted having as a final result a synthesis chorem for each city. To deepen in the differences between Arauca and Armenia, a similar chorem was constructed at a national scale that showed the main territorial dynamics of each city. Results. This methodology allowed the integration of different sources of information (qualitative, quantitative, secondary and primary) enhancing transdisciplinary work and formulating hypothesis that can be further addressed with statistical and geostatistical methods. Chorem became a useful mean to explore and communicate territorial dynamics related to dengue at different scales. Conclusions: Territorial analysis expressed in chorem offered a common ground for exploring the interaction between social and ecological systems.

C2.4: Interactions between the timescales of human and mosquito adaptation to environmental change drive geographic variation in vulnerability to dengue transmission

Harish Padmanabha, SESYNC/Universidad del Norte, Colombia; Fabio Correa, Universidad Nacional de Colombia; Maria Diuk-Wasser, Yale School of Public Health

We propose a conceptual framework to study dengue transmission as the outcome of daily physiological and behavioral adaptations of *Aedes aegypti* mosquitoes and people to changes in climate and water availability, interacting with human life history traits that maintain susceptible host densities. This framework is applied to investigate the vulnerability of dengue transmission to potential human or mosquito adaptations to environmental change. We present an agent-based model of the dengue transmission system in 2 adjacent city blocks. The model simulated epidemiological dynamics over 20 years, synthesizing household-level data collected in 2-block patches in six highly endemic Colombian neighborhoods spanning a thermal gradient, including surveys of vector and human behavioral dynamics, household adaptation strategies to water availability, human demography and dengue virus in children. Predicted ecological relationships were then evaluated across heterogeneous urban landscapes, using 7-10 years of weekly reported DF cases in each neighborhood in the cities of Armenia (high elevation limit of endemic transmission) and Barranquilla, overlaid with housing density, income and altitude. Results show three categories of vulnerability to dengue with respect to potential increases in human-mosquito contact rates, apparent in both simulated and observed epidemiological patterns: (1) low: socially well-connected populations with high viral introduction, experience intense and prolonged epidemics when new serotype invade, but little endemic transmission due to insufficient susceptible replenishment; (2) low-medium: populations on the fringe of dengue transmission because of interactions between low temperature, social connectedness or human-mosquito contact, vulnerable to intense but infrequent epidemics; (3) highest: inter-epidemic transmission foci characterized by high rural-to-urban immigration and fertility. Targeting these areas of high vulnerability is likely to produce the largest gains in overall dengue control. Humans experience socio-ecological pressures much more important than dengue, but we suggest that understanding of plasticity in human adaptation strategies is essential for understanding dengue's changing epidemiology.

C3 - Insect-borne diseases

C3.1: Entomological impact of a cluster randomized trial addressing vector densities in Fortaleza, Brazil. Experiences from an ecohealth approach

Andrea Caprara, Cear State University, Brazil; Jos Wellington De Oliveira Lima, Ceara State University; Ana Carolina Rocha Peixoto, Ceara State University, Axel Kroeger, TDR/WHO; Johannes Sommerfeld, TDR/WHO

Fortaleza is a particularly vulnerable city to infestation by *Aedes aegypti* due to its tropical climate and the highest demographic density. This intervention study intends to implement an evidence-based intervention and analyze its effectiveness in reducing vector density. Methods: A cluster randomized controlled trial was designed comparing ten randomly selected intervention clusters, with community directed waste management scheme, with ten clusters with routine vector control. 10 intervention clusters were paired/matched with other 10 clusters with similar ecological and sociological parameters. In all intervention clusters, ecohealth activities were organized through social participation, removal of small recipients, cleaning of backyard areas as well as the covering of large water containers without utilization of larvicide and insecticide. The variation of the House Index (HI), the Container Index (CI), Breteau Index (BI) and Pupae Per Person (PPI) from the dry season (before intervention) to the rainy season (after the intervention) was assessed by means of linear mixed models. Results: Two cross-sectional larvae and pupae surveys were carried out between January and June 2013 in both control and intervention areas. 2411 places were visited in both dry and rainy season (2353 Households and 58 public spaces). Before and after the intervention strong differences were identified between intervention and control areas: Overall, the House Index (HI), the Container Index (CI), Breteau Index (BI) and Pupae Per Person (PPI) increased from the dry season (before intervention) to the rainy season (after the intervention), but the increase was significantly higher in the control area (P-values: HI=0.029 CI=0.020, BI=0.014, PPI=0.023). Conclusion: The main results show the effectiveness of an ecohealth intervention based on community participation, covering the elevated containers on the roof and in-house rubbish disposal without larviciding the large elevated and ground containers in comparison with the traditional control programme.

C3.2: Comparing the risk of mosquito-borne infections in humans in irrigated and non-irrigated sites in Kenya

Bernard Bett, International Livestock Research Institute, Kenya; Rosemary Sang, KEMRI

Anthropogenic land use changes may induce a decline in the quality and flow of ecosystem services increasing the risk of occurrence and transmission of infectious diseases. We conducted a study in a semi-arid area in Kenya where irrigation had been introduced to determine the effects of these changes on the incidence of mosquito-borne infections including malaria, chikungunya, West Nile virus, Crimean Congo haemorrhagic fever and Rift Valley fever. The study used an analytical design whereby data were collected from irrigated and non-irrigated areas within the same ecosystem. Socio-economic data were collected using participatory methods. Blood samples were collected from randomly selected subjects using a household as the unit of analysis. Ethical approval for the work was obtained from the African Medical and Research Foundation's Ethics and Science Review Committee. The socio-economic data obtained from the irrigated areas show that both men and women are involved in agricultural activities and the high risk periods include those times when farmers are weeding, guarding mature crops against primate invasion and harvesting. This study also reveals perceptions of the local communities on the causes and relative incidences of infectious diseases. Entomological surveys that were conducted in the dry season revealed that adult floodwater *Aedes* mosquitoes *Aedes (Ae) mcintoshii* and *Ae sudanensis* were prevalent in the irrigated areas but not in the non-irrigated areas. Subjects were screened at the time of sampling for malaria using a rapid diagnostic kit and the results obtained showed that irrigated areas had a slightly higher prevalence of malaria than non-irrigated areas. Blood samples are currently being screened for the other diseases using ELISA kits but so far, findings that have been generated suggest that irrigated areas experience a higher risk of mosquito-borne infections than the non-irrigated ones. There is need therefore to incorporate disease control measures in irrigation

C3.3: Social participation in the construction of research activities for entomological monitoring with two indigenous communities: an Ecohealth experience in Colombia

Catalina González-Uribe, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Colombia; Angelica Maria Torres, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Natalia Gomez-Melendro, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Laura Castro-Díaz, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Andres Felipe Santo Domingo Jacome, Ecosalud ETV Colombia; Aura Isabel-Sotélo, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Sofia Díaz-Salcedo, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá

Introduction Social participation is a cornerstone of Ecohealth research. Therefore, it is necessary to strengthen participation tools and empowerment mechanisms as part of the research process when working with local communities. This study aims to describe the importance of an intercultural dialogue with the Barí of Karikachaboquira, and the Wayúu in Marbacella and El Horno, which allowed the co-construction of research activities for entomological monitoring. **Methodology** A transdisciplinary team designed a strategy to involve the community on the reconnaissance, search and collection of Malaria, Chagas' disease, and Leishmaniasis vector insects. We produced a booklet and entomological kit for each indigenous community. Socialization of both tools took place through theoretical-practical workshops on the reconnaissance and capture of adult forms and larval stages of vector insects. We used participatory and knowledge to action methodologies such as spider web, group summary tables, focus groups and plays to represent the vector-borne diseases with community members and technicians of the Departmental Secretariat of Health. Each participant received an entomological kit to carry out vector insect surveillance. **Results** By providing experiential training for the community, the relationship between the community and the fieldwork team strengthened allowing open communication about vectors and illness information. The participation of members of the Barí community in developing an insectarium for the reconnaissance of triatomines species motivated occasional captures of these insects by the community and contributed to the creation of a novel route to deliver the caught insects from the community health center to the departmental public health laboratory (213 km). **Conclusions** Applied intercultural knowledge translated into action allowed the community to lead vector surveillance, participate in research activities, and collaborate with public health officials at the local level. These results provide valuable information about empowering mechanisms in the context of an Ecohealth intervention with indigenous communities.

C3.4: Strategies To Achieve Participation Based On Ecohealth Approach Active Community Participation For The Design And Elaboration Of An Intervention To Improve Aedes Aegypti

Tatiana García-Betancourt, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Colombia; Catalina González-Uribe, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Juliana Quintero, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá

Introduction: Participation is an important Ecohealth core principle. Engagement process with the community and with stakeholders is a key element to increase the benefits of the intervention. The aim of "Ecobiosocial approach for the design and implementation of a sustainable strategy for dengue vector control in Girardot" was to implement an innovative community based intervention. Therefore, seeking for community participation is essential; strategies were implemented to achieve this principle. **Methods:** A cluster randomized trial study was conducted in order to evaluate the effectiveness of an intervention using long lasting insecticide treated curtains on windows and water containers in Girardot, Colombia. The materials and the containers were selected based on a previous diagnostic phase. **Results:** Active community participation was achieved performing several activities. First, identification of key actors as local leaders and intervention clusters residents through dialogue with the community. Second, workshops were conducted to create several designs for the water container

covers and identify materials, advantages and disadvantages of the intervention. Third, local companies were selected to elaborate the measures. The project involved ten seamstresses to elaborate the curtains and two aluminum frame local companies for the water container covers. These activities strengthen the bonds with the community and facilitated the acceptance of the intervention by the local residents. Taking into account the social cohesion and cultural dynamics of the population is important to create strategies adapted to the context. Conclusion: The strategies mentioned enhance community participation, achieving satisfaction and acceptability to the curtains and water containers covers by the locals.

C4 - Socio-ecological systems

C4.1: Identifying indicators to represent ecosystem-health relationships in the Credit River watershed

Martin Bunch, York University, Canada; Karen Morrison, University of Guelph; Tatiana Koveshnikova, Credit Valley Conservation Authority, Mike Puddister, Credit Valley Conservation Authority; Alexandra Belaskie, York University; Julie Mallette, York University; Mitch Harrow Iftekar Ahmed, York University

The importance of ecosystem services to human well-being, and of management of water and other watershed resources in maintaining such services, is not commonly understood by the general public, and not well-enough articulated by environmental management and governance organizations. Beneficiaries of such services are often unaware of the nature of their dependence upon supporting ecosystems. This is particularly true in urbanized watersheds, to the point where researchers discuss “nature deficit disorder” as an aspect of this disconnection. Watershed management organizations are aware of such benefits to watershed residents, but they very rarely track and report measures of human well-being to demonstrate the efficacy of their work. This paper reports the process undertaken in a collaboration of ecohealth researchers and Credit Valley Conservation in Southern Ontario to identify meaningful indicators to represent relationships among watersheds, ecosystem services and human well-being. This work has included the development and administration of household surveys (at both broad watershed and local neighbourhood scales), focus groups with watershed residents and the incorporation of demographic, social and environmental data. A set of Ecohealth indicators identified and developed in this project are incorporated into a web-GIS focused on the Credit River watershed for dissemination and evaluation of efficacy.

C4.2: Understanding and evaluating an ecosystem to improve human health: the case of the Yitenga watershed in Burkina Faso

Samuel Yonkeu, Université Aube Nouvelle, Burkina Faso; Joseph Wethe, Water and Sanitation for Africa; Lydie Yiougo, CEFREPADE, Evariste Dapola Da, Université de Ouagadougou; Tibi Didier Zoungrana, Université Aube Nouvelle; Zakari Bouraima, Water and Sanitation for Africa; Philippe Compaore, IRD

This presentation synthesizes an IDRC funded research project in Burkina Faso which took place from 2002 to 2010 in the context of the EcoHealth programme. The Yitenga watershed, 140 km east of the capital city Ouagadougou, is part of the province of Kouritenga. It belongs to the soudano-Sahelian part of the country with a long and rigorous dry season. It can be characterized by three particularly important ecosystemic components ie: the Yitenga dam, the city of Pouytenga, upstream of the dam, and series of villages/fields spread throughout the ecosystem. The interrelations between the physical, socio-cultural, economic and legal factors in this ecosystem has induce and maintain a loss of the integrity of this watershed which has in turn contaminate vital resources, increase the risks of water related diseases in general and diarrhea in particular. Various practices and behaviors of the communities explain the main factors of exposition to these diseases that increase the risk

of morbidity and mortality especially among children under five. An ecosystemic and interdisciplinary (ecology, sociology, geomatics, chemistry, epidemiology, communication) approach was used to analyze and evaluate these factors with the collaboration of the population living in or using the resources of the ecosystem. The mutual comprehension of the interrelations between the deterioration of the environment and the risks related to diarrhea diseases has led the researchers and the local actors to formulate different solutions to reduce the occurrence of these diseases. Some of these potential solutions have led to pilot projects in six of the villages. Other solutions will require further research before they can be implemented. Notably an ecological economics approach will be used to analyze the socio-economic dimension of the environment/health relation in the region.

C4.3: Social-ecological system and diarrheal morbidity in Nouakchott (Mauritania): from health inequalities to eco-health approach necessity

Ibrahima Sy, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Côte d'Ivoire; Doulo Traoré, Université Cheikh Anta Diop de Dakar (UCAD); Brama Kone, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Moussa Keita, Université de Nouakchott (UN); Bassirou Bonfoh, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire; Gueladio Cisse, Swiss Tropical and Public Health Institute; Marcel Tanner, Swiss Tropical and Public Health Institute

Water, sanitation and ecosystem which interact through social practices generate a social-ecological system influencing propagation of diarrhoeal diseases considered as major public health problem, particularly in precarious areas of the Sahelian cities like Nouakchott (Mauritania). However, access to appropriate expertise to manage such health risks requires use of integrated and cross-sectional approaches. To assess the impact of social-ecological system on the spread of diarrheal diseases, it has been developed a geographical approach putting in perspective socio-environmental data with epidemiological information from 5103 households surveyed with geo-referencing system in April 2012. A model of geo-spatial overlay technique was applied to determine the environmental factors that govern the transmission of diarrheal diseases. Globally, the results show the increasing complexity of risks health disparities. Mean diarrhoeal morbidity evaluated at 25% varies significantly from 10% to 40% depending on the neighborhood. The highest prevalence were registered in the densest populated urban areas concentrating at the same time most of unimproved water sources (over 60%) and inadequate sanitation (over 30%) illustrating that environmental factors are the main vector of transmission of this disease. Paradoxically to the conditions favorable to diseases emergence, the use of modern healthcare remains low. Altogether, 42.7% of people affected by a diarrhoea episode have been using a treatment whose 78.3% from a public healthcare or private healthcare and 21.7% used others therapeutic itineraries. Thus, by integrating environmental and epidemiological variables in a geo-statistical and mapping model, we conclude that the distribution of health risks due to diarrhoeal diseases is mainly associated with sources of water supply and sanitation. These results require the development of an eco-health approach to propose better management of precarious urban ecosystems to contribute improving well-being and health of urban populations.

C4.4: Why proposed adaptations to climate change health impacts from a large scale participatory action research project in the Paraguay basin were not translated into actions?

Pierre Girard, UFMT / CPP, Brazil

During four years, from 2008 to 2012, the Sinergia project gathered hundreds of participants to discuss the impacts of actual climate variability and future climate change in the Paraguay River basin and elaborate adaptation measures to cope with these impacts. Sinergia was co-designed and co-executed by its participants following principles of participatory action research. The Paraguay basin is a large area (~1 million km²) embracing parts of Argentina, Bolivia, Brazil and Paraguay. All workshops included actors from these four

countries coming from academia, government, private sector and civil society. The two first workshops were dedicated to set the objectives of the project and to delineate its working themes: agribusiness; biodiversity and forest; water resources and energy; health and cities. The next 3 workshops consisted in sharing the experience and knowledge of the participants (scientific or not) to discuss the actual and predicted climate impacts in each theme for each country, assess the vulnerabilities and elaborate a suite of adaptation measures that would lessen these impacts. Within the “health and cities” theme, the adaptation measures included some straight forward, low cost actions to diminish climate impacts, such as expansion of primary health care services and improved effectiveness in combating vector populations of endemic diseases (dengue etc.), amongst others. However, these adaptation strategies were not taken up neither by the local/regional governments and the civil society. Why was this the case? Apart from difficulties with project management over time as well as the geographic scale versus project budget issue, the main identified problems related to low actor commitment, which in turn is linked to a poor communication/facilitation strategy. Based on this analysis a set of measures is suggested to avoid these pitfalls as well as to suggest how the suggested adaptation strategies could be converted into concrete actions.

C5 - Onehealth and Ecohealth

C5.1: Surprise an organizing concept for an emerging infectious disease research strategy

Craig Stephen, Centre for Coastal Health, Canada

We report on a sub-project of work being undertaken to develop a strategy for using multi-stakeholder, systems-based, collaborative (MSC) research to address emerging infectious diseases (EIDs) in Asia. Given that the clinical and socio-economic impacts of EIDs do not exceed those of endemic infections or other public health threats (with the exception of HIV/AIDS), there must be another factor that is motivating international attention to EIDs. A major driver of concern over EID is not only their possibility of harm but also the problems we have in predicting those possibilities with sufficient precision to assure decision makers and the public that the risk is under control. Despite the wealth of knowledge, sophisticated surveillance and international health intelligence, EIDs have caught us by surprise. Given that knowledge of human-animal-environment systems tend to be incomplete and ambiguous, and surprise is an inherent part of complex dynamic system, there should be no surprise that we are surprised. Surprises have been the most influential event of any era and are the inevitable result of interactions between humans and their environment but, the focus on control and predictability in EID research and management has led to an ignorance about surprise. In this presentation, we draw on ‘surprise science’ from business and environment research to identify how a surprised-focus helps to identify research needs, particularly where MSC approaches may be most useful. We adopt typologies of surprise to differentiate surprising hazards versus surprising consequences and routine surprises from previously unthinkable events. This typology may help planners ‘stage’ an EID and thus differentiate the needs for disciplinary versus One health versus Ecohealth or other MSC approaches for research or action.

C5.2: Assessment of intersectoral partnerships for operationalizing ‘One Health’ approaches for zoonoses prevention and control

Syed Abbas, Public Health Foundation of India, India; Mannish Kakkar, Public Health Foundation of India

Zoonoses can be addressed through regular and ongoing interactions between the animal and human health sectors. However, limited clarity exists among international and national agencies about the possible contours and mechanics of such intersectoral partnership mechanisms. We assessed the existing capacities in animal and

human health sectors across four states in India for zoonoses prevention and control. We also assessed their officers' perceptions regarding ongoing and proposed intersectoral coordination mechanisms. We adapted the WHO IHR assessment and the OIE PVS evaluation tools to assess existing capacities. Conceptual frameworks around integration and One-Health informed development of interview guides for serving programme officers. We interviewed twenty-nine human and animal health program managers across the four states in a span of three months and shared the findings in a national policy consultation. We found varying capacity for zoonoses prevention and control in both sectors in all four states. In general, the presence of trained manpower was seen to be a good predictor for the level of preparedness in each state. The public health sector was found to be better equipped and with a deeper coverage than the veterinary public health sector of the same state. Institutionalized preparedness and response mechanisms for avian influenza were present in all the states. We also found instances of reactive coordination convened around outbreaks of leptospirosis and rabies. There was limited awareness about the importance of other zoonoses, especially among the public health officers. In addition, most stakeholders expressed a felt need for a neutral convening agency that could facilitate development of coordination mechanisms at the sub national level. We feel that given the suboptimal capacity in zoonoses at the subnational level in India, limited ongoing engagement of the human and animal health sectors is desirable and achievable. Evidence generation and scientific advocacy is an urgent priority.

C5.3: Sustainability and challenges of an Ecohealth Approaches for the Management of zoonosis in Yunnan province, China

Wengui Lee, Yunnan Agricultural University, China; Fred Unger, International Livestock Research Institute; Guorong Yang, Yunnan Academy of Grassland and Animal Science, Xiangdong Yang, Yunnan Institute of Endemic Disease Control and Prevention; Shibiao Yang, Yunnan Animal Science and Veterinary Institute; Jeffrey Gilbert, International Livestock Research Institute

Control and prevention of zoonosis is a complex process, requiring vets, public health, farmers, authorities and sociologists to work together. Regardless of ongoing control efforts, many zoonoses like Avian Influenza and Brucellosis are of continued importance in China as in other countries of Asia. The implementation of an Ecohealth (EH) project in the Yunnan Province of China led by the International Livestock Research Institute (ILRI) which emphasized on transdisciplinary collaboration between relevant stakeholders has been proved to be feasible to contribute to the control of Brucellosis and Toxoplasmosis. Several challenges have been addressed successfully. Build transdisciplinary relations between participating institution and the limited EH capacity of partners was overcome through multiple leaders and champions who collaborate on key tasks, ensuring that each separate unit builds commitment and buy-in to the overall transdisciplinary mission. Essential for the collaboration between involved partners was the identification of a mutual agreed research topic. Crucial was also the support by local authorities, like Agriculture Department and Health Department of Yunnan Province in this study. Another ongoing challenge is to ensure the sustainability of the EH approach after ending of this project to manage also other zoonosis in a top-down administrative environment as common practice in China. This is planned to be addressed by launching of teaching courses at Universities to introduce EH to Veterinary Public Health master's students, adding modules on zoonoses in the ongoing health education, and write EH related research topics into the guidance of annual projects to ensure EH research projects get funding, thus continuing EH related research in the absence of direct external funding.

C5.4: Integration of quantitative and qualitative research methods: observations from multi-country EcoHealth studies

Silvia Alonso, International Livestock Research Institute, Kenya; Fred Unger, International Livestock Research Institute; Rainer Asse, International Livestock Research Institute, Korapin Tohtubtiang, Independent M&E

consultant; Delia Grace, International Livestock Research Institute; Jeffrey Gilbert, International Livestock Research Institute

Now more than ever scientists, international organizations and donors throughout the world are acknowledging the added value of bringing closer the social and natural sciences. In practice, researchers and their projects are asked to combine qualitative studies and quantitative investigations. The EcoHealth approach could facilitate a process in which these complementary methodologies are merged together within a research project in a constructive manner. As part of a recently completed IDRC-supported EcoHealth project in the Southeast Asia region, multidisciplinary teams in 6 countries embarked in a venture to design, implement and transform into policy messages a research question looking at problems at the animal-human interface. A number of the studies combined a qualitative component, with focus group discussions aimed at capturing socio-economic aspects linked to disease transmission, and a more quantitative investigation, involving biological sampling and testing and risk factors statistical analysis. Team members, with predominantly unidisciplinary expertise, were introduced to, and required to participate in, the implementation of both types of research methods. We will present the results of a posteriori assessment of the degree of integration of the information obtained from both research approaches. To inform the assessment, a review of the literature on mixed methods will be summarized, with an emphasis on the different approaches that have been used in different research areas. Using relevant case studies from the above mentioned EcoHealth project, we will discuss to what extent the projects have successfully integrated the results from both research methods and what are the main challenges encountered by the teams in the process. Lastly we will discuss the extent to which each research method can complement and/or add value to the other in the context of research at the animal-human interface, and the spin off effects on capacity development for One Health work.

C6 - Environmental contamination and health systems

C6.1: An ecosystem analysis of antimicrobial resistance: promoting a new social and health justice paradigm in a Canadian-Ecuadorean collaboration

Bjorn Stime, University of British Columbia -Global Health Research Program, Canada; Annalee Yassi, Global Health Research Program - UBC; Jaime Breilh, Universidad Andina Simón Bolívar - Área de Salud, Jerry Spiegel, Liu Institute for Global Issues & School for Population and Public Health

Growing urgency to adequately address antibiotic resistance trends challenges us to pursue thorough strategies that involve interdisciplinary collaboration and broad stakeholder engagement, rather than addressing it as only a health services issue. In the context of Ecuador, our team has used an ecosystem approach to comprehensively describe the problem and engage stakeholders in multi-level action. In order to know where and how to target interventions, it is important to understand the social pathways of determination of the problem, linking resistant clinical infections back to the driving forces from which unhealthy conditions result, within a renewed social justice and public health paradigm. This study aims to fully understand the processes involved in antimicrobial resistance in Ecuadorian population groups: economic inequity; commodification of health resources; multiple environmental antibiotic contamination; cultural conceptions both in communities and academic settings; diagnostic limitations and uncertainty; and barriers to appropriate use, all the way to identification of structural root determination. Understanding this complex scenario is crucial to developing a sustainable containment and prevention strategy. The study utilized data collected through community consultations, an international multidisciplinary workshop, data gathering through local partnerships, and workshops with community health promoters. This was carried out in an adaptive emergent design,

continuously incorporating community feedback to modify the intervention approach. The Driving forces-Pressures-States-Exposures-Effects-Actions (DPSEEA) conceptual framework was used to guide and organize the qualitative findings. There are deep structural roots to the problem of antibiotic resistance, requiring actions to be taken at all levels of the generating pathways to adequately address antibiotic resistance at a national scale. In particular, this study should direct our attention toward understanding how greater accountability and cooperation can be obtained from the pharmaceutical and food animal industries and how to incorporate sound, evaluable means of intercultural participatory health prevention and promotion.

C6.2: Ecohealth implications of mixing prescription drugs with toxic heavy metals – an epidemiological analysis of NHANES

Mark Bradley, McGill University, Canada; Maia Siedlikowski, McGill University; Sung Kyun Park, University of Michigan, Niladri Basu, McGill University

Prescription drug use is prevalent and increasing in the developed world, and abuse of prescription drugs is a worldwide concern. While prescription drugs are intended to improve health, we are now realizing that a myriad of unintended health consequences may occur, from cellular through ecosystem levels. One potential unintended consequence, which we believe has yet to be studied, is the effects of prescription drug use on the metabolism and hazard of other more common environmental contaminants such as toxic heavy metals. Here, the objective was to understand if human pharmaceutical use can affect biomarkers of several toxic heavy metals (total blood mercury [Hg], total blood lead [Pb], and total blood cadmium [Cd]). This was achieved by analyzing prescription drug use and environmental contaminant biomarker data from the National Health and Nutrition Examination Survey (NHANES) (n=7133). Individuals taking anti-infective agents had 20-54% lower Hg, 14-42% lower Pb, and 19-30% lower Cd than those taking a variety of other prescription drug types. Within the anti-infective category, it was notable that cephalosporins and tetracyclines had an opposite relationship for Hg and Pb; cephalosporins were associated with lower Hg than tetracyclines, while tetracyclines were associated with lower Pb than cephalosporins. In summary, anti-infective users had lower blood Hg, Pb, and Cd than users of other prescription drugs, and different anti-infective drugs can be associated with different metal biomarkers. Prescription drug use may thus have differing effects on metal contaminant biomarkers, possibly reflecting microbiome- or metabolism-mediated individual variation in exposure. Since prescription drugs are ubiquitous in humans, wildlife, and environmental media, exposures may result in unintended ecohealth consequences by affecting exposures to other contaminants, such as toxic heavy metals.

C6.3: A Hospital Based Study for the Evaluation of Haze Effect on Urban Children Health Status in a Beginning Heavily Polluted City in China

Jie Zhou, Wuhan University, China; Xiaodong Tan, Wuhan University; Zhen Sun, Center for Disease Prevention and Control of Hongshan District, Haiyan Shao, Wuhan University; Meng Chen, Wuhan University; Yudong Qian, Wuhan University; Jian Chen, Wuhan University

Background: Wuhan locates in the middle area of China with more than ten million populations including one million 2-12 years old children population. Haze is the principal pollutant of atmospheric pollution in the world and happened more frequently since the middle of 2012 in Wuhan. Objective: To explore the health effects of haze and related air pollutants (PM2.5, PM10, SO2 and NO2) on the hospital visits of urban children for respiratory and other related diseases in a beginning heavily polluted area. Methods: The daily outpatients data of highly sensitive group (children aged 2-12 years), the meteorological data and the air pollution data were collected in Wuhan city in 2013. The time-series analysis was used, controlling for the potential confounding factors. Results: In 2013, 17 serious haze pollution events (total 162 days) have been reported and used for this study according to API (air pollution index) levels. During these haze pollution events, the study results showed

that there was a positive correlation between the haze level and the amount of children outpatients ($r=0.278$, $P=0.000$). The amount of daily children outpatients was increasing with the duration extended of the atmospheric haze. A hysteresis has also been found. However, with the decrease of time interval between the haze pollution events, the hysteresis for the children outpatients graduated disappeared (from 4 to 0 days). In addition, the air pollutants (PM_{2.5}, PM₁₀, SO₂ and NO₂) showed some positive correlation with numbers of the children who became outpatients. Conclusion: The results of this research indicated that the current level of haze pollution had seriously developed harmful effects on the sensitive group (children) in a beginning polluted city. It is critical for the government to adopt effective measures to control haze pollution and to avoid possible exposure of both children and whole people to the haze.

C6.4: Endotoxin and glucan related to PM₁₀ associated with respiratory and allergic symptoms in populations living near a landfill in the state of Morelos, Mexico

Maria Alejandra Terrazas Meraz, Universidad Autonoma Del Estado De Morelos, Mexico; Irma Aurora Rosas Pérez, Universidad Nacional Autónoma de México; Héctor Manuel Lamadrid Figueroa, Instituto Nacional de Salud Pública, Margarita Sánchez Arias, Instituto Nacional de Salud Pública; Rosario Guevara-Santillán, Instituto Nacional de Salud Pública; René Santos Luna, Instituto Nacional de Salud Pública; Horacio Riojas Rodriguez, National Institute of Public Health

Solid waste management is an environmental and public health concern that needs to be studied under a multidisciplinary perspective. Landfill air contain endotoxin and (1-3)-D-glucan because of waste management generate bioaerosols, and they can reach out to populations. Evaluate the relationship between PM₁₀ concentrations and its content of endotoxin and glucan, with the incidence of respiratory and allergies symptoms in populations who live near the landfill "La Perseverancia" in Cuautla, Morelos, Mexico. Methods Longitudinal study was conducted to measure the incidence of self-reported health outcomes of people who live nearest a landfill, supported by a domiciliary interview-questionnaire. Small particulate matter (PM₁₀) was collected using miniVol samplers with Teflon filters. Samplers were installed in 5 towns on the roof of a house. Content of endotoxins and glucan were determined with Pyros Kinetix Flex and Pyros EQS software, using Limulus Amebocyte Lysate (LAL) tests with purified extract of *E. coli* and GlucateLL Kit for the respective detection. Results The risk and respiratory symptoms questionnaire was collected from 56 males and 148 women in a fixed cohort. They were followed in average 1.6 (1 to 4) times during June to November 2012. Symptoms were evaluated with a binomial negative regression for longitudinal data because the distribution of variables, resulting an increased respiratory symptoms risk for people who live in downwind towns (RR 1.67, $p < 0.05$). Endotoxin concentration (EU/m³) increase respiratory and allergic symptoms (RR 1.16, $p < 0.05$ RR 1.18, $p < 0.01$ respectively). Glucan concentration increase respiratory symptoms risk (RR 1.51, $p < 0.05$). Both models were adjusted by zone of study, endotoxin concentration, the interaction between past two, glucan concentration in ng/m³, age, smoking habit and gender. Conclusions Pollutants generated in landfill increase health effects in population who live around 2 Km, specially downwind. Endotoxin is associated with incidence of self-reported symptoms.

C7 - Health and environment

C7.1: Floods, faeces & fishes: Managing island watersheds for sustainability and public health outcomes

Aaron Jenkins, Edith Cowan University/Wildlife Conservation Society, Fiji

Outbreaks of waterborne diseases are often seasonally associated with increased periods of rainfall and drought. In several Pacific island countries, including Fiji and Samoa, flooding events following cyclones and prolonged rainfall have been linked to outbreaks of waterborne bacterial disease (e.g. typhoid, leptospirosis, shigellosis), resulting in costly disaster response measures. Regional and local scale climate variability and the decreased ecological resilience of drainage basins interact to increase the frequency and intensity of extreme floods and droughts, contributing to disease emergence. Agency responses have been largely reactive, with little attention to basin scale preventative measures or attempt to evaluate downstream impacts on the ecosystem services (e.g. food fish security) on which Pacific islanders depend for their livelihoods and well being. Drawing on experience, literature and my preliminary research results, I discuss a transdisciplinary research framework for watershed health designed to understand the relationships between river basin modification and human health in the Pacific Island context. Within this research framework I investigate the hypothesis that typhoid re-emergence and decline in diversity of food fishes in Fiji have the same determinants, namely alterations to catchment land cover that result in increased flooding, sedimentation and associated pollution to waterways and the nearshore environment.

C7.2: Applying an ecohealth perspective in a State of the Environment report at a local Public Health Unit

Steven Lam, University of Guelph, Canada; Alanna Leffley, Grey Bruce Health Unit; Bob Hart, Grey Bruce Health Unit, Andrew Barton, Grey Bruce Health Unit; Donald C Cole, DLSPH, University of Toronto

Context: Like many regional public health units, Grey Bruce's practice in environmental health has traditionally involved ensuring safe water and food, infection control, and assessing and providing information on health hazards. Increasing awareness of the broader role of changing ecosystems and communities with multiple stakeholders has led practitioners to consider more explicit ecohealth approaches appropriate in a region with a UN Biosphere reserve.. Objective: To incorporate ecohealth perspective into a State of the Environment report for Grey Bruce Health Unit (GBHU). Methods/Implementation: Team includes GBHU the epidemiologist and environmental health practitioners, along with regional Ministry of the Environment and other relevant stakeholders. We aimed for comprehensiveness, including: standard media categories (air, water, land); ecosystem assessment topics (e.g., river systems, forests, and biodiversity); OneHealth assessments indicators (e.g., of animal and vector populations); Great Lakes sustainability surveillance indicators (e.g., swimability, fishability) and active transportation/leisure opportunities with their health implications., We organized indicators as threats , assets, states, exposures and responses, as per the WHO DPSEEA framework. Challenges/Results: Data availability for the potential range of indicators and ambiguities in evidence pose challenges. For example, wind turbines may impact the visual landscape and cause distress, but documented human biological health effects are scarce. Time scale of threats such as climate change and long term nuclear waste storage pose uncertainties. Keeping the project manageable and relevant to GBHU and stakeholders has been hard, particularly in relation to directions out of the report's findings. Implications/Learnings: Despite interest of public health practitioners in ecohealth approaches, applying such approaches is a complex undertaking, one for which most health units are not resourced (not in accountability agreements with funding provincial authorities). Ecohealth approaches can gain legitimacy within broader healthy community partnerships.

C7.3: Libreville Declaration on Health and Environment, five year after: Ecohealth as a potential spearhead for its rapid and successful implementation

Brama Kone, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Côte d'Ivoire; Amadou Mbaye, Santé Plus; Magaran Bagayoko, Département de Santé Publique et de l'Environnement, Bureau Afrique de l'OMS, Lucien Manga, Département de Santé Publique et de l'Environnement, Bureau Afrique de l'OMS

By 2015, many African countries will not reach their commitment on Millennium Development Goals, mainly for Water, Sanitation and Health. Five years after the adoption of the Libreville Declaration (LD) on Health and Environment in Africa, adopted in 2008, a set of four assessments have been made to assess what has been achieved at the national level in each country and at the regional level for Sub-Saharan Africa. A Country self-assessment, two external evaluations on the process and on inter-sectorial projects implemented and an internal self-evaluation by WHO and UNEP through their joint task force for the coordination of the implementation of LD were made. These evaluations revealed that in the African region, the challenges for the sectors of health and environment continue to be the access to drinking water, sanitation problems, soil and air pollution, vector control, management of chemicals, food security, children's and women's health. These factors are exacerbated by the negative effects of climate change, unplanned urbanization, rapid and uncontrolled population growth and rural exodus. Regarding the LD implementation process, only 34 of the 52 countries have completed their Situation Analysis and Needs Assessment (SANA) and 12 have developed their National Plan of Joint Action Health- Environment (NPJA). The main challenges to the implementation are among others (1) the absence of a permanent institutional framework for implementation, (2) the absence of a formal framework for the mobilization of resources for joint actions, (3) the low level of commitment from the highest authorities of some countries and (4) the low level of expertise in environmental health and epidemiology at some countries level. In view of these results, Ecohealth methodology can be a spearhead for the implementation of the LD, based on its' potentials for system thinking, transdisciplinarity, communication between stakeholders and for research to action.

C7.4: Monitoring the Grand Bassam déclaration on Ecohealth in Africa

Bassirou Bonfoh, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Côte d'Ivoire; Yao Adou, Université Félix Houphouët-Boigny; Brama Koné, University Pelefero Gon Coulibaly/ CSRS, Nicolas A. Brou, Université Félix Houphouët-Boigny; Inza Koné, Félix Houphouët-Boigny University / Centre Suisse de Recherches Scientifiques en Côte d'Ivoire

Over the past decade, Africa has experienced substantial economic growth with an observed impact on the ecosystem, whilst communities continue to suffer from emerging and re-emerging diseases at the human-animal-environment interface. In such a context, innovation is needed in order to reduce the disease burden and enable sustainable development. During the first African Regional Conference of the International Association on Ecology and Health, and the second African research meeting on Ecosystem Approaches and Human Health "Africa 2013" held in Grand Bassam, Côte d'Ivoire, a declaration was made by the conference participants to draw attention to the contribution of the Ecohealth concept to building comprehensive health systems in Africa. The conference argued that a sustainable development process must consider the ecological and social aspects of development together with the institutional and individual capacity building needed to promote behavioural change and social equity. The participants have designated Ecohealth and One Health as methodological innovations essential for the achievement of a sustainable health system. These innovations require a new generation of researchers, practitioners and decision makers with expertise in inter- and transdisciplinary approaches. Consultations have begun with most of the universities in Africa, as well as with other influential decision makers and the institutional body responsible for higher education and research evaluation in Africa, Cames (Conseil Africain et Malgache de l'Enseignement Supérieur). We provide here some outputs and outcomes

of these discussions and develop further strategies for monitoring and evaluating the process towards an African Community of Practice of Echohealth and One Health.

C8 - Contaminants in context

C8.1: Moving beyond the cubicles : A glimpse at the potential contribution of public administration to Ecohealth perspectives, using a Canadian conversation on toxics risk management

Geneviève Nadeau, University of Ottawa, Canada

A focus of this conference is on how the development of integrated and innovative knowledge and practices at the interface of ecosystems and human health calls for the articulation of diverse, substantive perspectives. Amongst potential voices, the field of public administration has a significant potential for contributing substantively to these conversations, as well as for connecting otherwise fragmented perspectives (e.g. STS, political science, environmental sciences, etc.). Yet, it has been only little involved or called upon so far. The objective of this paper is therefore to propose how, beyond its sole management theories, public administration can contribute to shape a more substantive, critical and integrative understanding of decision-making dynamics at the very interface of environment, health and policies, that transcend the typical evocation of catchphrases such as public policies, governance arrangements and multi-stakeholders involvement. Using as an example the case study of a federal program of risk management of environment- and health-toxic substances, we will propose an overview of a few key-concepts (expertise, administrative discretion, etc.) and discuss their implication for Ecohealth as a field, as well as open the discussion on how this type of insight can be better bridged with other disciplinary lenses on ecology and health in order to achieve organizational and public policy patterns that are more responsive to current and emerging challenges.

C8.2: Health and environmental impacts of transboundary movement of e-waste to developing countries

Christian Gideon, Faculty of Law, University of Ottawa, Canada; Goodness Ifeoma Mgbowula, Nigerian Red Cross Society

The quest for sustainable development has always involved the complex task of reconciling the need for socio-economic development with public health and environmental protection. This challenge has often emerged in the trade and environment debate but has most recently been evident in international trade in used electrical and electronic equipment (UEEE). While international trade in UEEE provides means for socio-economic development in the developing world, it also serves as a conduit for transboundary dumping of electronic waste or e-waste in the region. Management of e-waste presents a complex health and environmental challenge in both developed and developing countries. If not disposed properly, e-waste could constitute a public health and environmental hazard. This issue is more alarming in developing countries that lack the capacity and resources to effectively deal with the problem. In addition, developing countries are characterized by the absence of effective legal framework for regulating the transboundary flow of e-waste into their region. In the absence of this framework, developing countries have become a typical haven for global e-waste. This presentation is based on field research in two developing countries – Nigeria and Ghana. The research investigates the socio-economic factors that drive the transboundary movement of e-waste into these countries as well as the health and environmental impacts arising from unsustainable e-waste management in both countries. The field research includes interviews and field visits to e-waste dismantling and dumpsites including the Agbogbloshie dumpsite in Ghana which was recently noted by the Blacksmith Institute as the world's most polluted place (Blacksmith Institute, 2013). Having identified the major loophole in the existing international legal framework as the

primary factor responsible for e-waste dumping in the developing world, the research goes further to propose policy measures to deal with the health and environmental impacts of transboundary movement of e-waste to developing countries.

C8.3: Arsenic in Paracatu: environmental and epidemiological assessment, political contextualization and risk communication strategies

Zuleica Castilhos, CETEM, Brazil; Eduardo Mello De Capitani, State University of Campinas, School of Medicine; Iracina Maura de Jesus, Evandro Chagas Institute, Kleber Raimundo Freitas Faial, Evandro Chagas Institute; Lillian Irene Dias da Silva, CETEM- Center for Mineral Technology; Silvia Egler, Centre for Mineral Technology; Edison Bidone, Fluminense Federal University, Department of Environmental Geochemistry

When it comes to perform an environmental contamination assessment and epidemiological study, a multidisciplinary research team is essential, covering as many issues as possible. However, much more than putting together recognized experts from many fields, this sort of research needs a priceless integrative technical discussion framework, where creativity can emerge to solve unusual problems from specific situations. The objective of this work is to share the methodological bases and practice applied during an arsenic (As) environmental and epidemiological assessment study due to a potential environmental exposure from an open pit gold mine operating in Paracatu, MG, Brazil. The researchers' team has taken into consideration distinct aspects to elaborate a conceptual model, starting from the arsenic toxicological and geochemical fundamentals, the social economic and political contextualization as local population's health vulnerability to diseases, and financial and educational concerns. Several steps were undertaken, including As measurement in environmental matrices (soils, sediments, freshwater, groundwater, drinking water and atmospheric particulate material) and studies to better understand the mobility/retention and ecological significance of As levels quantified. A descriptive epidemiological study to assess the human exposure was carried out. Two subpopulations were assessed regarding hair, urine and blood arsenic concentrations. Cancer mortality and dermatological morbidity were evaluated, as well as the social economics and life quality indicators. Additionally, this study applied the methodology of social network analysis as a strategy to communicate with the local population to explain the hypothesis and results of this research. Acknowledgments: The study was supported by a special grant from Paracatu's Health Department. The authors also thanks all the students, the CNPq and CAPES scientific agencies, and Paracatu's Health Department staff for their support; special thanks to the all the people from local communities that accepted to participate in this research.

C8.4: Nurturing an Acquiescence to Toxification: The role of the state in New Zealand's Painted Apple Moth urban pesticide campaign

Manuel Vallee, Department of Sociology, University of Auckland, New Zealand

Over the last two decades numerous nations (including New Zealand, Australia, Canada, and the United States) have authorized large-scale pesticide spraying campaigns over densely-populated residential neighbourhoods, in order to eradicate insects of foreign origin. Like traditional agricultural spraying, the residential spraying campaigns are aimed at pests that threaten parts of the agricultural sector. Unlike traditional agriculture campaigns, however, the residential campaigns take place over densely-populated areas, thereby placing far more humans in harm's way. In trying to account for the emergence of this new social phenomenon I draw on the concepts of several authors, including John Bellamy Foster's (1999) "technological displacement of nature", Stella Capek's (2009) "naturework", Ton Bührs' (1989) "state vandalism"; Michael Bell's (2004) work on "economic utilitarianism", and Edward Woodhouse and Jeff Howard's (2009) "acquiescence to toxification". To deepen the analysis I also focus on New Zealand's Paint-Apple Moth spraying campaign, which took place between 2002 and 2004, and consisted of bi-weekly sprayings over 12,000 hectares of Auckland's densely-

populated residential land, leading the New Zealand Minister of Biosecurity to characterize the program as one of unprecedented worldwide scale. In the end, the spraying campaign exposed more than 193,000 Aucklanders to the pesticides, resulting in more than 22,000 calls to the government about health problems. On the face of it, the pursuit of residential-area spraying programs appears to be a ramping up of capitalist logic, which places business interests over the citizens health and well-being. However, this presentation will focus on the New Zealand government's role, elucidating how it nurtured the general public's "acquiescence to toxification". Beyond shedding light on the New Zealand case, this analysis shines important light on the way governments are manipulating publics to acquiesce to campaigns that increase everyday toxification, while also revealing how publics could resist them.

C9 - Community and ecosystem health

C9.1: Linking Agriculture and Health: A cross-sectoral approach to measure and improve community and ecosystem health in Southern Ethiopia

Tobias Lunt, University of Wisconsin - Madison, United States; Heidi Busse, University of Wisconsin-Madison, Surgery; Mariama Fofonah, International Potato Center, Wellington Jogo, International Potato Center; Steffen Schulz, International Potato Center; Rebecca Schwei, University of Wisconsin-Madison, Medicine

Agriculture and health influence each other in many ways. How a society produces, distributes, consumes, and disposes of food impacts the health of individuals and whole communities, and can either enhance or impede environmental, economic, and social well-being and food security. Moreover, food security is essential for robust local and regional economies, political stability, effective education, and a resilient environment. Consequently, measuring food security and understanding its influencing factors are important tasks for stakeholders across a variety of important sectors. This presentation will summarize the prevalence of household food insecurity among 5 woredas (zones) from the Southern Nations, Nationalities and Peoples Region (SNNPR) of Ethiopia, and evaluate the potential predictive factors specific to this region. Since 2012, the International Potato Center (CIP) has worked with stakeholders from agriculture, nutrition and health in the SNNPR to improve nutrition and food security for smallholder farmers and their households by improving the production and consumption of potato and orange-fleshed sweet potato (OFSP) as part of nutritious, diversified diets. Data were taken from baseline surveys conducted in 150 SNNPR households. The surveys were conducted in April-May 2013 with heads of households by trained Ethiopian enumerators. Survey data were analyzed to assess what variables may predict food insecurity. Ten predictive factors were compared against responses from mild and severe food insecure households to assess their ability to serve as accurate and significant variables. Consistent with extant literature, wealth indicators and education strongly predict food security levels, while other traditionally important variables such as family size and technical assistance did not have statistically significant association. Understanding predictive associations, and consideration of cross-sectoral relationships, can inform the design of integrated agriculture and health programs and policies – a necessary component of simultaneously strengthening community health and agricultural outcomes, while concurrently protecting environmental resources.

C9.2: Planning for environmental health and social well-being in the Credit River Watershed

Julie Mallette, York University, Canada; Alexandra Belaskie, York University; Martin Bunch, York University; Karen Morrison, University of Guelph; Tatiana Koveshnikova, Credit Valley Conservation Authority; Mike Puddister, Credit Valley Conservation Authority

A healthy watershed is made of thriving communities, both human and non-human. Vibrant, lively neighbourhoods depend on a resilient natural environment, and in turn, the protection of green space and natural features relies on caring, close-knit neighbourhoods. Urban and regional planners play a key role as agents of human welfare and aim at sustaining both healthy people and healthy places (Webber, 1963; Lucy, 1994). Conservation Authorities, important actors in regional planning in Ontario, also understand that conserving and restoring natural areas and features contributes to the social well-being of residents and aim to make this relationship apparent to the general public. This research aims to identify indicators of human well-being that connect to watershed ecosystem services and to illustrate this relationship. It will explore the ways in which the quality and quantity of natural features affect social well-being at a local scale. It will show how various forms of green infrastructure benefit different aspects of social well-being described as social cohesion, sense of place and sense of safety. This study will be informed by a survey and focus group administered in two neighbourhoods of the Credit River Watershed in Southern Ontario, which runs from the Town of Orangeville to the City of Mississauga before draining into Lake Ontario. Biophysical indicators will be analyzed along with gathered social well-being values to explore their relationships. Results from the survey will contribute to a greater understanding of the household and neighbourhood attributes that correspond to varying states of vegetation health and distribution. It will also inform future planning and management strategies on the effects of specific types of vegetation cover on a neighbourhood's social well-being. The knowledge gained will ultimately be shared through an educational interactive web-distributed mapping tool that residents can contribute to and explore.

C9.3: Evaluating Participating Epidemiology: application in a developed, urban setting

Jane Parmley, Public Health Agency of Canada, Canada; Karen Morrison, University of Guelph; Shannon Harding, University of Guelph, Sharon Zhang, University of Guelph; Jeffrey Mariner, International Livestock Research Institute

Participatory epidemiology (PE) is a relatively new innovative methodology that applies both conventional epidemiological concepts and participatory methods that empower stakeholders to identify and solve their own health issues. It is of particular interest to the ecohealth community, given its emphasis on context, participation, transdisciplinarity and research-to-action. The PE approach is flexible and qualitative and has mainly been applied in rural/remote communities, particularly in the developing world. However, the tools and skills can be extended and applied to fit an urban setting. To pilot PE methods in an urban setting we conducted a PE training workshop, including a hands-on training component, in May 2013 at the Ontario Veterinary College (Guelph, Canada). Our training goals were to explain the principles of PE and to develop and apply PE techniques in the field. Most participants indicated that their knowledge of PE improved and that they were more aware of the strengths of the approach and felt more confident using PE tools and techniques. Eighty-five percent (11/13) of participants indicated that their learning expectations were met and 100% (13/13) of participants felt the workshop was successful, should be offered again and that they intend to use PE methods in their future research or surveillance. Suggestions from participants for future trainings included making a full semester course so participants could be more involved in setting up the field study and to spend more time on qualitative data analysis. Through the pilot workshop, PE was shown to be a promising methodology to guide ecohealth studies in both rural and urban settings.

C9.4: Reporting trends for event-based EcoHealth data

Carla Tilchin, EcoHealth Alliance, United States; Nicholas Preston, EcoHealth Alliance

Event-based reports are proving invaluable to digital EcoHealth researchers for applying epidemiological intelligence to early diagnosis, spatiotemporal analysis, prediction, and surveillance. As the concept of EcoHealth

expands, and computational approaches are integrated into predictive disease models, there is increased demand for high-resolution, structured reporting. We present insights from a multi-year literature review of historic disease events (The Sicki Project) and propose guidelines for comprehensive event reporting drawn from our observations on the quality and quantity of EcoHealth data. This overview will discuss the barriers to curating this knowledge, including access to information, incomplete reporting, terminology, regional biases, language, and formats. Ultimately, we address the implications of these barriers to automated approaches to data collection and curation, in the context of emerging technologies.

D8 - Climate change and public health

D8.1: Public health in transition: Ecohealth competencies for public health adaptation to climate change

Chris Buse, University of Toronto, Canada

Climate change adaptation is an emerging field of public health practice in Ontario, Canada. Accordingly, practitioners are drawing from diverse disciplines to inform the evolution of this field and develop new competencies to address the emerging health impacts of climate change. This study draws from in-depth interviews with a representative sample of 20 public health professionals from 36 of Ontario's regional health units. Interviews explored the notion of 'field creation' and the practical 'doing' of climate change adaptation work. Many interviewees commented on the failings of individual risk-based communication methods associated with identifying so-called 'climate-vulnerable' populations, highlighting the perceived requirement for new sets of public health competencies suited to a more upstream engagement with climate change. Other public health professionals went further by employing key concepts associated with EcoHealth research and practice to give a language to some of their actions and operationalize aptitudes necessary for protecting and promoting human health in a changing climate. This presentation explores those competencies by discussing the challenges associated with the expansion of this new field of practice in Ontario. It concludes by providing a high-level exploration of public health competencies capable of simultaneously addressing complex social and environmental challenges and their associated impacts on human health and wellness.

D8.2: Mental well-being and sense of place for Australian farmers in a period of rapid climate change

Neville Ellis, Murdoch University, Australia

Anthropogenic global warming and attendant climate change is a serious threat to global agriculture. Beyond issues of degrading agricultural land and global food security, climate change may also constitute a mental health risk to farming populations living within climate change-affected home environments. Previous research has shown extreme weather events, such as drought, have the potential to undermine the mental and wellbeing of Australian farmers. However, such studies tend to underrepresent the intrinsic values attached to place by local populations and focus within their research metrics on clinical and measurable aspects of mental health and wellbeing. Informed by an understanding that an endemic sense of place- the emotional and psychological relationships people develop with the natural and built elements of their immediate and historical material surroundings- is a powerful predictor of human health and wellbeing, this research provides a socio-ecological examination of the interconnections between global warming, regional climate change, and environmental degradation in the investigation of farmers' sense of place and mental wellbeing. Utilising a qualitative case-study approach, a small number of farmers from a community in the climate-changed Western Australian wheatbelt were researched throughout the 2013-14 agricultural season. Qualitative data was derived from the thematic analysis of a three-part semi-structured interview series conducted with farmers at critical times

during the agricultural season in conjunction with other qualitative research strategies (i.e. key informant interviews, photography, and media analysis). The findings suggest that farmers form complex emotional and psychological relationships with their farm properties which, when subject to climate-driven environmental degradation, become threatened and elicit forms of place-based distress (e.g. solastalgia). This case study provides a novel understanding of Australian farmers' mental health and contributes to an emerging international discourse on the place-specific mental health threats posed by a changing climate.

D8.3: Climate Change and Mental Health: A Nunatsiavut Regional Perspective

Ashlee Cunsolo Willox, Cape Breton University, Canada; Inez Shiwak, Rigolet Inuit Community Government; Marilyn Baikie, Rigolet Inuit Community government ; Michele Wood, Nunatsiavut Department of Health & Social Development; Charlotte Wolfrey, Rigolet Inuit Community Government

Anthropogenic climate change and the associated changes in weather, temperature, snow, and ice are causing increasing disruptions to the lives, livelihoods, and health and well-being of Inuit across Canada. Emerging evidence indicates that climate change and associated environmental degradation are also causing impacts to mental health. These climate-sensitive mental health impacts are expected to be widespread, cumulative, and unequally distributed. Recognizing this, the five Inuit Community Governments of Nunatsiavut, Labrador, Canada conducted a regional study on the impacts of climate change on mental health. This research followed a community-based and community-led participatory framework, premised on EcoHealth approaches. Data were gathered through 120 in-depth interviews conducted by local research coordinators and 18 digital stories created by Inuit in the region. Participants reported that changes in climate and environment, and the resulting disruption to land activities, were a threat to mental health and well-being, and led to: intense emotional reactions associated with loss of activities, identity, and sense of place (grief, mourning, anxiety, stress, distress); real and potential increases in consumption of drugs and alcohol; potential increases in suicide ideation; and potential to aggravate acute anxiety disorders and major depression. Climate change was also reported to act as a magnifier for other forms of stress and distress and to highlight socio-economic inequalities, leading to further negative ramifications for mental health and well-being. These findings contribute to the emerging research on climate change and mental health in the North and globally, and provide a regional perspective and baseline of potential pathways through which climate change may continue to impact on mental health and well-being. This presentation will discuss the results from this study, screen a digital story highlighting the mental health impacts of climate change in the region, and discuss potential health adaptation strategies.

D8.4: Local and global changes in the transmission of rabies in the Canadian Arctic: what are the consequences for Inuit health?

Audrey Simon, Université de Montréal, Canada; Catherine Bouchard, Université de Montréal; Denise Bélanger, Université de Montréal, Patrick A. Leighton, Université de Montréal

Rabies persists throughout the circumpolar Arctic and infections pose an ongoing threat to the health of Inuit people. The Arctic fox (*Vulpes lagopus*) is the primary reservoir for rabies in the Arctic, and rabid foxes may attack and infect domestic dogs, which in turn may bite and infect people. Each year in the communities of the Canadian Arctic, cases of dog aggression result in expensive interventions to prevent possible rabies. Little is known about the epidemiology of rabies in the Arctic fox and, more specifically, how dog and human exposure may be affected by rapid anthropogenic changes occurring in this region due to rapid resource development and climate warming. In this context, a mathematical modeling approach can be useful to understand the complex dynamics of rabies risk exposure at the interface between wildlife, domestic animals and Inuit communities. In this study, we apply a model of the dynamics of rabies in the Arctic fox population of northern Canada in order to: 1) identify factors underlying the transmission of rabies in Arctic foxes, and increasing the risk exposure of

dogs and humans in Arctic communities, 2) identify how these factors may be affected by anthropogenic changes (climate changes and northern development) occurring in Arctic ecosystems, and 3) explore how the context of Inuit communities can have an influence on the transmission of rabies at the community scale.

D8.5: Exploring Water Insecurity and Health Risks in the Southern Inuit Community of Black Tickle, Labrador, Canada

Maura Hanrahan, Grenfell Campus of Memorial University, Canada; Atanu Sarkar, Memorial University; Amy Hudson, Memorial University

Introduction Water insecurity in Northern Indigenous communities in Canada is a complex and perennial problem. Yet, there are very few studies on the ecological perspectives of water insecurity and potential health risks. Contributing factors to the scarcity of academic discourse include the extreme remoteness of these communities and the cultural gaps between Indigenous peoples and the academy. The study aimed to understand the multiple dimensions, health risks, and coping strategies of long-term water insecurity in the Southern Inuit community of Black Tickle-Domino, Labrador, where there is no household running water system and people rely on a sometimes-functioning public -water source and community wells. **Methods** We conducted an exploratory study on water quality, access, uses, preferences, and cultural interpretations and analyzed potential health implications. We used qualitative and quantitative methods, including participants' observation, focus groups, survey, and water testing in both warm and cold weather conditions. **Results** The treated public-water was too expensive for the majority of the community to use on regular basis, thus perpetuating the reliance on untreated wells. For cultural reasons, these wells are shared or communal, not privately owned but none of these sources are protected and monitored. In winter and spring, some water sources get buried under heavy snow; further reduce household options for water access. Some water samples had E-coli, confirming animal/human activities. The high cost of bottled water compels the households to purchase cheaper high-sugar containing drinks, negatively impacting food security and community health. There were past records of outbreaks of water-borne illnesses. **Conclusion** Water insecurity in remote and neglected Indigenous communities, such as Black Tickle-Domino, pose ongoing major health risks. There is an urgent need for sustainable strategy to improve water quality and quantity in these communities. In the next phase, we will work with engineers and the community to identify possible solutions.

D8.6: Facing climate change in rural Nicaragua by evaluating and building water resource resilience

Tim Takaro, Simon Fraser University, Canada; Edwin Ojeda, National Polytechnical Institute; David Flanders, Consortium for Advanced Land-use Planning, UBC, Caitlyn Peake, Green Empowerment; Lindsay Galway, Simon Fraser University; Alan Bolt, Centro de Entendimiento con la Naturaleza

Ecosystems in the tropics are undergoing rapid and profound change. Extreme weather events are now occurring in increasing intensity and batter many countries from this zone, contributing to significant vulnerabilities in watersheds. Many communities have their drinking water and energy sources threatened from such events. Access to energy and clean drinking water is an important determinant of health, but the affected communities often have limited resources with which to increase their water resource resilience. Combined pressures from drought, flood and landslide, as well as population increases, development, unsustainable agriculture and poverty can be measured, estimated and planned for. Additionally, regional projections of climate change are improving and planners can begin to consider these projections along with these other ecosystem pressures. Local capacity and tools are needed to monitor threats to watersheds and to prioritize the sparse available resources for restoration, protection and adaptation. The mountain watersheds of Nicaragua face these challenges while mini-hydropower and drinking water projects are proliferating in this zone. We show it is possible to build capacity for the use of watershed adaptive management tools in such a setting. Beginning in

2012 we have been training rural development workers in the Cua-Bocay region of Nicaragua to use GIS tools to map vulnerabilities in the watersheds that serve their communities with drinking water and power. Fifteen workers have received a one week training course in GIS software and GPS integration, and five have received two trainings. The project is ongoing. This presentation will describe the context of water resource dependence in the central mountains of Nicaragua and the experience of the researchers in building local capacity in GIS. The tools are being deployed to describe baseline conditions related to watershed vulnerability and gastro-intestinal illness, to assist in priority setting for building resilience.

D9 - Exposure to contaminants

D9.1: Identification of environmental sources of lead exposure in Nunavut (Canada) using stable isotopes analyses

Myriam Fillion, Université d'Ottawa, Canada; Jules M. Blais, University of Ottawa; Emmanuel Yumvihoze, University of Ottawa, Maya Nakajima, Department of Health, Government of Nunavut; Peter Workman, Department of Health, Government of Nunavut; Geraldine Osborne, Department of Health, Government of Nunavut; Laurie H.M. Chan, University of Ottawa

Background: Blood lead levels (BLL) were investigated in the adult Inuit population of Nunavut, Northern Canada, during the Inuit Health Survey (IHS) in 2007-2008. Approximately 10% of the participants had BLL over the Health Canada's guidance of 100 µg/L. Objectives: 1) To repeat the measurement of BLL among the IHS participants with elevated BLL and household members including pregnant women and children under 10 years of age; 2) to measure lead (Pb) concentrations in environmental samples to identify potential sources and 3) to explore how Pb from environmental samples contribute to BLL using Pb stable isotopes analyses. Methods: Blood samples were collected from 100 adults and 56 children in 2012. Environmental samples (N=172; tap water, house dust, paint, country food, soil, and ammunition) were collected from 14 houses from three communities. Total Pb concentrations and Pb isotope mass balance were determined by inductively coupled plasma-mass spectrometry (ICP-MS). Isotopic signatures of blood and environmental samples were compared using lead isotope ratio (LIR) and discriminant analyses of the relative isotopic compositions of the samples. Results: The geometric mean of BLL was 43.1 µg/L; BLL increased with age and was higher in adults than children (71.1 vs. 17.5 µg/L, p

D9.2: Investigating bioaccessibility and bioavailability of methylmercury from fish and seafood commonly consumed in North America

Maia Siedlikowski, McGill University, Canada; Mark Bradley, McGill University; Niladri Basu, McGill University

More than 1 billion people worldwide rely on fish and seafood as their main protein source. However, fish also contain the toxic chemical mercury (Hg) in its methylated form (MeHg). Mercury is a global contaminant of concern and concentrations are increasing in many regions. Methylmercury's ability to bioaccumulate and biomagnify through the food web renders it particularly harmful. Balancing the risks and benefits of fish and seafood consumption is a challenge. Scientific experts and decision makers agree there is tremendous inter-individual variation in exposure and vulnerability to MeHg and this hampers risk assessment. Here we aim to increase understanding of inter-individual variation in Hg exposure by focusing on the bioaccessibility and bioavailability of MeHg from commonly consumed fish and seafood in North America. To achieve this, bioaccessibility and bioavailability of MeHg will be determined from commonly consumed fish using an established in vitro digestion method. It is hypothesized that bioaccessibility and bioavailability of MeHg will

depend on the type of fish digested. To date, steps have been taken to assess the bioaccessibility of MeHg from 10 different fish species (n>20 per species) with in vitro digestion method that has been modified from the physiologically-based extraction test (PBET). Next we will assess MeHg uptake by intestinal Caco-2 cells to measure bioavailability. The resulting data from this work will be coupled to an existing epidemiological study we run to better improve our ability to link dietary exposure assessment and MeHg biomarkers, and ultimately assess risk. The work here, using an interdisciplinary approach, is expected to advance our understanding of this inter-individual variation, and ultimately translate to better public health guidelines concerning fish and seafood consumption. In addition, given recent global support of the UN Minamata Convention, there is a need to develop new research tools to effectively manage this contaminant.

D9.3: Monitoring Mercury Exposure in Children of two Riparian Communities in the Madeira River – Brazilian Amazon Basin

Claudia Vega, Pontificia Universidade Catolica de Rio de Janeiro, Brazil; Sandra Hacon, Fundação Instituto Oswaldo Cruz; Dennys Mourao, Oswaldo Cruz Foundation, Gabriela Potazio, Fundação Instituto Oswaldo Cruz; Paulo Barrocas, Fundação Instituto Oswaldo Cruz; Jose Marcus Godoy, Pontificia Universidade Catolica do Rio de Janeiro

The scenario of human mercury exposure in the Brazilian Amazon has changed as gold extraction has diminished and a decrease in human hair mercury concentrations in the last decade has been observed. The present work is part of a program of Health Impact Assessment in riparian communities located in an area that will be under indirect impact of a hydroelectric plant. Hair and blood were collected as biomarker of Hg exposure in children in 2011 from two communities downstream the reservoir. The Cuniã Lake RESEX is a remote area without history of gold extraction located 180 Km from Porto Velho city, at the left margin of the Madeira river. Fish represents their main protein source and the Belmonte community located 10kms from Porto Velho, at the right margin of the Madeira River with a high frequency of fish consumption however their diet is often complemented with food coming from the city. An interview administered questionnaire was answered by the parents of the children to study health history and diet habits, Se levels were also studied and correlated with Hg levels. It was observed that Cuniã Lake RESEX presented higher average levels of Hg in hair (Cuniã: 6,7µg/g; Belmonte: 2,7µg/g). and blood collected during the dry season (Cuniã: 0,27µg/g; Belmonte: 0,12µg/g) that could be explained by the higher frequency of fish consumption of the RESEX. These results represent the Hg levels of both communities before flooding the reservoir, of hydroelectric plant in 2012 and will be used as a baseline for future studies of Hg load in order to study how anthropic activities, such as the construction of hydroelectric plants, may be affecting the Hg levels in the ecosystem and as a consequence Hg exposure for these communities.

D9.4: Challenges of identifying proper biomarkers for manganese exposure from well water in children

Céline Surette, Université de Moncton, Canada; Delphine Foucher, Université de Moncton; Maryse Bouchard, Université de Montréal

Recent studies conducted in Quebec provided the first epidemiologic evidence suggesting that exposure to manganese in water at levels commonly encountered in Canada could be neurotoxic for children. The identification and validation of exposure biomarkers is fundamental to human toxicology and risk assessment, as valid biomarkers integrate all sources of exposure and provide an estimate of the body burden. Therefore, biomarker validation represents an important emerging issue for environmental health in Canada, and we believe it deserves more attention to better characterize environmental contamination with the associated human health risks. However, there is currently no consensus on the best biomarker of exposure for manganese. We are thus leading a research to examine this question with a study among age-school children living in New

Brunswick and exposed to a gradient of manganese levels in their drinking water. Our main objective is to examine the association between exposure to manganese from drinking water and concentration of manganese in hair, saliva and toenails of children, and use this for risk assessment. In this presentation, we will discuss the challenges of identifying and validating biomarkers for different types of exposures in human population and the complexity inherent to epidemiological studies. Challenges we encountered are sampling protocol issues, external contaminations issues, difference within the biomarkers in time-weighted exposure to the contaminant, adequation of biomarker with calculated intake and observed effects. Scale issues (individual vs population), gender issues and age issues will also be discussed. By identifying and addressing these challenges to biomarkers validation, we aim to improve risk assessment for the presence of manganese in drinking water. In particular, improved characterization of biomarkers of exposure to manganese and associated adverse health effects are key-information to elucidate the link between contaminants present in the ecosystem and human health.

D9.5: Association between blood lead level and neurodevelopmental status in children in four lakeshore villages in Santa Rosa City, Laguna, Philippines

Lynn Crisanta Panganiban, Department of Pharmacology and Toxicology, College of Medicine, University of the Philippines Manila, Philippines; Amiel Nazer Bermudez, Health Futures Foundation, Inc.

Lead exposure poses significant adverse effects on human health because of heavy environmental contamination, and its long half-life. This paper attempts to determine the association of blood lead levels (BLL) with neurodevelopmental status in children. Data were analyzed from a cross-sectional study involving 100 children from four lakeshore villages in Santa Rosa City, Laguna, Philippines. Twenty two percent of children had BLL > 5 ug/dL with a mean of 4.56 ± 3.01 ug/dL. Multiple comparisons reveal that mean BLL in children from Sinalhan were highest among the four villages. Using the Wechsler Intelligence Scale for Children-IV, 63.89% of children had scores below average in perceptual reasoning, 72.22% in working memory, and 57.94% in processing speed. The mean IQ scores were lower among children with BLL > 5 ug/dL as compared with children < 5 ug/dL in all domains. Although, a very weak correlation was seen between lead levels and IQ scores, it was observed that children from Sinalhan and Aplaya who had higher mean BLLs were found to have lower IQ scores in both perceptual reasoning and processing speed compared with children from the other two barangays. Among the adverse health effects of lead in children, impairment of intellectual capacity is of utmost importance. Literature has shown that neurobehavioral effects of lead have been observed at levels as low as 2.4 ug/dL such that, at present, no blood lead threshold has been identified in children. Based on these findings, there should be monitoring of children with BLL > 5 ug/dL for target organ toxicities. Likewise, nutritional programs including micronutrient supplementation should be strengthened, along with the establishment of a surveillance and referral system on toxic exposures at the village level.

D9.6: A gender perspective to the analysis of the relations between information sources, interpersonal communication and preventive behaviors to reduce exposure to Arsenic in Paracatu, Brazil

Frédéric Mertens, Centro de Desenvolvimento Sustentável - Universidade de Brasília, Brazil; Renata Távora, Community of Practice in Ecohealth – Latin America and Caribbean (CoPEH-LAC); Marina Alves, Centro de Desenvolvimento Sustentável - Universidade de Brasília, Zuleica Castilhos, CETEM

Integrating gender considerations into research on diffusion of preventive health behaviors to reduce exposure risks to toxic substances is a main goal in ecohealth approaches. To achieve this goal, it is relevant to identify how men and women differently access and exchange information on toxic substances and how these communication processes are related to awareness and preventive health behaviors. The objectives of the present study are: a) to identify the sources of information on Arsenic issues, in a sample of men and women from an urban population at potential risk of Arsenic environmental exposure from natural and large scale gold

mining activities and, b) to analyze possible associations between information sources, awareness on Arsenic issues and preventive behaviors to reduce exposure. Data on information sources, including media and interpersonal communication through social networks, awareness and preventive behaviors, were collected in September 2012, using face-to-face interviews with 166 men and 294 women, in the city of Paracatu, Minas Gerais State, Brazil. Internet, newspapers, television and radio, as well as interpersonal communication are equally used as information sources on Arsenic issues by men and women. The most trusted sources of information were interpersonal communication (91,0%) and Television (70,0%). Interpersonal communication occurs preferentially between same gender individuals. Awareness of both men and women is strongly associated with using Television and interpersonal communication as information source. Interpersonal communication with other women is associated with preventive behaviors to reduce exposure risks for both genders. In contrast, interpersonal communication with other men is associated with a lower probability of preventive behaviors for men. Finally, we discuss the contribution of the study to the development of innovative approaches to integrate a gender perspective environmental health and ecohealth projects and to the strengthening of the linkages between research and actions to benefit health, ecosystems and society.

E9 - Community resilience

E9.1: From the Ground Up: Locating Land-Use Change and Community Health within an Environmental Justice Framework

Angela Day, University of Toronto, Canada

In Mexico, as in other countries across the globe, Indigenous populations are facing threats to their traditional territories for resource extraction and large-scale agriculture. These acute land-use changes have resulted in the contamination of traditional territories, a decrease in community-based agriculture, and threats to food security, significantly impacting Traditional Knowledge associated with the environment, agriculture, food, and healing. This presentation will outline the strengths and challenges of using an environmental justice framework to research the various health impacts of land-use transformation in Tuxpan, Jalisco, Mexico, as experienced by the Nahuas Indigenous population. While the environmental justice frame originated in the United States in relation to the siting of toxic industries near low-income, racialized communities, it has since rapidly transferred contexts, and expanded in scope to include various environment and health relationships at multiple scales. The environmental justice frame can contribute to environmental health research in multiple ways, particularly by linking empirical health data to structures of systemic injustice in specific contexts, thereby extending understandings of health (and ill-health) in diverse contexts, and at multiple scales. Through this lens, acute health problems are situated in relation to environmental, social, and economic systems, and informed by the Nahuas people's Traditional Knowledge and historic relationships with the local land-base. Situating health research in this way creates space for community members to contribute to broader conceptions of the environment and health dialectic. Ultimately, applying the environmental justice frame in such a context introduces novel conceptual and material approaches to improving ecological and community health.

E9.2: Eco-food education in Quebec: exploring the landscape

Nayla Naoufal, Research center in environmental and ecocitizenship education, Canada; Lucie Sauvé, Centre de recherche en éducation et formation relatives à l'environnement et à l'écocitoyenneté; Eva Auzou, Centre de recherche en éducation et formation relatives à l'environnement et à l'écocitoyenneté

Conducted by the Canada Research Chair in Environmental Education of the University of Québec in Montréal from 2006 to 2011, our collaborative research program aimed at identifying and examining the theoretical backgrounds and practices of eco-food education in contexts of community education or popular education in Quebec. Weaved at the intersection of the fields of environment, food, health and education, eco-food education is a process promoting individual and collective adoption of a healthy diet (diversified and safe), based on food produced, distributed and consumed while respecting ecological processes and social equity. In 2013, an important part of our research results was published by Éditions Écosociétés (Presses de l'Université du Québec) : "For an eco-food education: 10 inspiring stories", edited by Lucie Sauvé, Nayla Naoufal and Eva Auzou. This book presents and discusses an interesting diversity of eco-food educational initiatives developed in non-formal contexts. In this presentation, after a brief examination of the context, the objectives and the methodology of the research program (funded by the Social Sciences and Humanities Research Council of Canada), we will highlight the main observations that come out of our 10 case studies (or « stories »), that allow us to confirm and complete the results of the whole research process.

E9.3: Building Resilience One Community at a Time: the Emergence of the Transition Movement in Canada; Report from a National Study

Blake Poland, Dalla Lana School of Public Health, University of Toronto, Canada; Chris Buse, University of Toronto; Rebecca Hasdell, Dalla Lana School of Public Health, University of Toronto, Rivka Kushner, Dalla Lana School of Public Health, University of Toronto; Randy Haluza-Delay, Sociology, The King's University College; Lenore Newman, University of the Fraser Valley; Paul Antze, Health & Society Program, Faculty of Arts, York University

Originating in England in 2004, and spreading around the world, including over 80 municipalities across Canada, the Transition movement seeks to build community resilience in the face of emerging threats (to health equity) as part of a larger social movement for relocalization, decarbonization, degrowth, and community-building. Our SSHRC-funded national study seeks to document and account for the emergence of the Transition Town movement in Canada, attending especially to conditions that favour or limit its development; and to derive lessons learned and implications for practice. We take a practice theory approach that emphasizes how movements create alternative spaces for social learning about sustainable living rooted in place. Mixed-methods include document analysis, interviews with movement leaders, surveys of movement participants, and interactive regional workshops. The research process is oriented toward dialogical action research that critically engages with, learns from, facilitates the story-telling of, and seeks to contribute to the TT movement. We will present results from surveys and interviews, exploring how the movement is taking root, key challenges and how they are being overcome, and how the movement is reaching out to and working with others. Implications for public health will be highlighted. The Transition movement is on the leading edge in integrating issues of ecology, social inclusion, resilience, community-building, degrowth, health/well-being, and energy transition. Like many movements, it struggles with issues of diversity, leadership, volunteer recruitment and retention, internal conflict, and balancing analysis with action. Social movements are key drivers of social change, challenging cultural norms around patriarchy, racism, and environmental stewardship. As we enter a period of unprecedented change and upheaval, understanding how such movements emerge, take root, and forge partnerships can inform how public health works with movement leaders in addressing determinants of health, recognizing the importance of community collaboration/partnerships for building health at the local level.

E9.4: Small scale integrated agriculture and water public health in Vietnam

David C. Hall, University of Calgary, Canada; Quynh Ba Le, University of Calgary; Jeff Davidson, University of Prince Edward Island

The objective of our research is to examine the relation between water public health, small scale integrated farming, and mitigation of emerging infectious diseases in Vietnam. Data for this cross-sectional study came from 600 farms in north and south Vietnam (Thai Binh and An Giang provinces) and was collected using questionnaires, semi-structured interviews, and water testing conducted (E. coli, turbidity, and pH). The typical profile of our participants was a 45 year old married individual with two children, low income (c. \$1200 p.a.), seven years education, nine years farming experience, currently raising fish, poultry, often a few pigs or cattle, and some cropping activity (typically rice). Most participants had basic awareness of avian influenza prevention of transmission to humans, but very limited knowledge of water-borne bacterial pathogens such as E. coli. Respondents were predominantly male (71%). More than 90% of participants claimed they boiled and/or filtered their water used for drinking (rain or well water). Water samples were collected from participants' wells or rain water cisterns and analyzed in government laboratories using WHO standardized methods. Water test results revealed that more than 80% of samples contained unacceptable levels of E. coli (10 to several thousand cfu's). The WHO standard ranges from 0 to 5 depending on expected usage. Using probit analysis, we also examined association of demographic variables with E. coli levels in drinking water. Significant variables included age, presence of and number of livestock on farm, history of vaccinating poultry against H5N1, and declared interest in public health training. We conclude that levels of E. coli in respondents' drinking water is unacceptably high, that they have a basic understanding of public health concepts, but are not using preventive practices to mitigate waterborne emerging infectious disease. Increased awareness of water public health and livestock waste management is recommended.

E9.5: Sustainability of Ecohealth interventions in an urban farming site in Benin

Hervé Lawin, Department of Public Health, University of Abomey Calavi, Benin; Elisabeth Pazou, Laboratoire de recherche en biologie appliquée, University of Abomey calavi; Andre Soton, Centre Régional pour le développement et la santé, Benjamin Fayomi, Département de Santé Publique, University of Abomey Calavi

Rationale EcoHealth interventions by promoting a better understanding of the determinants of ecosystem lead to improve human health. Many studies showed the occurrence of health and environment improvement with Ecohealth interventions. But what is the sustainability of the gains when these interventions ended Methods A longitudinal study on the same farmers reported the starting situation (T0), the achievements after three years of interventions based on EcoHealth approach (T1) and 5 years after the end of the interventions (T2) on an urban farming site in Benin. The interventions consisted of activities to promote health, to establish sanitation structures, to promote the use of compost and the establishment of an organizational framework and sound financial management. The results showed that interventions in health promotion and sanitation facilities on the site led to a sustainable improvement of health indicators for the urban farmers including anemia (T0:19,4% Vs T1:11,1% Vs T2:5,6%), cough (T0:11,1% Vs T1:13,9% Vs T2:2,8%) and digestive infections (T0:22,2% Vs T1:2,8% Vs T2:2,8%). The proper functioning of the sanitation facilities was supported by the established organizational framework. The use of biological pesticides contributed in organophosphate pesticides poisoning reduction. The red blood cells acetylcholinesterase (RBC Ache) increased a lot at T1 (+8,8+/-0,0U/g d'Hb) and decreased a little at T2 (-0,8+/-0,0U/g d'Hb). At T2 the RBC Ache didn't differ from the controls (p=0,06). But the keeping of the account of financial results was not observed by the urban farmers and the use of compost has been kept down because of financial constraints. Conclusion The gains of the EcoHealth interventions were mostly kept 5 years after the end of the interventions. Behaviors that were unusual in the general community like bookkeeping of monthly financial results were difficult to maintain.

E9.6: Farming in the city: how to collect, analyse and communicate ecosystem, social and human health impacts of urban agriculture?

Josephine Archbold, Toronto Public Health, Canada; Kate Mulligan, Toronto Public Health; Jessica Wegener, Ryerson University, Wally Seccombe, Black Creek Community Farm; Donald C Cole, DLSPH, EkoSanté

Context: In Toronto, urban agriculture occurs at many scales, ranging from backyard growing to full-scale, community-based urban farms. This practice both influences and is influenced by shifts in the policy landscape e.g. the municipal Toronto Agricultural Plan (2013) and the provincial Local Food Act (2013). A key site is the Black Creek Community Farm (BCCF), located on Toronto Regional Conservation Authority land and serving an urban area with low income, high unemployment, low food security and a high proportion of recent immigrants. Objective: To develop a framework for multi-faceted (ecosystem, health and societal) assessment of farm, micro-watershed, and neighbourhood impacts of community-based urban agriculture. Methods/Implementation: Establishment of a governance structure for the multi-year, multi-partner research initiative. Mixed methods action research including: development of a screening health impact assessment framework and ranking of indicators; on farm documentation of sustainable practices and monitoring of visitors and production; off farm (mall) surveys of awareness of the farm and support of urban agriculture; compilation of watershed and neighbourhood data; key informant (KI) interviews with decision makers from multiple sectors and jurisdictional levels. Challenges/Results: A number of the existing indicators are not disaggregated sufficiently or frequent enough to serve our purposes, meaning we will have to raise additional funds for direct measurement. On farm documentation is one among many tasks which BCCF staff undertake, along with important community involvements. Mall surveys indicate that about 1/3 of neighbourhood residents contacted are aware of the farm in the first growing season. Preliminary findings of KI interviews indicated widespread support for the project with the majority expressing strong interest in using the results in their future work. Implications/Learnings: Urban agriculture is a timely example of a potentially equity- and sustainability-promoting population health intervention. We think our multifaceted approach has potential to inform design and demonstrate impacts.

F6 - Contaminants in context

F6.1: A Global Ecohealth Approach for Nanotechnology in Food and Personal Care Products

Louise Vandelac, UQAM, Canada; Simon Beaudoin, Institut des sciences de l'environnement, UQAM; Aleck Guès-Bergeron, Institut des sciences de l'environnement, UQAM, Manon Berge, Département de sociologie, UQAM

For twenty years, and unbeknownst to the public, the world of « nanos » has proliferated in electronics, aerospace, automotive, medicine, surface coatings, packaging, clothing, personal care products and food. Extremely effective, these nanoparticles (<100 nanometers) cross biological barriers (brain and placenta included) and transfer into living organisms, and the environment. In the current context of the absence of mandatory declaration and labeling, poor public statistical data, lack of scientific assessment, and inadequate regulation and jurisdiction, how can research approaches in regards to global analyses and inter-related actions at different scales be targeted? In order to do this, we have elaborated an ecohealth approach for nanos relying on two research projects (CRSH, Ne3LS), several masters' and a doctoral thesis, within the TITNT and Ne3LS networks, permitting to develop a new narrative showing:

- The heavy dependence of the nanotechnology sector on nanoproduct market performance, the target market for nano-enabled products being 224 times more important (Lux Research) than that of nanomaterials;
- That the main nanosubstances susceptible for ingestion or cutaneous contact, sparking unease in consumers and the public alike, are nanosilver and nanotitanium dioxide in personal care products and foods.

From there:

- An inventory of 563 products claiming nanosilver contents, (more numerous than carbon, zinc, silica, etc.) manufactured by 438 firms (72% from China and South Korea), 38% of which fall into personal care products and food, was completed;
- The porous boundaries between titanium dioxide and nanotitanium dioxide, their strong presence in body care and food, and Quebec's role in the production cycle were examined;
- The health/environmental effects, and the impacts of industrial concentration generated by these nanoproducts, notably on global agrifood systems were analysed;
- The insufficiencies of the risk assessment paradigm for nanos were examined, helping to elaborate public policy alternatives."

F6.2: Can we really save lives, slow global warming and reduce forest loss by changing the way we cook?

Joshua Rosenthal, Fogarty International Center, National Institutes of Health, United States

Efforts by the international development community to change cooking technology in the poorest parts of the world surged, sputtered and nearly died out over the past few decades. These initial programs were largely driven by concerns with deforestation produced by people scavenging woodlands and other habitats for combustible materials. Designing, distributing and convincing people to use stoves that are more efficient, cost-effective, run on available fuels and meet cultural and lifestyle needs in diverse settings turned out to be a bigger challenge than many imagined, and most efforts by development organizations, including the World Bank, were terminated by the mid 1990s. However, epidemiological research over the past decade has highlighted the large and growing burden of disease associated with traditional cooking by almost 3 billion people, and estimates are that this is a contributing risk factor in nearly 4 million deaths annually. The World Health Organization is developing new guidelines for Household Air Pollution, and a Global Alliance for Clean Cookstoves is championing renewed efforts around the world to replace polluting practices with a new generation of cleaner cooking technologies. Recent atmospheric research also indicates that the black carbon produced by poorly combusted materials constitute short term climate pollutants that contribute substantially to global warming. Because of this, climate mitigation activities, such as the Clean Development Mechanism, are beginning to support these renewed efforts around cookstove improvement. This is all good news for health and the environment. However, experiences in Indonesia, Kenya, Mexico, India, Pakistan and elsewhere demonstrate that there remain significant challenges to making clean, efficient, locally-adapted stoves that people will adopt and use in place of the three stone cooking fire. An impressive and growing array of researchers and development professionals from academia, NGOS, government organizations and private companies is emerging to tackle these problems.

F6.3: The definition of haze pollution event and the effects of air pollution on hospital admissions of respiratory illnesses in Wuhan

Haiyan Shao, Wuhan University, China; Xiaodong Tan, Wuhan University; Zhou Jie, Wuhan University, Zhen Sun, Center for Disease Prevention and Control of Hongshan District; Meng Chen, Wuhan University; Jian Chen, Wuhan University; Yudong Qian, Wuhan University

Objective: To define a haze pollution event with the rank of the health damage and to evaluate the acute health effects of outdoor air pollution exposure. Methods: Data for daily air quality, meteorological conditions and hospital admissions of respiratory symptoms collected from January 1st to December 31st, 2013 in Hongshan District of Wuhan. An eco-epidemiology was also applied in this study, categorized by gender, age, season, lag, and disease category. Results: There were 192 haze days in 2013, 41 of which were seriously polluted. Haze day was more common in spring, autumn and winter than summer. According to the classification of air quality index

(AQI) and corresponding effect on population health, a haze pollution event was defined as a period which started when the level of AQI exceeded level three, and ended when the rank was inferior to three. Judging by this standard, 17 haze pollution events were found in 2013 (the longest period contained 31 days and the shortest one was 2 days). The primary pollutant was PM_{2.5} (94.12%), which could reach the maximum index of 414. Pollutants have positive relationships with residents' hospital visits for respiratory complaints. When the PM index hit its peak, the hospital admissions of respiratory diseases grew consistently. After lag time (range from lag0 to lag4), hospital visits reached the highest level and children were more susceptible than others to air pollution. Conclusion: Haze pollution was associated with respiratory diseases, and children were the sensitive population to air pollution. In addition this study still needs further research.

F6.4: Bananas, pesticides and the political ecology of health on Ecuador's southern coast: A modified metanarrative approach to targeting research and interventions in global health

Ben Brisbois, University of British Columbia, Canada

Recent work on globalization and health has generated thoughtful recommendations for global health governance, while Ecohealth research has advanced methodologies for understanding complex environment-health interactions at the local level. It is not obvious, however, where new research efforts should be focused when inter-connected environmental and social pathways link global forces to local health outcomes. I develop and apply an exploratory approach for targeting health action-research projects, focusing on environmental and occupational pesticide exposure in Ecuador's banana-producing El Oro province. I modify a metanarrative synthesis methodology to map knowledge areas relevant to complex, globalized environment-health interactions. The approach is modified in being a) focused on a specific geographic area; b) applied to numerous sub-questions embedded in long causal pathways; and c) supplemented by ethnographic data on knowledge of local stakeholders as well as locally-available literature sources. I first characterize different 'storylines' in relevant knowledge areas. I next synthesize relevant evidence by elaborating on one such storyline – a political ecology of health approach – as it relates to pesticide exposures. Using this approach, pesticide exposures in El Oro emerge as produced by interactions between human biology, labour relations, banana markets, environmental dynamics, and science-policy interfaces. A major dimension is the role of international actors such as social movements, fruit and pesticide companies, and researchers. The results suggest application of rigorous epidemiologic methods in an empowerment-based, participatory process, particularly if accompanied by global-scale knowledge translation efforts and informed by international political economy. In addition, the results provide a road-map that could be used for a more resource-intensive metanarrative synthesis, using the baseline analysis provided here to begin an adaptive action-research process. Finally, I highlight areas in which the metanarrative synthesis methodology could achieve greater reflexivity and effectiveness through application of its methodological toolkit to its own institutional location.

F6.5: Ecohealth in practice: reducing the risk of dioxin exposure at severe dioxin hot spots in Vietnam and factors affecting program's sustainability

Tuyet-Hanh Tran Thi, Hanoi School of Public Health, Vietnam; Anh Vu Le, Vietnam Public Health Association; Michael P Dunne, School of Public Health and Social Work - The Queensland University of Technology, Thomas Tenkate, Ryerson University; Leisa Maree Toms, School of Clinical Sciences and Institute of Biomedical Innovation - The Queensland University of Technology; Ngoc-Bich Nguyen, Vietnam Public Health Association; Fiona Harden, School of Clinical Sciences and Institute of Biomedical Innovation - The Queensland University of Technology

Bien Hoa and Da Nang airbases served as bulk storages and supply facilities for Agent Orange and other herbicides during the Vietnam War and are currently the two most severe dioxin hot spots in Vietnam.

Intervention programs applying some core principles of Ecohealth approach were implemented in the Bien Hoa (2007-2009) and the Da Nang (2009-2011), aimed to reduce the risk of dioxin exposure through foods for local residents. The research team applied system thinking in understanding the health, social, economic, scientific and political aspects of a very complex issue of dioxin/Agent Orange in Vietnam – the remaining ghost of the War. Rich picture was used as a tool to demonstrate the complexity and connections of various factors affecting this issue. Knowledge, attitude and practices of local residents as well as different perspectives of related stakeholders at different levels were considered during the programs' development and implementation. The knowledge on available environmental data on the extremely high levels of dioxin in the environment and foods were used to define intervention areas to reduce the risk of exposure for local residents. The programs involved different related stakeholders and applied several methods to maximise their participation. Three groups of factors potentially affecting program sustainability including: (1) program design and implementation factors; (2) factors within organisational setting; and (3) factors in broader community environment were considered. The interventions were seen as an effective strategy toward reducing the risk of human exposure to dioxin at severe dioxin hot spots in Vietnam. This presentation will describe in detail how some core Ecohealth principles were applied in practice and discuss factors affecting the programs' sustainability based on the results of a comprehensive assessment implemented in 2013 (i.e. at 2½ and five years since the interventions were completed).

F6.6: Advances in the assessment of exposure to toxic metals in children from Aquiles Lanza ghetto-Montevideo, Uruguay

Fiorella Iaquina, University of the Republic, Uruguay; Nelly Mañay, University of the Republic; Adriana Cousillas, University of the Republic

In 2011 a study was performed on blood samples in Aquiles Lanza ghetto's children, which showed high concentrations of lead. Gurises Unidos NGO takes action to support this ghetto working with the families that live there to improve their children's quality of life. Because of this organization's concern for the results obtained in the study mentioned above, the Department of Toxicology poses a project in conjunction with the organization, based on the EcoHealth parameters. The aim of this project was to assess the exposure to lead and other metals of toxicological relevance, such as manganese, arsenic and mercury, being the first time in Uruguay that the manganese was involved in a toxicological study. The biological evaluation was made on children's hair samples, which is challenging for this kind of studies. In this paper we present the progress of this study (based on the EcoHealth parameters from its beginning) as an innovating approach to this kind of environmental health problems in Uruguay. As a part of a master's thesis, the analytical methodologies are being developed in hair matrix. We have also been in contact with Gurises Unidos which works with doctors, social workers and teachers. We are altogether preparing didactic materials to present in workshops. These workshops are organized with a multidisciplinary approach training in order to reduce metals exposure. Once we have developed the analytical methodologies and analyzed every sample we have collected, a comparative study with a control group will be done. The results obtained will be presented to the families in the workshops where we will show the differences and similarities between both populations. We will also give the families some tools in order to improve their children's quality of life.

F7 - Vector-borne diseases

F7.1: Applying a multidisciplinary One Health framework to evaluate yellow fever risk factors at selected municipalities in Southwestern Antioquia, Colombia – pilot project

Paula A. Castaño, Tufts Institute of the Environment, United States; Martha C. Ocampo, Parque Zoológico Santafé; Douglas L. Hatch, RESPOND Project/DAI, Felicia Nutter, Cummings School of Veterinary Medicine at Tufts University; Benjamin Hickler, Routine Immunization and New Vaccines, Health Section, UNICEF; Marco A.B. Almeida, Divisão de Vigilância Ambiental em Saúde, Centro Estadual de Vigilância em Saúde, Secretaria Estadual de Saúde

Yellow fever (YF) is endemic to 30-40% of Colombia's territory, affecting human and nonhuman primate (NHP) health and economically impacting affected human communities. Most studies conducted to date in the country on YF epidemiology have focused on determining the vectors and vertebrate host(s) involved in the disease transmission cycle and the effects on human populations, but little evaluation of the dynamic interaction of these factors at the interface of human, animal and environmental health. Using a multidisciplinary One-Health framework, we examined potential risk factors for YF in human and NHP populations in Southwestern Antioquia. We incorporated ethnographic methodologies coupled with epidemiological tools to assess the possible causal relationship of occupational activities, degree of interaction with NHP, or NHP trade with the risk of exposure to YF virus. Serological testing using ELISA and hemagglutination inhibition in a captive population of howler monkeys did not identify any YF virus-specific IgM and IgG antibody. Occupational activities, degree of interaction, and presence of NHP trade were determined by conducting observations, focus groups, and standardized questionnaires in different communities located within 10km of captive and free-ranging NHP populations. Preliminary analysis of the qualitative data did not identify any NHP trade in the study area. The main occupational activities identified were agriculture (e.g. coffee, cardamom), livestock production, and housekeeping. The degree of interaction with NHPs was associated with the intensity of landscape modification and local knowledge of the value of natural resource conservation. For instance, participants from La Cascada, which has a largely intact landscape, reported the same degree of interaction with NHPs regardless of their occupation, while those from San Francisco, with a heavily modified landscape, reported zero interaction. Further research incorporating mosquito sampling, wild NHP and human serology is required to confirm these preliminary results and any correlation with human exposure to YF.

F7.2: Towards a resource-based habitat approach for spatial modelling of vector-borne disease risks

Sophie Vanwambeke, Université Catholique de Louvain (UCL), Earth and Life Institute, Georges Lemaître Centre for Earth and Climate Research, Belgium; Nienke Hartemink, Utrecht University; Bethan Purse, Centre for Ecology & Hydrology, Marius Gilbert, Université Libre de Bruxelles; Hans Van Dyck, Université catholique de Louvain

Landscape, including land use and land cover composition and structure, are recognized as important drivers for vector-borne disease risk. Since vector-borne pathogens rely on at least one vector and one host species, the occurrence of a disease is linked to areas where habitats of these species overlap functionally. The fact that these areas do not necessarily coincide with specific vegetation types hampers the correct identification of areas at risk. In this paper, we explore the potential of a resource-based habitat concept (RBHC) in identifying 'suitable habitats' for vector-borne pathogens. The resource-based habitat concept has been much used in conservation ecology, but has not been used yet in disease ecology. This concept would offer a framework to systematically study the different resources that are necessary for the completion of the transmission cycle, and link these resources to landscape features and other environmental factors. We show that the RBHC can be adapted to the

multi-species setting of a vector-borne pathogen and illustrate this by applying the concept to bluetongue, a midge-transmitted virus in ruminants. We discuss the usefulness of the concept for vector-borne diseases and we argue that the concept may enable us to study the functional habitats of all the relevant species (vectors as well as hosts), which will give new insight in the spatial and temporal variation in transmission opportunities and the resulting disease risk. Also, it may facilitate communication between modellers and entomologists, help in identifying knowledge gaps and data gaps. Our framework may help act as a bridge between existing bottom-up mechanistic modelling approaches, that do not include landscape factors at all, and top-down satellite image-based approaches that are based on statistical inferences only.

F7.3: Human vulnerability to *Trypanosoma cruzi* vector-borne transmission through social representations and practices in Zoh-Laguna, Calakmul, Mexico

Alba Valdez-Tah, El Colegio de la Frontera Sur, Mexico; Janine Ramsey, Instituto Nacional de Salud Pública; Laura Huicochea Gómez, El Colegio de la Frontera Sur

Introduction: Vector-borne transmission of *Trypanosoma cruzi* (VBTTc) to humans depends upon multiple factors across a landscape ecosystem use and modification, the biology and ecology of the infected triatomine species, characteristics of dwellings as human nests for the vector, and use of humans as blood source. Using health-disease and socio-territorial appropriation approaches, representations and practices of inhabitants living in a *T. cruzi* endemic area were analyzed. **Materials and methods:** This is a qualitative-ethnographic study conducted over 10 months (2011-2012) in Zoh-Laguna, Calakmul. In depth-interviews explored representations and practices regarding variables for an ethno-ecological model for VBT within landscape fragments. The participatory observation recorded relevant practices related to health-disease processes and socio-territorial appropriation. **Results:** Knowledge and beliefs of VBTTc is heterogeneous among the population, and unrelated to ecological factors recently received information has been insufficient to gain greater social visibility. Men have elaborated knowledge regarding the distribution of bugs and mammals in non-domestic fragments (monte), where they reported bites. Women report that bugs transmit a disease, although their knowledge is based on their comprehension of dengue, mosquitos and non-bloodsucking reduviids. The most important landscape practices affecting vulnerability for VBT are those in and with the ecotono/crop and pasture areas in the dry season, and preventively the traditional use of bednets. **Conclusions:** Social representations motivate practices which create and expose VBTTc, implying that both are components of social vulnerability. A landscape approach regarding both gives a more complete understanding of vulnerability components from health-disease perspectives based on territorial appropriation and use. This is a key issue where vectors maintain domestic and non-domestic populations and there is continuous movement of vectors assisted in large part to the human population. Understanding the population's viewpoint regarding knowledge, beliefs, and practices which create and maintain vulnerability are essential to develop culturally relevant community-based VBTTc

F7.4: From the knowledge, perceptions and behaviors of the public to the implementation of Lyme disease preventive interventions: A comparative study between Canada and Switzerland

Cécile Aenishaenslin, Université de Montréal, Canada; Pascal Michel, Public Health Agency of Canada; Andre Ravel, Université de Montréal, Lise Gern, Université de Neuchâtel

Lyme disease (LD), a bacterial infection transmitted to humans by a tick after it has acquired infection from an animal reservoir, is emerging in Canada. Its annual incidence could reach 8000 cases in Canada in 2050, and this raises concerns both for the public and for health authorities. In the last decade, decision aid tools for LD management have focused on risk quantification in ecological systems. But the population's knowledge and perceptions of risk are also important determinants of the success of prevention strategies. This presentation will provide results from a comparative research project between Canada and Switzerland which aimed at

describing risk perception for LD within the general public and for various decision-making groups; and at describing the impact of risk perception on the adhesion and acceptability of preventive measures. The project used a mixed methods research design. A quantitative analysis of a web-based survey involving 800 participants along with focus groups composed of members of the general public and decision-makers was conducted. This approach has been applied to two different study regions: the Montérégie region, in Québec, Canada, where LD is emerging, and the Neuchâtel Canton, in Switzerland, where the disease has been endemic for more than 30 years. The results are interpreted for each study region, with a comparative analysis between regions. Differences between levels of knowledge and risk perception, as well as between levels of adherence to preventive measures were found between both study regions. The results of this study demonstrate the importance of considering population's perceptions along with expert's knowledge to enhance transparency of decision, social acceptability and efficacy of interventions, particularly in the context of emerging diseases in Canada.

F7.5: Social Imaginaries Associated To Vector Borne Diseases As A Foundation For Building An Ecohealth Strategy With The Bari Indigenous Community Of Karikachaboquira, Colombia

Elkin Daniel Vallejo Rodriguez, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Colombia; Andres Felipe Santo Domingo Jacome, Ecosalud ETV Colombia; Angelica Maria Torres, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Catalina González-Urbe, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá ; Daniel Garzón-Moreno, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá

Introduction: The Catatumbo region in Colombia is an endemic area for different vector-borne diseases. The indigenous Bari of Karikachaboquira, are the ancient inhabitants of this territory, and through their daily interaction with their socio-cultural and ecological context, they have created social imaginaries related to vector-borne diseases. The objective of this study is to identify and analyze these imaginaries to formulate with the local community an EcoHealth intervention for the prevention, monitoring and control of vector-borne diseases. **Methodology:** A transdisciplinary team collected the information using semi-structured interviews, focus groups, guided informal dialogues, participatory action research, social mapping, and time lines. These activities included the participation of locals of different gender, age and occupation. **Results:** The Bari people identify insects that transmit diseases, from the local perspective, blood-sucking insects are bad, but in previous years this concept is absent, which suggests it is a recent social imaginary. There are names in native language for vectors, which denotes vector traditional knowledge. We identified imaginaries associated with vectors and/or illnesses. Malaria is the only illness with a name in native language derived from its symptoms "dat-dat-ye" which mean shiver disease. We identified traditional treatments for the prevention and cure of disease and for the control of vectors. We triangulated the results and socialized them with the community for validation and complementation of the information. **Conclusions:** Knowledge about imaginaries allowed us to identify the logic underlying the ways of thinking and acting of locals regarding vector borne diseases, creating a better understanding of the local situation and possible intervention strategies to improve health conditions. The EcoHealth approach was widely applicable through the pillars of: transdisciplinarity, social participation, systems thinking and research to action. These approach in conjunction with an intercultural philosophy provided deep understanding of the imaginaries through real and active participation of the community

F7.6: Ecohealth approach to determinate vector borne diseases among the Barí- Karikachaboquira indigenous group, in Catatumbo, Norte de Santander-Colombia

Angelica Maria Torres, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Colombia; Andres Felipe Santo Domingo Jacome, Ecosalud ETV Colombia; Elkin Daniel Vallejo Rodriguez, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Sofia Díaz-Salcedo, Centro de Estudios e Investigación

en Salud- Fundación Santa Fe de Bogotá; Catalina González-Uribe, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Helena Brochero, Universidad Nacional de Colombia; Eulides Pabón, Unidad de Entomología, Laboratorio de Salud Pública. Secretaría departamental de Salud de Norte de Santander

Introduction In Colombia, indigenous populations are highly vulnerable to the transmission of vector-borne diseases due to socio-ecological and environment conditions. The aim of this study is to describe the implementation of a transdisciplinary methodology to collect the entomological, ecological and social baseline information for the design of an Ecohealth intervention strategy with the Barí-Karikachaboquira indigenous group located in the Catatumbo Region, Norte de Santander. **Methodology** The investigation took place with the active participation of the community. We discussed and refined our proposed research protocol with the local leaders and community. We implemented ecological and social research through geo referencing routes, KAP surveys, semi-structured interviews, participatory workshops. Entomological surveillance with local people included training in insect capture, active search for triatomines, light traps to capture *Anopheles* spp., and inspection of larval habitats for malaria vectors. We presented, discussed and validated with leaders and members of the community all the information collected. **Results** We achieved an intercultural knowledge dialogue through the participation of community members in several stages of our research activities. Eco-social research allowed for the identification of socio-economic activities, knowledge and practices linked to vector-borne diseases. We captured *Rhodnius prolixus* in wild habitats, *Pastrongylus geniculatus* and *Eratyrus mucrunatus*, which the community name as "shidru" and occasionally enter the houses and are associated to Chagas disease. We identified the presence of *Anopheles nuneztovari* a primary vector of malaria in Colombia. The abundance of the mosquitoes increases with the rainy season, which generates changes in fishing and agriculture activities. The community has generated attitudes associated with vector control, healing and disease prevention practices. **Conclusions** In the context of the design of an Ecohealth intervention, the information obtained provides comprehensive information that could serve to build local capacity through the strengthening of traditional medicine, entomological and epidemiological community vigilance, diagnostic and monitoring.

F8 - Linking global issues to local resource management

F8.1: Coastal Ecohealth Advancement through Gender Mainstreaming in the Philippines

Marivic Pajaro, Haribon, Philippines; Perla Marquez, Indigenous People of the Philippines

The challenges of coastal Ecohealth in the Philippines have been well documented, but previously little attention has been paid to the potential role of gender-based equity strategies. Although in some ways, Filipino women are much better off than many countries, our coastal research has documented that there is a culture of female acquiescence regarding the dominance of males in the local management of coastal resources. The current work reports on two separate projects along the Northern Philippine Sea (NPS) where gender mainstreaming has been employed to advance coastal ecohealth goals. The NPS is not only challenged by dwindling coastal resources but is also highly vulnerable to climate change as it faces the Pacific Ocean. In the Municipality of San Luis, the President of the Lady Mayors Association of the Philippines co-led a team of women leaders to represent strategies for improved coastal ecohealth in four barangays (communities). An unprecedented level of local buy-in occurred in part due to the leadership of the female Municipal Agriculture Officer. In the Municipality of Burdeos on the Pollilo Islands in northeast Philippines, a second coastal resource management initiative focused specifically on gender mainstreaming for integrated coastal resource management as a strategy to engage local buy-in. Emphasis is placed upon the empowerment of women within the planning process and inclusion of gender concerns to advance aspects of coastal ecohealth in these remote setting. The current work further

reports on the successes resulting from the Burdeo experience and compare these to San Luis in terms of future gender mainstreaming associated with the specific challenges of the Northern Philippine Sea Marine Bioregion. Further, consideration is given to strategies for gender mainstreaming that can stimulate leading global approaches for coastal ecohealth involving the establishment of marine protected areas and other related interventions.

F8.2: Fishing annual dynamics and its relation to malaria and dengue transmission among the Wayúu indigenous group in Marbacella and El Horno, La Guajira-Colombia

Laura Castro-Diaz, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Colombia; Daniel Garzon-Moreno, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Natalia Gomez-Melendro, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Catalina González-Uribe, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá

Introduction Community knowledge is vital to understand the ecological and cultural dynamics that occur in local environments. This paper aims to identify fishing annual dynamics among the Wayúu people in Marbacella and El Horno, in Colombia, and its relation to malaria and dengue transmission in order to define intervention strategies from an EcoHealth framework. **Methodology** We conducted a transdisciplinary participatory workshop using seasonal graphics, 15 semi-structured interviews, 73 KAP surveys, geo-referencing routes, ethnographic observation and governmental epidemiological information. We analyzed variables such as climatic seasons, socio-economic activities, presence of *Anopheles* spp and gender distribution of chores. **Results** The socioeconomic annual dynamics in Marbacella and El Horno change depending on weather conditions. During the rainy season, the inhabitants of this community reported changes in fishing schedules, activities, zones and practices. Local fishermen carry working activities from 2 am until 5am. To perform their tasks men have to work during the night selecting the shrimp and fishes that they caught in their net. This activity may represent a risk of malaria transmission due to the time and the presence of breeding sites of *Anopheles albimanus*, near to the beach. After fishing, men can sell their products on the beach; several of the women and wives of them come ashore to arrange the shrimps for weighting and selling it. Some of the women travel to sell the fish in the market square of Riohacha, an endemic area of dengue, which highlights the heterogeneity of susceptibility of transmission. **Conclusion** There is a direct relationship between rainy and drought seasons, the presence of the insect vectors, malaria and dengue cases and socio-economic activities such as fishing practices. Due to the distribution of chores by gender there is a differential risk of transmission of malaria and dengue for the locals of Marbacella and El Horno.

F8.3: Using Ecohealth principles to improve rural livelihoods by reducing shrimp disease in an outbreak prone region of Sri Lanka

Theresa Burns, Center for Coastal Health, Canada; Tim DeJager, Center for Coastal Health; Kawadugama Prasanna Kumara, University of Kelaniya, S.L.A. Daniel, Ministry of Livestock and Rural Community Development; Craig Stephen, Center for Coastal Health

Shrimp farming plays an important role in improving livelihoods of rural coastal dwellers in the Northwestern province (NWP) of Sri Lanka, and is a re-emerging activity in the Eastern province (EP) since civil war ended in 2009. However, in the NWP, smallholder livelihoods are constantly threatened by shrimp disease outbreaks, while in the EP, it is probable that industry growth will lead to similar issues in the near term. In the NWP, government, industry and universities have undertaken many activities to reduce disease, including a recent collaboration to produce better management practices (BMPs) - actionable strategies farmers can use to reduce the risk of catastrophic losses. We used Ecohealth approaches to support the development and rollout of BMPs. These included systems thinking to document knowledge-sharing and disease-spread networks, and

participatory work amongst farmers, governments, universities and industry to develop strategies for BMP implementation. Based on this process, we developed a knowledge mobilization strategy that included collaboration amongst researchers and local experts to develop and implement an SMS messaging system for knowledge sharing and carried out an SMS trial with 60 farmers during one shrimp production cycle. One key outcome was that technologists working for input-supply companies became highly engaged in the trial and increased collaboration. They performed water quality analysis, received disease outbreak information, shared information with each other, and collaboratively made decisions about and composed SMS messages, as well as received feedback and questions from farmers in real-time. At trial end, farmers reported that shrimp health and engagement in cooperative activity to reduce disease risks in shrimp were markedly improved by participating in the trial. Due to the trial, key Sri Lankan decision makers engaged in a subsequent project to sustain and institutionalize knowledge sharing activities and expand them to other aquaculture sectors.

F8.4: Balancing large marine ecosystems designations and local ecohealth goals in the Canadian Arctic

Paul Watts, Institute of Arctic Ecophysiology, Canada

Globally there is a focus on large marine ecosystems (LMEs) or bioregions as units for ocean management. However, the world's leading action that engages people in both coastal and marine resource sustainability is through the establishment of local marine protected areas (MPAs); a concept generally developed and applied in tropical and temperate regions. Although MPA design, strategies and management need to be carefully considered to meet parallel ecohealth goals in the Arctic; related cross-cultural conservation strategies and education needs have generally not been the focus of research or programming. Interestingly, our results indicate a similar level of marine resource dependence for the Inuit of Canada when compared to more broadly recognized marine-resource dependence settings in countries such as the Philippines. Although in both locations the development of LME or bioregional approaches to the ecohealth goal of food security, remain problematic; the vast differences in geographic scale, transportation challenges, food alternatives and governance create different priorities. In the current work, the various approaches to LMEs in the Canadian Arctic are examined relative to food security challenges and the establishment of meaningful development strategies that are inclusive of indigenous cultural considerations and societal goals. Next step strategies in building local capacity for community-based approaches to ecohealth and food security are discussed with particular reference to the Hudson Bay region. Although the Hudson Bay Region has attracted a great deal of interest in some ways; as an ecological and jurisdictional unit, The Bay represents an enigma of large geographic significance. The current work considers the role of small non-government agencies as drivers of ecohealth goals by examining the former university Hudson Bay Ethnoecology Program as well as the on-going Hudson Bay Inland Sea Initiative, in terms of stimulating local action to include help address ecohealth-based food security, ecological governance and inter-jurisdictional consensus.

F8.5: Linking local fisheries management to seafood security and community well-being on the central coast of British Columbia, Canada

Rachelle Beveridge, University of Victoria, Canada

Coastal resource governance is an important driver of social-ecological well-being from the local to the global scale. While the degradation of socially, culturally, and economically invaluable fisheries has impacted coastal communities throughout the world, renewed local involvement in coastal management has the potential to foster community well-being by a variety of means. Drawing on social well-being and ecohealth approaches and informed by indigenous research perspectives, this participatory, community-based study characterises the relationships between past, present, and proposed management institutions and community well-being on the central coast of British Columbia, Canada. A situational analysis combining grey literature, interviews, and a

community consultation process is used to examine local and regional perceptions of the benefits and barriers to First Nations' involvement in local fisheries management. In particular, it examines how the re-integration of traditional knowledge into local management plans is understood to support community well-being, by whom and for whom. The concept of "seafood security" is explored as a mediator of the relationship between local management and community well-being, and as one way to understand and communicate the important relationship between the two.

F8.6: Living locally, social resiliency and feedbacks between human and ecological health

Harish Padmanabha, SESYNC/Universidad del Norte, Colombia; Fabio Correa, Universidad Nacional de Colombia; Andrew Gerkey, National Socio-Environmental Synthesis Center (SESYNC)

Social resiliency favors human health and adaptive capacity in heterogeneous environments through the transmission, between and within households, of socio-ecological knowledge, materials and energy, psychosocial support, immunological learning and cooperation. Here we explore linkages between human resource utilization, social contact and the contemporary crises of ecosystem and human health. For greater than 99% of human history we made use of resources (energy, time and information) available locally, within ranges determined by physiological constraints on movement. In recent times, however, technologies and environmental change have dramatically expanded human foraging range. We are modeling how these socio-ecological changes, through time costs of foraging further away from home, affect social relationships within a simulated human community. Preliminary simulations indicate that local environmental deterioration combined with adaptive foraging to more distant areas reduces the density and diversity of linkages within and between houses, all prerequisites for developing cultural adaptation networks. Reduced tendency of children and the elderly to remain closer to home has a larger impact than maximum foraging distance of households. Social networks are more resilient to local environmental degradation or social limitations on movement (ex. schools, social class, costs of travel) in child-friendly and demographically stable communities – that is, communities with high densities of children that learn locally and do not migrate in adult life. Increased distance between the origin and consumption of resources is central to the global environmental crisis. Our preliminary results suggest that by reducing social resiliency, communities may become dependent on this foraging strategy, leading to negative feedbacks between human and ecological health. By contrast, living locally reduces time devoted to obtaining more distant resources in favor of resource acquisition patterns that sustain the relationships driving socio-ecological knowledge transmission and resiliency. Therefore, living locally has the potential to generate positive feedbacks between individual, cultural and ecological health.

F9 - Agrifood systems

F9.1: Farming Practices and Risk to Cutaneous Leishmaniasis

Issam Nouri, National Institute of Agronomy of Tunis, Tunisia; Jamila Ghrab, Institute of Environnemental Technologies of Bordj Cedria; CHAHED Mohamed Kouni, Faculty of Medecine- University El Manar

Research on the Zoonotic Cutaneous Leishmaniasis (ZCL), an emerging disease in Tunisia, has mostly focused on disease epidemiology, including more recently on its eco-epidemiology and the environmental determinants of risk, and on clinical research. There has been virtually no attention to the human environmental determinants of risk. We sought to understand if and how farming practices in two communities in central Tunisia affect farmers' exposure to *P. papatasi*, the vector of ZCL in the study area. To understand farming practices, we reviewed irrigation records and conducted site visits and interviews with community members. A combination of factors

(farming intensity, crop choices, irrigation technology and management) required one community to practice nighttime irrigation, thus increasing their exposure to the lone vector of ZCL, the nocturnal sand fly *P. papatasi*. In a nearby village, because of different farming practices, farmers do not engage in nighttime irrigation and thus do not face this same exposure. At the same time, an entomological survey confirmed the nighttime presence and predominance of female *P. papatasi* in the irrigation zone and in livestock shelters. The rate of infection of females in the irrigation zone was 100%. Understanding of human environmental determinants suggests of new possibilities for ZCL prevention that are cost-effective and practicable in the near-term in Tunisia and other endemic-epidemic regions. Interventions targeting these same factors may help reduce risks of ZCL infection, complementary to more conventional vector control and case detection and treatment, where they exist.

F9.2: Perspectives on brucellosis and pastoralist livelihood based on dairy products: What practices can be improved in Uganda?

Pius Nina, Makerere University, Uganda; Samuel Mugisha, Makerere University

This paper examines research evidence on brucellosis risks in Uganda, in light of practice environment domain using Ottawa Model of Research User (OMRU) by Logan and Graham (1998). It draws lessons from IDRC supported zoonotic project work (of Makerere University, 2010-2014) that illuminate current challenges and opportunities researchers in interdisciplinary fields have to influence integrated dairy sector development policies. It also situates the discussion within the strategies for knowledge transfer as described by Levis et al. (2003). We argue that stakeholder engagement for capacity to absorb, own and interpret new knowledge is critical to informing policy in order to improve the practice. Killick (1981) describes policy and its implementation as distribution of power through expression of political processes. The empowerment of small holder livestock farmers, in a specific context such as south western Uganda, can mediate broader national socio-economic development, particularly by strengthening pastoralist livelihood systems that contribute to overall national economic growth. Pastoralist communities in Uganda currently lack the capacity to own their dairy product (milk) through value chain management. Rather, they often play a peripheral role of the commodity producer, as they sell liquid milk in raw form. Indeed, trade in fresh milk (produced in high wild animal density areas) is significantly reducing the income of spatially disadvantaged pastoralist households, who in turn become more vulnerable. What is more, this practice also exposes distant urban populations to infections with pathogens causing brucellosis. Existing empirical evidence indicate a need to engage local research in adjusting and adapting dairy sector policies to reflect realities of communities located adjacent to the protected areas where frequent wildlife, livestock and human interactions occur. It concludes that for research to play a significant role it must be credible and engage key stakeholders (research community, opinion leaders and policy makers) through planning to implementation.

F9.3: Do improvements in rangeland resources result in significant opportunity costs for the pastoralists of south-western Uganda?

Samuel Mugisha, Makerere University, Uganda

The presence of wild ungulates, on private livestock farms/ranches adjacent Lake Mburo National Park (LMNP), leads to widespread occurrence of zoonotic and non-zoonotic diseases and in addition the loss of rangeland resources. The improvements of rangeland resources, in the LMA, are as a consequence of a Government of Uganda Policy aimed at promoting a better productive sedentary pastoralism. We tested the hypothesis that an increased dispersal of wild ungulates from adjacent LMNP onto private farms/ranches is associated with significant economic losses hence hampers optimal economic gains from sedentary pastoralism. The present study was guided by two specific objectives namely characterisation of factors that increase the propensity of wild ungulates to disperse outside LMNP onto private livestock farms/ranches and (2) quantification of the

opportunity costs associated with the presence of wild ungulates on private farms/ranches. We used a cross-sectional research strategy to characterise critical factors that increase the dispersal of wild ungulates onto private farms/ranches and also quantify the opportunity costs brought about by the presence of wild ungulates onto private farms/ranches. Data were collected for key variables namely presence of different types of wild ungulates/cattle breeds across a distance gradient from the park, pasture management regimes, presence of water in man-made valley dams, provision of rock salt, and the average time wild ungulates spend on private farms/ranches. The findings show that the probability of finding a zebra herd on managed pasture is higher than on natural rangelands. In addition there is a significant opportunity cost ($P < 0.01$) defined by a distance gradient due to the presence of zebras on private farms/ranches. It is concluded that sedentary pastoralism, which is synonymous with improvement of rangeland resources, leads to significant opportunity costs that need policy attention.

F9.4: Water related policies (WRPs) and their implications for reduction of the risk factors of water related zoonotic diseases among small scale livestock farmers in Vietnam

Quynh Ba Le, University of Calgary, Canada; David C. Hall, University of Calgary; Susan Cork, Dept. Ecosystem and Public Health, University of Calgary

Objective: To critically review water related policies (WRPs) in Vietnam with respect to impact on health of livestock farmers, their animals, and the environment. Method: We review the content and implementation of published national water strategies, programs, research, and evaluation reports on rural clean water supply and sanitation in Vietnam over the period of 2006 to 2013. Results: Livestock farmers as well as community health and veterinary workers appeared to have limited voices in the design and implementation of WRPs. The majority of livestock farmers are small scale farmers (70%) and are at high risk of infection with water related zoonotic diseases. However, existing WRPs do not explicitly address this risk in their policy cycle; the focus of the current strategies is generally on engineering, water security and equity instead of water quality at the small scale service level. Water service policies have direct impact on livestock farmers while water management policies can help ensure sustainability of livestock production. Disruption of water supply is a significant constraint to maintaining healthy livestock production, high crop yields, and being healthy farmers. The roles and responsibilities of water stakeholders in the design and implementation of WRPs are not well defined. Conclusions: It is critical for WRPs to address the complexity of water issues relating to livestock production to ensure long term positive impacts on the health of humans, animals, and their environment; recommendations might be needed to improve education around water use and risk. Existing WRPs should be reviewed and updated to understand better and address explicitly linkages between water and livestock production. A more trans-disciplinary participatory approach is needed in the design and implementation of WRPs to optimize utilization of limited water resources and reduce negative impact on health and socioeconomic conditions of the rural population, especially small scale livestock farmers.

F9.5: Contamination of Choqueyapu River and irrigated crops with multiple bacterial and viral enteric pathogens. Implications for food-borne transmission and farmer exposition risk to human health

Volga Iniguez, UMSA, Bolivia; Violeta Poma, UMSA; Miguel Fernandez, University Mayor de San Andres, Beatriz Mamani, Instituto de Biologia Molecular, University Mayor de San Andres; Alexandra Blanco, Instituto de Biologia Molecular, University Mayor de San Andres

The Choqueyapu -a major river system of the city of La Paz- at a Bolivian Highlands, receive contamination from human and animal sources, through a discharge of untreated domestic sewage and industrial effluents. Since crops of fresh fruits vegetables are directly irrigated by river waters, there are concerns for microbial pathogens

contamination potential source that may cause gastrointestinal illnesses. In this study, using PCR and culture methods, we monitored the occurrence of enteric pathogens in river water samples and raw vegetables. Samples were collected monthly along a year from 4 river points. After membrane filtration /PEG precipitation of water and elution of vegetables samples, RT-PCR and cell culture-PCR were performed to detect Salmonella, Diarrheogenic E coli (ETEC, EPEC, EAEC, EHEC), rotavirus, norovirus, sapovirus, followed by sequence analyses of the detected pathogens. Physico-chemical parameters and level of sewage pollution indicator bacteria and their variation along the year were also evaluated. Of the 48 water samples and the 50 vegetable samples, 36(75 %) and 32(64 %) were positive for enteric pathogens, respectively. The occurrence of enteric pathogens in water and vegetable samples was correlated with fecal coliform indicators. The most contaminated site was the point nearby hospital discharges. ETEC, Salmonella norovirus were the most frequently detected pathogens in water samples, while norovirus and Salmonella in vegetables. Most of bacterial pathogens were resistant to at least 3 antibiotics (86 %). Phylogenetic analysis indicated both human and zoonotic origin of the detected pathogens. Our results indicate that river water can be a reservoir of multiple enteric pathogens some of which may be highly persistent and that raw vegetables may act as a potential vector of food-borne transmission constituting a significant public health risks. These data highlight the need for a water treatment process to protect farmers assure water quality for produce irrigation system.

G2 - Research networks in ecohealth

G2.1: Agriculture, Environment and Health Research Network in the Arab World

Rima Habib, American University of Beirut, Lebanon

Farm laborers and small farm owners live in precarious conditions across the world. Child labor, illness, and poverty are the promises of farm life in societies that purportedly value education, health, and prosperity. These social justice issues are also evident in the flagrant destruction of rural environments, typically through untenable agricultural practices. Although the livelihoods and wellbeing of these workers are all closely tied to these land and water resources, their protection through sustainable development and agricultural practices is rarely pursued. Furthermore, farm practices are also directly related with the health of workers, evident in high rates of occupational injuries and illnesses, as well as the deleterious effects of environmental pollution on their homes. Our group of researchers based in the Arab region aim to establish a research and practice network for agriculture, environment, and health initiatives in the Arab world. These issues are crucial here, because agriculture features widely as an industry in many countries and a livelihood for millions of people. Partially as a result of negative environmental, social, and economic developments, rural flight to urban centers has been widespread across Arab states—a phenomenon that several commentators suggest has contributed to recent turmoil in the region. Moreover, many Arab countries face increased militarization, political and social tensions, as well as the mass mobilization of refugees and displaced people. Regional policymakers have focused their attention on these issues, often at the expense of progressive development policy. This paper will discuss these developments as they pose unique challenges that will necessarily play a central role in our research, analysis, and practice as a network. The paper will also outline how the proposed network can strengthen research and intervention initiatives targeting agricultural communities by building capacity, channeling resources to researchers and practitioners in the field.

G2.2: Mobilizing partnerships for multi-sector, transdisciplinary research to action – a look at successful field examples

Sonia Fevre, Veterinarians without Borders-Canada (VWB/VSF), Lao People's Democratic Republic; Daovy Kongmanila, Faculty of Agriculture, National University of Laos; Margot Camoin, VWB/VSF, Fabienne Uehlinger, Bristol University; Hung Nguyen-Viet, Hanoi School of Public Health; Pattamaporn Kittayapong, Center of Excellence for Vector and Vector-Borne Diseases, Faculty of Science, Mahidol University; Lauren Crawshaw, VWB/VSF

Setting up frameworks for effective evidence-based, sustainable community development which links research to action is challenging, and Ecohealth perspectives can help address some of the barriers. This presentation will describe a practice-focused approach using multi-sector partnerships to bridge the knowledge to action gap, linking academic research, action research and participatory learning. It will also illustrate how strategic network building through multi-institutional collaborations can develop institutions. In the Foodlive Camlao program in Laos, local university capacity drives the development of community-based livelihoods and animal health actions by providing local expertise, lab capacity and student researchers. Interventions involve participatory community consultations, giving voice to vulnerable populations and respecting their resources. These actions are strengthened by partnerships with local government to ensure alignment with government policy and structures. Human, technical and financial resources are enhanced by a Canadian INGO, while student researchers support data collection, analysis, and communications, and collaboration with a UK university supports research design and data analysis. These collaborations have improved research design and action learning and have resulted in the establishment of a comprehensive animal health monitoring system in target villages improved gender inclusion and analysis of outcomes from community events and in specific livelihood activities driven by the community and supported by local authorities. In the Southeast Asia Field Building Leadership Initiative for Ecohealth, complimentary skills and motivations brought by university and NGO partners maximise transdisciplinary partnerships and create a practical basis to advance Ecohealth in Southeast Asia through curriculum development, teaching, knowledge translation and research. This presentation will discuss some of the institutional processes which can help build transdisciplinarity, one of the key principles of Ecohealth. In addition, it will highlight benefits, such as methodological improvements and institutional strengthening, that can be achieved through social and financial investment in collaborative, multi-sector research.

G2.3: EcoHealth-OneHealth Resource Centers in Thailand and Indonesia – establishment, success and perspective

Fred Unger, International Livestock Research Institute, Vietnam; Lertrak Srikittjakarn, CMU; Wayan T Artama, Gadjah Mada University, Tongkorn Meeyam, Chiang Mai University; Dyah Ayu Widiasih, UGM; Jeffrey Gilbert, International Livestock Research Institute; Delia Grace, International Livestock Research Institute

To promote integrated research in the region EcoHealth-OneHealth Resource Centers (EHRC) were established in two universities of Thailand and Indonesia, Chiang Mai University, CMU (Oct 2010) and Gadjah Mada University (Jan 2011) respectively. Both centers received seed funding from ILRI/IDRC for the first years. Initial steps included start up workshops in which expectations were identified. Strategic support for the EHRC was provided by advisory and/or executive committees established in each university and through EcoHealth (EH)/OneHealth (EH) experts. Both centers were created through a joined effort by scientist from different faculties, a process led by each Veterinary Faculty. Those faculties comprised of Medical Science (e.g. Veterinary, Medical and Nursing) but also Economics or Natural Science (e.g. Faculty of Geology). Faculties involved in each center varied due to the local context but the overall interdisciplinary approach was prominent in both centers from the time of establishment. Day to day work was organized by specific working groups addressing more specific topics, e.g. research and teaching. The centers are intended not only to promote EH/OH within their

universities, but also to be a pilot project for the extension of the approach throughout and beyond the university as well as interested groups including policy makers. Overall directions to build up EH/OH capacity were research, teaching, student exchange and communication. Activities at both centers included start up lectures providing a basic understanding of EH/OH followed by a research component to address the demand among researchers to move away from theory to applied research, in this way addressing publications needs of scientists. Success varied between centers influenced by available capacity and funding opportunities. In the longer perspective funding remains a challenge but both centers meanwhile operate without seed funding e.g. through embedding of activities in other regional EH/OH programs which is in particular the case for CMU.

G2.4: Lessons and Challenges from implementation of ecohealth projects: Experiences from Zimbabwe, Botswana and South Africa

Moses Chimbari, University of KwaZulu-Natal, South Africa

Ecohealth projects are designed to garner ownership among all stakeholders; researchers, communities, local leadership and policy makers. Ideally the designs are meant to ensure that implementation goes smoothly and that findings from the study benefit all stakeholders and bring changes, particularly to the communities researched. Paradoxically the process is fraught with challenges associated with the key principles of the ecohealth approach; transdisciplinarity, participation, social and gender equity, sustainability, knowledge to action and systems thinking. Notwithstanding the challenges evidence from projects implemented in sub-Saharan Africa justify the need to invest in ecohealth projects. This paper highlights lessons and challenges that have been experienced in the implementation of ecohealth projects in Zimbabwe (2002-2005), Botswana (2010-2014) and South Africa (ongoing) with a view to contribute to the field of ecohealth. The following are some of the questions posed and addressed using real experiences (author has been project leader for all case studies) from the case studies: What leadership is necessary for success of the project? Are stakeholders, in particular communities, truly engaged in project processes? Are real community needs met? How can sustenance of project ideals and activities be sustained beyond the project lifespan? What benefits and challenges are associated with project students? Why is it so difficult to influence policies or the policy making process? The paper addresses the issues raised by analysing all stages of project cycle; pre-implementation phase (conceptualization of project, writing proposal and acquiring grant), implementation phase (entering community, data collection, continuous stakeholder feedback) and post implementation phase (final report writing -technical and financial). Furthermore interactions between project leadership and funding agencies are interrogated. Based on the analysis the paper concludes that there are justifiable benefits for adopting the ecohealth approach for research projects. However the challenges discussed clearly indicate the need to invest in the implementation processes for improved project outcomes.

G3- Urban planning and green spaces

G3.1: Development of a methodology based on an ecosystemic approach to promote healthy urban planning at local scale in France

Anne Roué Le Gall, EHESP, France

It is nowadays well-established in Research and Academic circles that urban planning choices affect positively or negatively human health and wellbeing (WHO Europe, 2010 Barton, 2009). Health issues such as obesity, asthma, health inequalities, mental health, and exposure to deleterious agents constitute as many contemporary public health challenges conditioned by the quality of physical environment. However, due to the complexity of

the relationship between the multidimensional aspects of both human health and urban planning, moving from knowledge to action is still a real challenge and constitutes a wicked problem. We propose in this presentation to analyze and discuss how to foster this challenge in the French context and to focus on the development of a Health impact assessment (HIA) tool based on a holistic approach to health determinants as a way to promote health in urban planning. **METHODOLOGY** The first step was to analyze existing practices in urban planning, health and environment in order to have a better understanding of the organization and role of different stakeholders involved in both planning and environmental impact assessment (EIE) procedures and to clarify their understanding of the concepts of health and healthy urban planning. In parallel, the HIA development tool has been initiated from the WHO guideline "Planning and Health" (Barton and Tsourou, 2000). It helped us to structure analysis around relevant determinants of health regarding their ability to form levers to promote health in urban environment. **RESULT** The analysis of existing practices showed a highly compartmentalized functioning of urban planning, health and environment sectors. By focusing reflections around strategies that hinted at working across silos, we identified specific levers and adapted the HIA tool to make it more operational and accessible to a multitude of actors. This work culminated in the development of a multi-stakeholder action guide for promoting healthy urban planning.

G3.2: The Ontario ECOhealth Collaborative - Exploring the links between environment and human health in an urban and urbanizing landscape

Mike Puddister, Credit Valley Conservation Authority, Canada; Kiruthiha Kulendiren, David Suzuki Foundation; Louise Aubin, Peel Region Public Health, Dean Middleton, Ontario Agency for Health Protection and Promotion; Helen Doyle, York Region Public Health; Marianne Kingsley, Toronto Public Health; Marina Whelan, Simco-Muskoka District Health Unit

There is growing awareness of the evidence that natural environment provides many benefits to humans and that there is a need to better understand relationships between natural environment and human health in order to provide evidence for policy change. Typically the approach to these matters has been uncoordinated. There has been some success, but by and large we have seen a continual degradation of natural environment and increasing prevalence of human health issues such as respiratory disease, obesity and other chronic illnesses. Two Ontario public health agencies, four public health units, two Ontario watershed agencies (i.e. conservation authorities) and a national non-governmental organization have entered into a formal collaborative agreement. They have come together to form a partnership in research, policy development, stakeholder engagement and outreach, of which an initial deliverable is a systematic and rigorous review of the scientific literature that identifies the impact of urban and near-urban natural environment on the health and wellbeing of residents. The collaborative's goal is to help partners position themselves to be strong advocates for change in community planning- emphasizing links between healthy natural environments and healthy human populations. As with any successful collaboration, this partnership began with thoughtful introspection, sharing of perspectives, vocabulary and mandates, in an effort to understand where we had common interests and where our mandates and programs complemented each other. The result has been an agreement between all nine parties to advance the mandate of the collaborative, sharing in its costs and its outcomes, through a transdisciplinary approach. A committee structure has been established which builds on strengths or interests of all parties, but allows for new strategic collaborators to participate as the initiative moves through its various phases.

G3.3: The impact of green spaces and natural areas on human health and implications for urban planning and policy

Ronald Macfarlane, Toronto Public Health, Canada; Tara Zupancic, Habitus Research; Marianne Kingsley, Toronto Public Health, Kiruthiha Kulendiren, David Suzuki Foundation; Louise Aubin, Peel Region Public Health

Our society is facing many serious public health issues today, ranging from obesity to increases in illness and death from climate change related events such as extreme heat, poor air quality and flooding. The structure of our communities has a large impact on how and why we are facing these issues, how we can improve the situation and increase our health and resiliency. While it is widely accepted that green spaces and natural areas play an integral role in human health, the specifics of types and characteristics of this role are not clear enough for translation into action. To begin to address this gap in understanding and the implications for planning and policy, two evidence reviews and analysis were initiated by the Ontario EcoHealth Collaborative. The first review focused on the range of green space types and characteristics which can influence health outcomes in an urban environment and the range of options that exist to maximize the positive impacts in a dense area. The second review focused on how natural areas influence climate related health impacts, such as heat and extreme weather mitigation and air quality improvements. Initial results from these two results will be presented. The outcome of these reviews was combined to identify gaps and/or to inform policy and decision makers about the relationship between natural areas and health.

G3.4: Green Spaces and cardiovascular diseases in Québec - an environmental health study

Roland Ngom, INRS ETE, Canada; Pierre Gosselin, INSPQ INRS ETE; Claudia Blais, INSPQ

With direct and indirect negative effects of climate change on human health such as pollution and urban heat, it becomes more urgent to develop smart adaptation strategies that promote sustainable environments. Moreover, the obesity pandemic illustrates a shift in population behaviour and has led to questions on how urban environments can contribute to reduce the morbidity and mortality associated with those factors. Primary prevention strategies in environmental health are recommendable in such a context. However, there is a tangible need to evaluate the real contribution of those ecological-based prevention strategies on population health. We present here a study of the effects of Green spaces on cardiovascular diseases morbidity and mortality in the metropolitan regions of Montreal and Quebec (Canada) between the years 2006 and 2011. Total population of interest is about 4 million people. Distances to green spaces and a variety of qualitative functions of green spaces were developed and integrated within regression models together with extended covariables of social and environmental origin. Results show that the qualitative functions of green spaces, rather than simply their proximity have a beneficial effect on cardiovascular diseases. Accessibility through cycling and walking paths and, more moderately, presence of sport facilities were important factors. Accessibility through roads had a more controversial role: sometimes beneficial, sometimes negative, indirectly illustrating the negative effect of air pollution. People living in most dense areas such as the Montreal Island had a higher exposure to this qualitative offer of green spaces. These results illustrate the complexity of choices in urban planning for a sustainable environment and better population health.

G4 - Malaria management

G4.1: Community-directed intervention for malaria control using ecohealth approaches in the fishing community of Rusinga Island, western Kenya

Everline Adhiambo Olanga, International Centre of Insect Physiology and Ecology, Kenya; Lucy Irungu, University of Nairobi; Wolfgang Mukabana, International Centre of Insect Physiology and Ecology/ University of Nairobi

Introduction Strong evidence shows that fishing-related activities are linked to malaria in western Kenya. The aim of this study was to determine the impact of a community-based intervention to reduce malaria mosquito breeding using ecohealth approaches in a fishing community in western Kenya. **Methodology** An intervention study was conducted in Rusinga Island. Baseline and post-intervention surveys were conducted among fishermen. The intervention involved the use of ecohealth approaches to reduce mosquito breeding sites like drainage of water from abandoned boats, addition of fish in finger ponds and ditches used to trap fish, and filling up of abandoned fish ponds with soil. Education on malaria prevention and control strategies was also used as part of the intervention. Fisherfolk were educated about fishing activities that are related to mosquito breeding by leaders of fishing Beach management Units (BMUs) and members of a Fish farming group. Responses on causes and transmission of malaria, elimination of breeding sites at home or at the fishing beach, and knowledge on malaria and its' relation to fishing activities, were outcome measures. **Results** Community and stakeholder participation improved in relation to malaria control. There was a significant increase in the number of fishermen who knew the correct causes and transmission of malaria. There was a significant effect on the number of respondents who heard that fishing activities are related to malaria. The intervention significantly increased malaria preventive measures, specifically reduction of mosquito breeding sites using ecohealth approaches. **Conclusion** A community-directed intervention for malaria control using ecohealth approaches can help prevent malaria mosquito breeding.

G4.2: Malaria interventions with an Ecohealth approach: Latin American experiences

Sandra Martinez, Fundación Santa Fe de Bogotá, Colombia; Fabian Ardila, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Borrero Elizabeth, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Alwers Elizabeth, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá

Introduction: Several interventions for malaria control in Latin America are in line with the Ecohealth approach. The objective of this paper is to identify interventions for malaria control, with elements from the Ecohealth approach to evidence guiding elements, limiting factors and facilitators, and recommendations for future interventions. **Methodology:** A search took place in six databases: Medline, Scopus, Central, ISI Web of Knowledge, Embase and BVS-Lilacs. Grey literature and technical reports from IDRC were included. To complement information, selected researchers participated in in-depth interviews. **Results:** We identified ten articles, 6 reports of 3 IDRC interventions and 1 report of the PAMAFRO project. Interventions included different methodologies to help improve the environment and health of the population. The main limiting factors identified were lack of follow-up during financial carrying out and finalization, lack of communication between investigators and decision makers, authoritarian outlook by the professionals, outcome illness not perceived as priority by the community, lack of political interest. The main facilitating factors were community social participation, strengthening community abilities and proficiency, identifying problems and solutions with the community, providing feedback of information to the community, articulating the activities of the project within the health plans, creating alliances from the start with universities, state institutions, international entities, and private entities, and constant communication with collaborators about failures and successes. Interviewees coincide in analyzing malaria as a complex disease. They argue the importance of carrying-out partnerships with various stakeholders aimed to achieve sustainability. **Conclusions:** This approach implies a dialogue between knowledgeable community people and researchers, transdisciplinarity, active participation of stakeholders, creation and maintenance of strategic alliances in pursuit of sustainability and scale-up of public policy.

G4.3: Social and geographic configuration of healthcare for dengue and malaria in Colombia

Mauricio Fuentes, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Colombia; Fabian Ardila, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Sandra Martinez, Fundación Santa Fe de Bogotá, Borrero Elizabeth, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá

Introduction: Dengue and malaria are endemic in most Colombian territory. This study focuses on the social and geographic healthcare itineraries in rural and urban areas for each disease. This work attempts to make conceptual and methodological contribution to the Ecohealth approach for prevention and control of dengue and malaria. **Materials and method:** In seven Colombian departments (provinces) we conducted two independent case-control studies to evaluate risk factors associated to severe malaria and dengue mortality. Additionally, family members and patients (39) were interviewed to identify healthcare itineraries. Fieldwork was completed with interviews to decision makers, healthcare professionals, and healthcare civil servants (63). The traditional analysis by the Maine's delays model was strengthened with time-geography methodological framework to elaborate spatio-temporal diagrams to better understand people's healthcare itineraries. **Results:** We evidenced regional differences for both diseases concerning how people transit across the healthcare system, showing that territorial dynamics are related to how people become ill, healthy or die. Analysis of healthcare itineraries permitted us to understand the interaction between people and the ecosystem in which they are embedded, considering their interaction with other systems (transport, cultural, healthcare...). As pathways become more complex during the search for healthcare it is even more evident the structural constrains which are out of the patient's and family's control. Systems thinking and transdisciplinarity were key points for the methodological framework and analysis of this study. **Conclusion:** The analysis of healthcare itineraries from a spatio-temporal perspective allows a more complex visualization of people's realities that should be considered when planning public health activities for the prevention and control of vector borne diseases. Decision makers ought to go beyond linear health-disease-healthcare approaches.

G4.4: Social-Ecological Decision Support for Integrated Malaria Management

Carsten Richter, Kunming Institute of Botany, Chinese Academy of Sciences, China; Jianchu Xu., World Agroforestry Centre (ICRAF); Bruce Wilcox, Faculty of Public Health Studies, Mahidol University; Tropical Disease Research Laboratory, Faculty of Medicine, Khon Kaen University

In spite of a global commitment to the decrease of disease burden, as articulated by the UN millennium goals, malaria remains one of the world's major communicable diseases. Ever since the wide-spread utilization of the insecticide DDT as primary vector control measure the tools employed in malaria control programs have not been challenged, although their limitations have become obvious. Instead, insecticides and antimalarial drugs have constantly been refined in co-development with technological advances in a constant race of adaptation with nature. While considerable reductions in disease incidence can be achieved at least temporarily by the combined control approach of mass drug administration and residential treatment with insecticides, the usefulness of this strategy for sustainably interrupting plasmodia transmission depends on a variety of parameters and their magnitudes specific to the particular social ecological system. Not surprisingly, programs around the world employing the same strategy and similar materials accomplish variable results ranging from elimination in countries of low transmission potential to constant disease reemergence in highly endemic environments. To address this short-coming we introduce a social-ecological framework that enables the mathematical simulation of a strategy's likely achievements incorporating essential social-ecological considerations. Corresponding to the findings derived from different scenarios describing ecosystems with varying infectious potential, we present a phased program plan with recommended intervention focus and

activities corresponding to a set of indicators descriptive of local transmission processes. In doing so, we exemplify what considerations are currently missing in malaria policies and program planning, which typically solely rely on the chemical magic bullet without consideration of the health of the ecosystems and the corresponding resilience that naturally modulates disease emergence.

G5 - Dog ecology and rabies

G5.1: Cost estimation of a 'One Health' population level rabies control programme in Tamil Nadu, India

Syed Abbas, Public Health Foundation of India, India; Mannish Kakkar, Public Health Foundation of India; Elizabeth Rogawski, Gillings School of Global Public Health, University of North Carolina at Chapel Hill

While the economic burden of rabies is often cited as a reason for advocating rabies elimination, limited information exists around the costs of delivering interventions at a population level. We present an estimate of the costs of implementing rabies control from the provider perspective using data from a government program on rabies control. The state government in Tamil Nadu, India implemented a set of animal and human health interventions from 2006 to 2010 to prevent and control rabies. We calculated the costs to the state government of implementing five different combinations of animal and human interventions using an activity-based costing approach. State surveillance data and census records among human livestock population were used to generate disease incidence rates and canine population density; program costs were sourced from official documents. Capital costs were depreciated to estimate annualized costs and all costs were inflated to 2012 US dollars. Sensitivity analysis was conducted across all major cost centres. We found that the annual costs of providing Anti-rabies vaccine and vaccine alone and in combination with Immunoglobulins to humans would cost \$0.7 million and \$2.2 million, respectively, annually. For animal sector interventions, the annualised costs of rolling out surgical sterilisation-immunization, injectable immunization and oral immunizations were estimated to be \$ 44 million, \$23 million and \$ 11 million, respectively. Dog bite incidence, health systems coverage and cost of rabies biologicals were found to be important drivers of costs for human interventions. For the animal sector interventions, the size of dog catching team, dog population and vaccine costs were found to be driving the costs. Rabies control in Tamil Nadu would require 2.1% of the combined budget of veterinary, health and municipality departments in its current form. Policy makers should consider the long-term financial sustainability before embarking upon a state or nation-wide rabies control programme.

G5.2: Applied systems thinking for rabies control: Experiences from the rabies control program in N'Djaména, Chad

Monique Léchenne, Swiss TPH, Switzerland; Service Naïssengar, Institut de Recherche en Elevage pour le Développement; Rolande Mindekem, Centre de Support en Santé Internationale, Assandi Oussigueré, Institut de Recherche en Elevage pour le Développement; Daugla Doumagoum, Centre de Support en Santé Internationale; Idriss Oumar Alfaroukh, Institut de Recherche en Elevage pour le Développement; Jakob Zinsstag, Swiss TPH

The rabies control project in N'Djamena successfully demonstrated the feasibility and benefit of dog mass vaccination by two consecutive campaigns (2012/2013), which both reached a coverage of over >70%. Already 6 months after the first vaccination round, dog rabies incidence dropped from an initial monthly incidence of 0.8/1000 to less than one case in a month. Gathering knowledge about demography and ecology of dog populations is a prerequisite for such campaigns. Because the socio-ecological and socio-cultural human background influences dog densities, their behavior and accessibility for vaccination, this factor has to be assessed carefully by a KAP-study (Knowledge-Attitude-Practice). This information allows ordering sufficient

supplies, choosing the accurate approach (mobile or fixed) and to place the vaccination posts wisely. Additionally, coverage estimation by the Capture-Mark-Recapture approach and Bayesian modeling needs reliable prior information on total dog numbers for the intervention area. Another factor to success is sufficient training, management and remuneration of the vaccinators. But even with highly motivated staff a campaign cannot achieve the coverage targeted without ample community mobilization by stakeholder implication and rise of public awareness with an Information and Education Campaign (IEC). Only with these latter measures a long term sustainable control of rabies can be envisaged. Consequently the challenge of controlling rabies spans from the field of veterinary and human medicine, to ecology, sociology and educational science and is therefore an excellent paradigm for ecohealth thinking.

G5.3: Village Rabies Working Group: The Knowledge Translation of Understanding Better on Dog Ecology and Community Engagement for Optimizing Rabies Control Program in Bali, Indonesia

Winda Digna, Center for Indonesian Veterinary Analytical Studies (CIVAS), Indonesia; Andri Jatikusumah, Asia Partnership on Emerging Infectious Disease Research; Sunandar Sunandar, Center for Indonesian Veterinary Analytical Studies (CIVAS), Edi Basuno, Indonesian Centre for Agricultural Socio-Economic and Policy Studies (ICASEPS); Anak Agung Gde Putra, Disease Investigation Center of Denpasar; Fred Unger, International Livestock Research Institute; Jeffrey Gilbert, International Livestock Research Institute

Rabies was introduced into Bali in late 2008; previous to this the island had been historically rabies-free. The Center for Indonesian Veterinary Analytical Studies (CIVAS) with the support of International Livestock Research Institute (ILRI) and International Development Research Center (IDRC) conducted activities using an ecohealth approach to support the government's efforts in optimizing a rabies control program in Bali; through studies on dog ecology (demography, behaviour, and fecundity), socio-culture study, and community engagement. Activities were undertaken between January 2011 – June 2013. One component led to formation of village rabies working groups (VRWG) – made up of rabies cadres at the village level. The system was adopted by the government. This community initiative to build its independent structure at village level and work closely at grass-roots level was encouraged by better understanding by the community and local government, based on the scientific-basic results of studies and its relation to potential role of community on rabies control program. CIVAS' initiative to build village's rabies cadres encouraged provincial government to recruit two rabies cadres in each village in Bali (752 villages). VRWG establishment in two pilot villages also encouraged government to advocate for the roll-out to other villages by conducting technical/preparation trainings for development of VRWG in 30 villages deemed at high risk of rabies cases. Understanding rabies and its risk factors enhanced the control program through local-specific community behaviour and wisdom, intensive-step planning in communities, and advocacy approach. Providing evidence-base results was the key that promoted behaviour changes among many stakeholders. By working in this interdisciplinary way, with different roles within the community, an ecohealth approach succeeded in promoting systems thinking, adopting new knowledge, encouraging willingness to participate, and translating these into action for protecting the community from rabies.

G5.4: Needs of and challenges for ecohealth in a Canadian culturally-sensitive context: tackling the dog-related health issues among Inuit in Nunavik

André Ravel, Université de Montréal, Canada; Audrey Simon, Université de Montréal; Cécile Aenishaenslin, Université de Montréal, Manon Simard, Makivik Society; Francis Lévesque, Université Laval; Isabelle Picard, Ministère de l'Agriculture, des pêcheries et de l'alimentation du Québec; Johanne Saint-Charles, Cinbiose UQAM

Dogs have been part of the physical, social and cultural environment of the Inuit for generations, notably by providing the essential mean of travel for this nomadic culture. Despite the Inuit settlement and the arrival of

snowmobiles, dogs are still very common in Nunavik villages and dog sledding is still practiced and encouraged. The subtle, exact role of dogs in Inuit social and mental well-being is still to be explored. On the other hand, dog attacks and bites are commonly reported in Nunavik communities, the main age group at risk being children under 10 years old. This leads to public health concerns and actions, including the prevention of human rabies, a fatal disease reported in dogs and wildlife in Nunavik. In addition, parasitic infections can also be transmitted from dogs to humans and represent another health risks for Inuit. All these dog-related health issues for Inuit are exacerbated by free-roaming dogs and by dog overpopulation, both of which are common issues in Nunavik villages. All these dog-related health issues create a recurrent and pressing need for immediate and ongoing action to insure a healthy environment while also allowing the preservation of the role of dogs in Inuit communities. However, history, culture, social tension within villages, and lack of political mandate about dog population management are intricately intermingled and so far no efficient, sustainable, and culturally adapted solutions have been implemented. The presentation will provide details and evidences for the dog-health related issues in the special context of Nunavik communities and will outline an ecohealth project designed for overcoming historical hurt, cultural differences, social disagreement, political void, traditional knowledge and perspective, and occidental knowledge and perspective to promote the positive impact of dogs on Inuit well-being while reducing their negative impact on the health of Nunavik inhabitants.

G6 - Knowledge to policy

G6.1: Translating evidence of the effects of triclosan on human and ecosystem health into policy and regulation: A critical review and public health policy analysis

David Paterson, University of Toronto, Canada

Endocrine disrupting substances (EDS) are a class of toxicants that inordinately affect human and ecosystem health, in part due to their penchant for biomagnification up trophic levels, bioaccumulation, and ability at extremely low concentrations to mimic biological signalling systems common across biota. Their impact is not only recognised within scientific spheres, but also policy and legal ones – for example, the Canadian Environmental Protection Act (1999) enumerates specific provisions on the manner, and extent to which, they are subject to federal governmental regulation. There exists converging evidence of the endocrine-disrupting effects EDS exact on humans and other organisms from laboratory, clinical and epidemiological studies. Moreover, the rate of global exposure to EDS is on the rise. The high incidence and the increasing trends of many endocrine-related disorders in humans often manifest along a social gradient, making the swift regulation of these substances a matter of health equity and social justice. Despite its importance as an ecohealth issue, the Canadian government is insufficiently regulating many EDS, including triclosan. A balanced approach that considers government values, the present political zeitgeist, and existing legal and policy frameworks, is to restrict triclosan to industrial use, and otherwise ban it from consumer products to prevent household applications, through coördinated action at both legal and policy levels. This presentation first addresses the context of this issue, including reviewing the evidence-base of its public health risks, the historical context of EDS in Canada, and the factors related to EDS use and regulation. Second, it analyses the policy, legal, and regulatory context, providing inter-jurisdictional comparisons. Third, it enumerates specific options to address these issues as they pertain to triclosan, including policy and corollary legal and regulatory instruments, which are likely to successfully effect the changes necessary to protect human and ecosystem health from the effects of this toxicant.

G6.2: Antimicrobial Resistance: Mapping Complex Drivers of Change to Identify Policy Community Actors for Participatory Research

Shannon Majowicz, University of Waterloo, Canada; Jane Parmley, Public Health Agency of Canada; Katarina Pintar, Public Health Agency of Canada, Carolee Carson, Public Health Agency of Canada

Antimicrobial resistance is a complex, multi-faceted issue that occurs when micro-organisms are no longer susceptible to drugs used to treat or prevent infection. Resistance in gastrointestinal bacteria is particularly complex, resulting from the intimate relationships between humans, animals and environment, and involving multiple drivers of change, such as human and animal medicine, agriculture and food production systems, trade regulations, economies, consumer purchasing patterns, public perceptions, changing demography and vulnerability, and bacterial evolutionary mechanisms. These diverse drivers each have different potential control options, policy or other change levers, and actors responsible. Rising rates of resistant human infections have prompted a call for reduction strategies, including changing on-farm antimicrobial use. One such an approach was the voluntary withdrawal of ceftiofur, a third generation cephalosporin, by Québec poultry hatcheries in February 2005. However, linear “cause-effect”, single-action, voluntary approaches may not be sufficient for sustainable, ongoing changes required to ultimately reduce resistance. Because there are many underlying, inter-related system pressures, understanding resistance within the wider context of different drivers is critical. Mapping the inter-relationships of social, technological, environmental, political, economic, and demographic drivers of resistance is required to accurately identify key actors across the policy community, who must be engaged in developing approaches that act at multiple points in the system if a long-term reduction in resistance is to be achieved. Mapping the underlying drivers also allows the potential future impacts of policy decisions to be more clearly understood, and unintended consequences of policy decisions to be more proactively identified. To this end, we mapped the causal system of drivers of antimicrobial resistance in gastrointestinal bacteria in Canada, and used this to identify the relevant policy community (i.e. actors, roles, and their interactions). These results will be used to guide future participatory research aimed at identifying sustainable solutions to resistance in gastrointestinal bacteria.

G6.3: From knowledge to decision: Using multi-criteria decision analysis as a participative and transdisciplinary tool to managing Lyme disease in Québec

Cécile Aenishaenslin, Université de Montréal, Canada; Valérie Hongoh, Université de Montréal; Hassane Cissé, UQAM, Pascal Michel, Public Health Agency of Canada; Jean-Philippe Waaub, UQAM; Denise Bélanger, Université de Montréal

Background: The recent emergence of Lyme disease in Quebec, Canada is an example of a complex health issue for which the public sector must find interventions. Traditional prevention and control can have important environmental, social and economic impacts, and decision-making requires a systems approach capable of integrating multiple factors and concerns. Objectives: This study had a two-fold objective: first, to realize a multicriteria decision analysis (MCDA) for ranking Lyme disease management interventions in Quebec, Canada and secondly, to evaluate the use of MCDA to facilitate decision-making for the management of complex and transdisciplinary public health issues such as zoonotic diseases. Methods: MCDA models were developed using a participatory approach with key stakeholders to assess various prevention and control decision criteria pertinent to a comprehensive management of Lyme disease. Two models were developed: one for surveillance interventions and another for control interventions. Multi-criteria analyses were conducted under two epidemiological scenarios: a disease emergence scenario and an epidemic scenario. Results: For the surveillance model, the three preferred methods were: active surveillance of vectors by flagging or dragging, active surveillance of vectors by trapping of small rodents and passive surveillance of vectors of human origin. For the control interventions model, basic preventive communications, human vaccination and small scale landscaping were the three preferred interventions. Scenarios were found to only have a small effect on the group ranking of

interventions in the control model. Conclusions: MCDA was used to structure key decision criteria and capture the complexity of Lyme disease management. MCDA presents itself as an interesting systematic approach for public health planning and zoonoses management with a “One Health” perspective. This study demonstrates that MCDA enables a clear identification of complementary interventions that could be used to improve the relevance and acceptability of zoonoses prevention and control strategies proposed by public health decision-makers.

G6.4: EcoHealth researches that make changes: the results of an intentional stakeholder outreach using Outcome Mapping

Korapin Tohtubtiang, Independent M&E consultant, Thailand; Rainer Assé, International Livestock Research Institute; Fred Unger, International Livestock Research Institute, Jeffrey Gilbert, International Livestock Research Institute; Delia Grace, International Livestock Research Institute

Eight transdisciplinary teams across six countries in Southeast Asia adopted an EcoHealth approach in the project, The Ecosystem Approach to the Better Management of Zoonotic Infectious Diseases in Southeast Asia (EcoZD). The teams applied Outcome Mapping (OM), a tool for systematic stakeholder outreach, monitoring and evaluation, to influence knowledge, attitude, and practices (KAP) changes of targeted stakeholders. This presentation demonstrated KAP changes of key actors in zoonotic infectious diseases management at national and local levels. The stakeholder outreach process implemented by the teams and facilitated by scientists of the International Livestock Research Institute (ILRI) improved capacity of and enhanced collaboration between public health and animal health personnel. The use of the EcoHealth approach and OM fostered in-team exchange and communication. Some of the teams constituted of national research institutes, policy-makers from public health and animal health relevant departments, and academics collaborated to plan and conduct researches and the stakeholder outreach activities. Therefore, teams gained new perspectives, knowledge, and valuable experience essential for disease research, prevention, and control. Having synthesized research findings, formulated key messages, and communicated with policy-makers, teams had significantly improved understanding and experience to better engage in the policy-making process. However, teams’ KAP changes varied due to several factors: individual team’s adoption and internalisation of their learning and experiences from the researches and the stakeholder outreach process. Some teams already applied their KAP changes in other projects beyond EcoZD. This knowledge translation process constructed a significant basis for effective zoonotic diseases management and contributed to bridge the gap between researchers and policy-makers.

G7 - Food security and sovereignty

G7.1: Assessing access to healthy diets in Ecuador following the Constitutional adoption of Food Sovereignty: a qualitative study of the environmental drivers of inequities

Kelly Garton, University of British Columbia, Canada

Background: Ecuador shows high rates of diet-related chronic diseases, which are quickly becoming leading causes of morbidity and mortality. This is partly attributed to a nutrition transition toward more animal-based and processed foods. In 2008, Ecuador introduced Food Sovereignty to its Constitution in an effort to improve diets and protect local agricultural production. However, this has not yet translated to improved nutrition habits at the community level, indicating a need for local evidence to improve policies. This project seeks to uncover gaps where existing food policies and environments are not addressing the nutritional needs of marginalized urban communities, and provide suggestions for policies and programs to improve their access to and consumption of healthy foods. Methods: Focus groups, participatory mapping, and key informant interviews

were used to examine geographic access, food prices, nutritional knowledge, dietary preferences, and awareness of Food Sovereignty legislation in three low-income peri-urban neighbourhoods in Machala, El Oro. Results: Environmental drivers of poor nutritional habits were observed at different scales. Poor nutritional knowledge, high cost of fruits and vegetables, and poor geographic availability of healthy foods were the main barriers to healthy eating in the study neighbourhoods, with national policies and international trade regimes as upstream influences. Price was the primary factor influencing participants' food choices, even in the presence of adequate nutritional knowledge. Barriers to healthy eating were experienced most strongly by the most marginalized groups. Conclusions: Access to affordable healthy foods is still an issue as perceived by the community, and barriers are primarily financial and geographic. This could be addressed either by improving the linkages between producers and consumers to shorten supply chains, or by adopting fiscal policies subsidizing fruits and vegetables and taxing foods high in salt, trans and saturated fats, and sugars to help make the healthy choice the easy choice.

G7.2: Integrating food sovereignty and sustainability in a Canadian-Ecuadorian research program on global food system pathways to health equity

Jerry Spiegel, Liu Institute for Global Issues & School for Population and Public Health, Canada; Hannah Wittman, University of British Columbia; Jaime Breilh, Universidad Andina Simón Bolívar - Área de Salud, Ben Brisbois, University of British Columbia

To stimulate thinking about strategies for advancing research on global, national and local scales when faced with complexity, we reflect on the first 2 years of a 5-year research program that is being conducted by Canadian and Ecuadorian researchers and knowledge-users by applying an ecosystem approach to better understand ways to promote health equity in response to dominant processes associated with producing, distributing and consuming food globally. In initiating our “Food systems and health equity in an era of globalization: Think, Eat and Grow Green Globally (TEG3)” program by conducting a comprehensive meta-narrative synthesis of published English and Spanish language literature, we have confirmed that cross-cultural perspectives can stimulate new insights that may otherwise not be appreciated – and deepen understanding of systemic relationships. While strong proportions of literature in both languages cite “food” and “health” explicitly invoke “security”, identification of “sovereignty” is 4-fold greater in Spanish while of growing interest in English. Social class influence on nutritious food access is increasingly noted to be of particular health equity importance; and sustainability concerns related to climate change and contaminants (framed as “bio-security” in Spanish) such as agro-toxins (referred to as pesticides in English), animal antibiotic use or GMOs are noted by knowledge users in both settings as requiring more attention. Action research projects to contribute to improving health equity that are currently being initiated by researchers and knowledge-users in both Ecuador and Canada (BC) contexts include i) examining the feasibility and benefits of linking local agro-ecological producers with institutional purchasing opportunities (schools, public sector program to provide greater access), ii) conducting comprehensive (ecosystemic) assessment of costs and benefits of agro-industrial versus agro-ecological methods for export-oriented production; and iii) exploring ways that greater sovereignty can be asserted by indigenous communities in settings where growing/gathering of food retains especially strong cultural meanings.

G7.3: Exploring the Seasonal Dynamics of Food Security amongst the Homeless of Northern British Columbia

Julia Russell, University of Northern BC, Canada; Margot Parkes, University of Northern British Columbia

Globally, homeless populations have poor levels of health and wellness, and food plays a critical role in this health status inequity. As a consequence of homelessness and limited access to environments and resources,

people are constrained in their ability to control their food supply. At the same time, international corporations and agribusiness exert influence on emergency food aid. Despite interventions to improve nutrition for the homeless, there is limited understanding of their food acquisition strategies, including how people who are homeless navigate seasonal and daily barriers to improving their food security and nutrition. This study explores the complexities of the food system of individuals who are homeless in Prince George, British Columbia, and how food related social and environmental contexts influence their health and well-being. This study will address the gap by engaging with individuals who are homeless to explore their food related experiences, and how they may differ throughout the year. This is timely and relevant in Northern Canada considering the social and environmental changes underway. The presentation will share findings from the first two phases of the study. The first phase of this research involved the completion of a literature review and relationship building with community partners. The second phase involves modified community-mapping and semi-structured interviews with both individuals with experiences of homelessness and providers of emergency food aid. The interviews will build on the themes that emerge from the community mapping, while also exploring individual participant's personal experiences with food security, considering social, cultural and nutritional elements. These findings will inform a final phase of work of collaboration with participants for results dissemination.

G7.4: Mapping Food Safety and Food Security

Wanda Martin, University of Victoria, Canada

Concept mapping is an innovative method to engage policy makers and practitioners in addressing challenges in complex systems. Designed by Trochim and Kane, concept mapping is a participatory mixed method that can assist with knowledge translation of study results by identifying concrete ways to move forward and is particularly geared toward systems thinking. In this paper, I describe the use of concept mapping in my dissertation study on tensions between those working in food safety and in food security. With a case study approach and complexity theory framework, I used methods of concept mapping and situational analysis to understand the tensions between those working in food safety and food security, and to identify ways to improve intersectoral collaboration and reduce health inequities. Concept mapping provided ideas on ways to work across different forms of knowledge and practice to develop a shared framework on how to achieve a safe and accessible food supply. This method allows for a number of visualizations to describe the findings. The concept map is a type of conceptual framework that shows numerous perspectives on a problem. The ladder graph indicates the variance in opinions on best approaches to a situation, and the go-zone maps give an indication of what the collective group identify of the best way to move forward. Concept mapping provided opportunity for interaction with study participants who have recognized tensions between food security and food safety, and had knowledge or opinions on mitigating the tensions. This method exposed dimensions in relationships, and the mindfulness and quality of relationships between the two groups. I describe the innovative approaches and challenges to using this method, and how I integrated concept mapping with situational analysis.

G8 - Capacity building

G8.1: Social networks: A tool for addressing Eco/One Health approach among youths

Mourice Mbunde, Sokoine University of Agriculture, Tanzania

Tanzania eco-health students club (TEHSC) was formed following a sensitization meeting held at Sokoine University of Agriculture and Muhimbili University-School of Health and Allied Sciences by One Health Central and Eastern Africa (OHCEA). The TEHSC seeks to help driving the transformational changes for continuous

improvement of humans, animals and ecosystem through multidisciplinary and transdisciplinary approach; hence achieving the key principles of Eco health which are systems thinking, transdisciplinary research and participation, gender and social equity and knowledge to action without the necessary thrust to policy influence. To accomplish these goals the club will make sure that young people from different institutions and professions are fully engaged in addressing the health challenges using the interdisciplinary and transdisciplinary approaches. It is well known that, if well engaged, youth groups can make positive and rapid changes in the course of reducing and /or eradicating the global health challenges of emerging and re-emerging infectious zoonotic diseases. Having recognized the need to reach youth in their most common and user friendly way of communicating, the club intends to use social networks, such as face-book and twitter. In so doing the club will be able to reach over 500,000 face-book members and twitter users in a day hence making a huge change in a “minute”. In addition, the club will make sure that young people are fully engaged in preparation of scientific forums and workshops organized by different associations such as Tanzania Veterinary Association (TVA), Tanzania Wildlife Research Institute, and One Health Central and Eastern Africa (OHCEA). Other activities of the club will include, calling for scientific write up competitions, to produce different publications emphasizing on Eco health /One health approach in addressing health challenges.

G8.2: Ecohealth and resilience thinking: Trading lessons for human health research and practice

Marta Berbes, York University, Canada; Sky Oestreicher, UQAM; Frédéric Mertens, Centro de Desenvolvimento Sustentável - Universidade de Brasília, Johanne Saint-Charles, Cinbiose UQAM

In answer to the wicked problems that we face, new approaches to research and practice have emerged that view complexity as the departing point to understand social-ecological systems and that can offer socially appropriate responses to wicked problems. In this article we consider two such frameworks: resilience thinking and ecohealth. There is richness in comparing these two frameworks when their differences are highlighted as complementarity. Although ecohealth is oriented primarily towards health and resilience is oriented primarily towards ecosystem management, the fact that they both deal with complex systems suggests that there are opportunities for mutual learning. Such is the goal of this paper: to explore similarities and differences between resilience thinking and ecohealth in order to identify opportunities for cross-pollination and propose areas for further research. The paper is organized as follows: First, we present the ecohealth and resilience frameworks, focusing on the work and experiences of the Resilience Alliance and the Communities of Practice in Ecosystem Approaches to Health. Second we present the lessons from each framework that can be enlightening and useful for the other. We concentrate on the role of health, participation, equity and knowledge-to-action in ecohealth, and on adaptive management, regime shifts, social learning and scales in resilience thinking. Last we conclude with some suggestions for a future research agenda for those interested in the intersection of environment and health.

G8.3: Pollinating power: Stories from Australia of research and practitioner collaboration to effect EcoHealth thinking and action

Rebecca Patrick, Deakin University, Australia; Jonathan Kingsley, Deakin University; Teresa Capetola, Deakin University

Metaphors of our ecosystem can work as powerful symbols and tools for stimulating thinking and action in EcoHealth. In the same way that insects both collect and distribute pollen to support their ecosystems, public health researchers and practitioner can come together to produce knowledge and create impetus for promoting the health of the environment and humans alike. Public health professionals have important roles in protecting health from environmental threats and in promoting ecosystem sustainability within their day-to-day practices. In order to understand the nature and scope of these health and sustainability practices in Australia, the Health,

Nature and Sustainability Research Group from Deakin University undertook a mixed method investigation among public health practitioners. A key aim of the study was to develop planning and evaluation tools to support public health interventions in this arena. A national survey (n=82), semi-structured interviews (n=15) and in depth-case studies (n = 3) with public health practitioners revealed that current practices for addressing ecosystem sustainability are either implicit or opportunistic rather than systematically planned and evaluated. The study also revealed that whilst health indicators have been used to evaluate existing programs there is a need for joint inter-disciplinary indicators as well as systemic support in terms of funding and policy direction. At the EcoHealth conference our team shall present the evaluation tool and its application highlighting three case studies. This presentation will illustrate how researchers and practitioners can move between research and action drawing on evidence and frameworks. The team will showcase the evaluation tool, which in turn, can influence policy, contribute to knowledge and ultimately contribute to the EcoHealth ethos. This presentation will demonstrate that the interactive process between practitioners and researchers pollinates power in the form of courage to take action on environmental and human health imperatives."

G8.4: Monitoring and evaluation of EcoHealth projects; lessons from Asia

David C. Hall, University of Calgary, Canada; Quynh Ba Le, University of Calgary; Jeff Davidson, University of Prince Edward Island

The BECA project (Building Ecohealth Capacity in Asia) was a three year project to develop capacity in ecohealth research in Southeast Asia. The project was supported by the International Development Research Centre (IDRC) and the Australian Government Overseas Aid Program (AusAID). The project was facilitated by Veterinarians Without Borders Canada and implemented by the University of Calgary and other partners in Canada and Asia. An important part of the project was monitoring and evaluation (M+E), including end-of-project findings and identifying a process for Monitoring and Evaluation (M+E) of Ecohealth/One Health projects. Methods for M+E included development of progress markers, use of pre- and post-workshop as well as on-line questionnaires, interviews, small group discussions, gap analysis, performance indicators, and SWOT analysis. Key findings from the M+E activities revealed the following benefits of participating in BECA: participants gained knowledge and confidence about ecohealth; sharing of experiences and learning from others; inspiration to apply an ecohealth approach to problems; incorporating complexity in problem identification and solving; learning to develop a policy brief; understanding the importance of disseminating research findings beyond academic communities; and learning to work collaboratively with a transdisciplinary team. Areas for improvement were suggested as: strengthening the application component of the project (applying what was learned to the field); training for participants to seek their own project funding; case studies of policy implementation (not just research); and improved follow-up and communication. Limitations of the M+E approach included selection processes for identifying M+E participants, lack of detail in questionnaire answers, respondent bias, and time needed to conduct and analyze one-on-one interviews. The M+E process could have been improved by setting clearer indicators relating to specific outputs and clearly documenting their status over the course of the project, and by increased communication among participants during the project.

G9 - Ecobiosocial perspectives of zoonosis

G9.1: Ecobiosocial Vulnerability Maps From An Ecohealth Approach With The Bari Of Karikachaboquira And The Wayuu Of Marbacella And El Horno Two Indigenous Communities In Colombia

Andres Felipe SantoDomingo Jacome, Ecosalud ETV Colombia, Colombia; Laura Castro, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; David Munévar, Centro de Estudios e Investigación en

INTRODUCTION Spatial representation related to vector-borne disease, is used in risk maps to identify key sites at regional scales, susceptible of transmission. However, the construction of these from an EcoHealth approach, particularly in indigenous communities, requires new methodologies that understand the socio-ecological contexts, considering the pillar of transdisciplinarity and social participation as the base line to intervention strategies. This paper aims to describe the variables, methods and results of the construction of a vulnerability map with two indigenous communities. **METHODOLOGY** The investigation took place with the active participation of the community, through participatory workshops, training courses, geo referencing routes, entomological sampling, characterization and geo referencing of potential habitats of insect vectors and use of landscape, google earth photo interpretation, KAP surveys, semi-structured interviews, informal discussions and spatializing of sites and routes of therapeutic itineraries. This information was organized and analyzed to geo-spatialize through the ArcGIS program. **RESULTS** We obtained a vulnerability map per community, to illustrate ecobiosocial environmental dynamics. We mapped house location, grouped by family clusters and distance to positive larval habitats of *Anopheles* spp., some found within 50 m from the houses, roads and socio-economical activities. Social information includes therapeutic routes, and places of self-treatment by traditional and western medicine. In the Bari community, with respect to Chagas disease we identified three positive palm trees, as wild habitat of triatomines located 50mts from houses. For the Wayuu community, triatomines were spatially associated with the houses (20 mts). **CONCLUSIONS** The development of vulnerability maps in indigenous communities from an EcoHealth approach should be considered alternative and participatory methods of capture and representation of information. Furthermore, this may take different levels of detail such as household, perimeter and settlement, and multiple vulnerability variables. The construction of this product should always be developed through local knowledge dialogue to validate information.

G9.2: Integrated approach to evaluate environmental health in the Cuitzmala River Basin, Mexico

Ana C Espinosa-Garcia, Universidad Nacional Autonoma De Mexico, Mexico; Jesus Sotomayor-Bonilla, Facultad De Medicina Veterinaria Y Zootecnia, Universidad Nacional Autonoma De Mexico; Omar Garcia-Suarez, Facultad De Medicina Veterinaria Y Zootecnia, Universidad Nacional Autonoma De Mexico, Ana Cecilia Espinosa-García, Universidad Nacional Autónoma de México; Enrique Martinez-Meyer, Instituto De Biología, Universidad Nacional Autonoma De Mexico; Gerardo Suzan, Facultad De Medicina Veterinaria Y Zootecnia, Universidad Nacional Autonoma De Mexico; Marisa Mazari-Hiriart, Instituto de Ecología, Universidad Nacional Autonoma de Mexico

Different approaches have been suggested to evaluate ecosystem health. We evaluated the ecosystem health of the Cuitzmala River Basin, located on Mexico's Pacific Coast, based on an integrated and multidisciplinary approach. The basin is considered as a low impact region because there are anthropogenic activities but are not intensive. The livestock is an increasing activity with few facilities. The families are living in households without safe drinking water supply and sanitation. Some areas mainly in the up-basin are deforested. The aim was to identify abiotic and biotic indicators of ecosystem health at a basin level. Different pathogens in water and in terrestrial and flying small mammals were considered. We collected water samples along the river basin to determine the presence of coliform bacteria, enterococci, *Cryptosporidium parvum* (Cp), *Giardia lamblia* (Gl), *Clostridium perfringens* (Clp), and rotavirus. In rodents we identified the presence of hantaviruses, Cp, Gl, and Cl. In bats we identified rabies and Dengue Virus (DENV). We found Cp, Gl, Clp and rotavirus in water samples suggesting fecal (animal and human) contamination. We also detected a 16.5% and 12.94% of prevalence of Cp and Gl in rodents, respectively. The prevalence of rabies and DENV2 in bats was 5% and 1.4%, respectively mostly reported in synanthropic species. The presence of zoonotic microorganisms in water, rodents and bats highlight the importance of improvements on water management due to potential pathogen transition. Several zoonosis including rabies, cryptosporidiosis and giardiasis are maintained by peridomestic and synanthropic

species, therefore control procedures are suggested in surrounding areas in the villages. Methods to evaluate environmental health, considering biotic and abiotic indicators under a multidisciplinary scheme, are basic to understand the useful factors to reach an ecohealth management, which will be positive to the conservation of the basin and for public health.

G9.3: American Cutaneous Leishmaniasis Perception, Knowledge and Attitudes among patients in southwestern Amazonia

Natália de Fátima Gonçalves Amâncio, University of Franca. Graduate Programme on Health Promotion, Brazil; Mateus Duarte Ribeiro, University of Franca. Graduate Programme on Health Promotion; Mônica Andrade, University of Franca. Graduate Programme on Health Promotion

In the last decade the State of Acre, southwestern Amazonia, Brazil presented the highest coefficient of detection for American Cutaneous Leishmaniasis (ACL) within the country and Assis Brazil presents an area of highest risk of ACL infection. The aim of this study was to identify the factors that favor ACL endemicity in Assis Brazil (AC), through a survey of living conditions, knowledge, attitudes and values of individuals affected by the disease. It is a qualitative research conducted through participant observation and household interview. During August 2012, 45 patients were visited for an interview and environment inspection, 20 of them were living in urban area and 25 in rural area. Their houses were built with wood (86.8%), with cracks in the walls (84.5%) and in the floor (77.8%). Domestic animals were present in almost all houses (86.7%), but only dogs presented lesions suggestive of the disease. Regarding the knowledge about the disease, 95.5% of the interviewees heard about ACL, however knowledge about form of transmission were confusing and poor. There was a predominance of men, which works inside the forest areas, and individuals under 20 years old. The factors that favor ACL high transmission are illiteracy, poor housing and sanitation, domestic animals, water courses and nearby of forest the surrounding environment. As all interviewed subjects were patients, they could be given simple information to increase awareness in the community.

G9.4: Tracking the Inter-Epidemic Activity of Rift Valley Fever (RVFV) virus in RVF Outbreak Hotspots in Kenya; Identifying Biotic and Socio-economic drivers

Rosemary Sang, International Centre of Insect Physiology and Ecology, Kenya; Mbaabu Murithi, Ministry of Agriculture, Livestock, Fisheries, Department of Livestock, Directorate of Veterinary Services; Jacqueline Kasiti, Ministry of Agriculture, Livestock, Fisheries, Department of Livestock, Directorate of Veterinary Services, Samwel Arum, International Centre of Insect Physiology and Ecology; Washington Onyango-Ouma, University of Nairobi, College of Humanities and Social Sciences; Tobias Landman, International Centre of Insect Physiology and Ecology; Hippolyte Affognon, International Centre of Insect Physiology and Ecology

Rift Valley Fever (RVF) is a mosquito-borne viral zoonosis that affects humans and livestock, occurring in periodic epidemic in Africa during periods of heavy sustained rainfall. RVF virus transmission is complex involving vectors, livestock, wildlife, and humans. Communities in arid N.E Kenya depend on nomadic pastoralism, moving with large livestock herds in search of pasture and water. We hypothesized that eco-climatic, human/mosquito behavioral determinants contribute to virus spread. If environmental and socio-economic factors which differentially drive transmission can be understood, transmission could be effectively predicted and controlled ahead of epidemics. We sought to understand the spatiotemporal dynamics of RVFV, determine how nomadic pastoral lifestyle and the vectors response to environmental dynamics drive virus activity among the animals and pastoral communities. Six livestock herds were selected in RVF hotspot areas and tracked using GPS-fitted collars. Tracking data was imported into GIS system to provide route-maps. Sampling of 10% of each herd and vectors (identified to species) was done after each rainy season. Blood samples were screened for RVF exposure and vectors for arboviruses. Knowledge, attitude and practice (KAP) study and participatory mapping

were used to understand the underlying dynamics that guide decision-making process of livestock owners. Maps generated from animal tracking and participatory mapping revealed consensus pattern of animal movement driven by availability of pasture/water. There was elevated virus activity after the rains as animals emerged from forested areas where pasture was available during extended drought. This was supported by the distribution and abundance of primary and secondary vectors of RVFV. The KAP study revealed that majority of farmers (86%) believed that the RVF is transmitted by vectors. However, only 56% knew that mosquito is the vector. Findings demonstrated how the spatial distribution patterns of RVF was influenced by the nomadic pastoral systems and provided information that could be utilized to guide interventions.

H2 - ESaP experiences

H2.1: How to Flow Upstream: Eco Art Connecting Students with their Learning

Shimshon Obadia, University of British Columbia, Canada

Shimshon Obadia is an undergraduate student artist working on the Fascieux Creek project in partnership with The University of British Columbia's SSHRC funded Eco Art Incubator research initiative and École K.L.O. Middle School in Kelowna, B.C.. This project's mandate is to use eco art to re-envision education and the role of the natural world in school curricula. For the past year, Obadia has been using eco-art to connect middle school students with their more-than-human community. The project is also designed to bring attention to the students' now seven-year struggle to restore the often flooded concrete-covered wetland habitat that once ran through their school grounds. Initiated by students' discovery of blue-listed Western Painted Turtle eggs in their long jump sand pits, this school's community began to restore the species' disappearing habitat. Originally challenged to raise \$100,000.00 by the City of Kelowna and their school board for this habitat's restoration, multiple "generations" of students remarkably raised \$86,000.00. Unfortunately, in an updated quote, these students recently discovered their project will now cost half a million dollars. Although dismayed and disappointed, through work on this issue, the students and teachers involved ended up creating a process of discovery- how the natural world is an educational resource gold mine. Through eco art implementation in their education, these students have shown an aptitude for learning far beyond what is regularly observed of middle school students in a traditional classroom setting. This presentation discusses the details of this endeavour, these students' inspiring passion for their environment, the role of eco art in the classroom and in school curricula, and helping students negotiate the disappointments and obstacles of bureaucratic intransigence and even, some might say, of dismissal of children's right to learn from and steward the natural world.

H2.2: Discursive and affective dimensions of Ecohealth training and practice: A Canadian trainee's perspective

Ben Brisbois, University of British Columbia, Canada

Field-building and knowledge-to-action efforts in Ecohealth have been paralleled by an increasingly well-developed critical literature examining the basic assumptions underlying the field. These critical perspectives can provide valuable insights to the movement for Ecohealth field development and policy impact, especially if applied in a sensitive and constructive manner. In this presentation I examine Ecohealth in light of social theories on framing, discourse and ideology. By analyzing documents originating in the Canadian Ecohealth literature, I characterize some of the 'frames' motivating Ecohealth as an academic social movement, and their associated participant identities. I next employ Foucault's notion of Discourse to identify some 'subject positions' associated with contemporary biomedical and environmental professions and disciplines. Finally, I use Žižek's

theory of the psychological rewards of ideology, coupled with my own experience as a graduate student in the Canadian Community of Practice in Ecosystem Approaches to Health (CoPEH-CAN), to highlight some of the ways in which participation may have real or intended emotional effects. Identifying these affective dimensions illustrates how conventional academic and professional roles in Canada increasingly fail to provide these psychological rewards, and how field-building in Ecohealth interacts with this deficiency. In particular, I encounter common frames related to scientific objectivity, evidence-based health practice and environmental consciousness. The participation of trainees in these frames is complicated, however, when their desire to make a difference (and a living) encounters the highly competitive market-based logic of today's academic and professional job markets. By identifying Ecohealth's frames and their affective dimensions, this analysis provides a basis for heightened reflexivity in Ecohealth training and practice. By clarifying some of the contradictions between common frames and political economic realities, furthermore, the presentation attempts to lay out a constructive pathway to more effective knowledge-to-action efforts in Ecohealth.

H2.3: Pulsed Facilitation and paraprofessionals in societal transdisciplinary transformation

Paul Watts, Institute of Arctic Ecophysiology, Canada; Marivic Pajaro, Haribon

The concept of Pulsed facilitation was first put forward at a plenary session of last year's Canadian Congress of the Humanities and Social Science. The concept involves long-term trust relationships that are highlighted by periodic interactions or facilitations. This approach may be particularly critical in development where ecohealth challenges include limited professional resources. The current work outlines the specific parameters of this approach focused upon the challenge of meeting the developmental ecohealth needs of peoples' organizations, institutions and government agencies; while also building organizational capacity. Further, the concept is applied to indigenous and other resource dependent communities in terms of building paraprofessional expertise that supports ecohealth goals. Individual and institutional examples are drawn from experience in the Philippines, Kenya, Bangladesh, Canada and China. Further consideration is given to the role of this form of development as it applies to the balance between successes and failures in the professional areas of proposal writing and publication. The presentation will demonstrate how this concept can provide a significant platform for the establishment of successful transformational design for professionals with limited time and resources, as it applies to specific and general societal ecohealth objectives. The paper is intended as a partial redefinition of success and failure in the advancement of transdisciplinarity as it applies not only to professionals, but as well to transformation at the societal and paraprofessional level. In part the focus is on development practice that is innovative in terms of stretching limited professional expertise over broader platforms of need. Thus, expertise emerging from areas such as Canadian public health can best be used for advancement towards global equity. The discussion may be of particular interest to emerging scientists focused on career path development in ecohealth that are looking to translate known parameters of ecohealth into applications for less developed settings.

H2.4: "Come take a walk in our shoes!" The practical and shared experiences of four PhD students navigating transdisciplinarity in a large ecohealth research project

Sky Oestreicher, UQAM, Canada; Émilie Bélanger, UQAM; Annie Béliveau, UQAM, Leandra Fatorelli, Universidade de Brasilia - CDS; Stéphane Tremblay, UQAM

This presentation synthesizes our experience as four students of the PLUPH (Poor Land Use, Poor Health) project, a large transdisciplinary and participatory research project dealing with the complex links between human health and land-use change in the Brazilian Amazon. We have gained a wealth of practical experience and tacit knowledge through our five-year collaborative process, whereby we worked intensively and intimately to weave our individual research projects together, from conception of questions to the production of articles.

Driven by our belief that the whole is greater than the sum of its parts, we traversed geographic borders, leapt over disciplinary boundaries, struggled with epistemological differences, and faced myriad logistical and linguistic challenges to realize our research. In particular, we discuss how our collaborative efforts in data collection and analysis, results dissemination, and article and grant writing activities bring up questions of credibility, validity and feasibility within the knowledge construction process. We believe that there is value in synthesizing and sharing our unique experience in that it may be of use to others in similar situations. We also hope to stimulate dialogue around the nitty-gritty of transdisciplinary practice as well as the student experience so as to complement the theoretical debates already happening. This presentation builds upon a roundtable discussion had in 2013 at UQAM.

H3 - Capacity building

H3.1: The development of Ecohealth and One Health training programs in Vietnam

Phuc Pham Duc, Hanoi School of Public Health, Vietnam; Tuyet-Hanh Tran Thi, Hanoi School of Public Health; Hung Nguyen Viet, Hanoi School of Public Health, Toan Luu Quoc, Hanoi School of Public Health; Tung Dinh Xuan, National Institute of Animal Sciences; Anh Vu Le, Vietnam Public Health Association

The Ecohealth and One Health approaches involve many different disciplines, working trans-disciplinarily, to strengthen the ability of professionals to work together and with the communities in addressing complex health problems such as outbreak investigation and response. These approaches help to react strategically, effectively and efficiently to emerging and re-emerging infectious diseases in the region. Professionals from governmental agencies, NGOs and private sector working in outbreak responses (e.g. medical doctors, veterinarians, nurses, public health professionals, ecologists, epidemiologists, etc.) usually have undergone university training programs. Therefore, embedding the philosophy of Ecohealth and One health (OH) in the university training programs can be an appropriate way to ensure that the approaches will be strongly supported and implemented in the near future. In this presentation, we will describe our experiences in developing training courses in Ecohealth and OH in Vietnam within the Ecohealth Field Building Leadership Initiative (FBLI) Program and Vietnam One Health University Network. The Ecohealth and One Health training programs in Vietnam have been developed and applied for undergraduate and post graduate students by incorporating certain modules of Ecohealth and One Health programs into different existing courses for undergraduates, in particular in environmental health, water and sanitation and food safety. Full courses of Ecohealth and One Health are being developed and will go through the approval process of universities to be accredited as elective courses. Training courses for professionals are designed by multi-universities to enhance the knowledge and skills of professionals who have deep expertise in their disciplines to work collaboratively across disciplines in order to respond to complex one health and ecosystem health issues. These courses will facilitate learners to effectively deal with public health challenges beyond one's discipline and to successfully function as an integral part of a larger and multi-disciplinary team of professionals.

H3.2: Regional training strategy to institutionalize the Ecohealth Approach in VBD's programs

Laura Quezada Jiménez, Instituto Nacional de Salud Pública, Mexico; Laura Magaña Valladares, Instituto Nacional de Salud Pública; Mario Henry Rodriguez, INSP, Juana Suárez Conejero, Grupo Avance Educativo

Vector-borne diseases (VBD's) have high clinical and social impact in the region of Latin America and the Caribbean. It represents a loss in years of healthy life with economic implications and is an obstacle for the wellbeing of the population. In this context, the initiative "Leadership for the Development on Ecohealth for

prevention and control of VBD's in Latin America and the Caribbean", sponsored by the International Development Research Center (IDRC), was developed. This initiative aims to build a strategic alliance between leading institutions in the region that will consolidate the Ecohealth approach as an innovative strategy with 4 components: Education and training, Research, Social participation and Knowledge Management. The Education and training component has designed a strategy that seeks the institutionalization of the Ecohealth approach. Four target groups were identified: Strategic - decision-makers-; tactical - operational-; the community and the academia. Specific and cross cutting competencies were identified for each group in order to develop specific course content. The Training strategy focused in training the trainers in: Colombia, Central America and Venezuela. A total of 125 participants from 10 different countries have participated, from academic institutions, Ministries of Health and non-governmental organizations. Once the participants are already certified, in turn, they have trained 171 people from the four target groups initially defined. This number is increasing as more participants are been certify within the scope of the initiative. The pedagogical tools designed, include a course for trainers with a manual for the design and operation of Ecohealth courses, multimedia educational activities, virtual learning objects, a GElearning. The materials are ready to be public access for a wider use.

H3.3: A doctoral research program to impact policies for the prevention of vector-borne diseases

Benjamin Fayomi, Département de Santé Publique, University of Abomey Calavi, Benin; Marius Kedoté, ISBA

In West Africa, several diseases vector-borne (VBD) are considered as concern namely: malaria, river blindness, trypanosomiasis, filariasis, leishmaniasis, dengue, chikungunya, West Nile virus, etc. Enormous efforts have been made by the health systems of endemic countries and international organizations with the aim of controlling diseases vector-borne (VBD). Today the sad fact is that these diseases continue to be of concern in the country and thus constitute a considerable brake on development. One of the factors contributing to this failure is the lack of integration of environmental, economic, social and health, aspects in decision-making by stakeholders at different levels. Faced with the seriousness of the consequences of the VBD (death, risk of disabilities and sequela, expensive cost of taking charge or their socio-economic consequences), five universities West-Africa unite their effort for a major research initiative on the VBD in the context of the Interuniversity Doctoral program of public health, ecosystems, health and sustainable development (Ecohealth) option. This training program is so timely to strengthen the development of the appropriation of the Ecohealth approach by: i) gather around the clear themes on the VBD seniors and doctoral researchers taking into account gender and profiles (decision-makers and relevant disciplines for the themes of the research program), ii) enable them to implement integrated research protocols (multidisciplinary) to generate knowledge, iii) develop with other actors of society a better dissemination of this knowledge to influence regulations and prevention policies. This initiative is a solid foundation for better prevention of the VBD by ecohealth approach, with the understanding that students will lead work on the same theme at the regional level.

H3.4: Outcome Harvesting as a Monitoring and Evaluation tool in the Ecohealth Field Building Initiative Leadership Initiative (FBLI) in South East Asia

Giang Pham, Vietnam Public Health Association, Vietnam; Tung Dinh Xuan, National Institute of Animal Sciences; Bob Williams, Independent, Hung Nguyen-Viet, Hanoi School of Public Health

Outcome Harvesting (OH), a variation of Outcome Mapping, a Monitoring and Evaluation concept, focuses on a specific type of result: outcome as behavioral change. We used OH as the main evaluation tool for the Ecohealth Field Building Initiative Leadership Initiative (FBLI) in South East Asia which implemented by multi-sectorial teams in four countries of Thailand, Indonesia, Vietnam and China and aims at positing Ecohealth as a sustainable dynamic field in the region. Followed six basic steps of OH, the team based on the visions and missions of the program proposal to identify social actor, change agent as well as outcome significance and

developed a set of usable questions for the teams of Indonesia and Vietnam. A form of outcome description has been developed and filled and several communications have been exchanged to substantiate the findings. The first OH exercises showed that the outcomes from research and capacity building serve as seeds for the future Ecohealth field. After two year implementation, the collected outcomes in Indonesia indicated that behavioral changes have not yet been directly generated by the impacts of the research results but will lead to successive impacts that at the end contribute to build the field of Ecohealth in the region. Meanwhile, in Vietnam, outcomes yielded by researchers' activities rather than research results created changes in different stakeholders' attitude toward doing Ecohealth research. Besides, challenges in communication with research teams suggested that collecting and synthesizing raw outcomes is a time consuming process. We conclude that OH is the suitable tool to evaluate outcomes and impacts in the FBLI. It is also suggested that behavior change rather than output should be focused in interdisciplinary and multi-sectional research.

H4 - Food, plants and traditional knowledge

H4.1: Synergies between human, animal and plant health systems in Uganda

Sophie Haesen, Swiss TPH, affiliated with University of Basel, France; Eric Boa, Center for Agricultural Bioscience International; Charles Waiswa, Makerere University, Solveig Danielsen, Center for Agricultural Bioscience International; Esther Schelling, Swiss TPH, affiliated with University of Basel

Background: The term One Medicine describes linkages of veterinary medicine and human health that strengthen cooperation between human and animal health professionals, and improve provision of health services. The terms One Health and EcoHealth were coined for the interplay of human, animal and ecosystem health. Healthy plants are essential for healthy animals and humans, but plant health and its linkages to human and animal health have rarely been described or trialed. Plantwise, an initiative led by the Center for Agricultural Bioscience International (CABI), helps establish community-based plant clinics to improve food security and reduce crop losses. Harmonization of the three health services might increase performance and health status of humans, animals and plants, with positive socioeconomic consequences particularly in remote rural areas. Aims: To describe the human, animal and plant health systems in rural Uganda and identify synergies and benefits of their closer cooperation. Methods: We conducted a systematic review on the structure and mandates of the human, animal and plant health systems to conceptualize a framework between them. The main linkages were described qualitatively by stakeholders (smallholder farmers, NGOs, researchers, health workers, administrative staff) in a rural context of Africa within a transdisciplinary approach. Study area selection was based on agricultural livelihoods and an active network of plant health clinics. Identified synergies were evaluated and quantified by a questionnaire survey. A trial to test the most prominent joint intervention was outlined. Results: An evaluation of synergies between human, animal and plant health systems that can be tested to describe benefits of closer cooperation. An established framework on linkages between the three health sectors underlining the importance of cross-sectoral cooperation. This approach should be valid for any environment where smallholders depend on extension services for the health of households, livestock and crops. The framework and survey results will be presented.

H4.2: Systems thinking approach to understand therapeutic itineraries in the Barí and Wayúu indigenous groups in Colombia

Daniel Garzon-Moreno, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Colombia; Elkin Daniel Vallejo Rodriguez, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Catalina González-Uribe, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá

Introduction: Analyses of local therapeutic itineraries characterize routes and actors involved in healing practices. The aim of the study was to describe from an Ecohealth framework the processes and dynamics of therapeutic itineraries with two indigenous groups in Colombia: the Bari group of Karikachaboquira, and the Wayuu from Marbacella and El Horno. Methodology: Based on systems thinking we conducted semi-structured interviews, focus groups and knowledge dialogues with the community, medical doctors, health providers and traditional knowledge leaders. Results: In the Barí community of Karikachaboquira there are several therapeutic itineraries depending on the disease. We identified three main itineraries: general therapeutic Itinerary which is marked by the syncretism of traditional Bari and Western medical practices; therapeutic itinerary for malaria as the product of collective experiential learning, and cultural disease therapeutic itinerary where the community identifies diseases that cannot be treated by Western medicine and can only be cured with traditional medical procedures. In contrast, the Wayuu community, link the healing process associated to malaria to members of the Departmental Secretariat of Health who provide diagnosis and treatment, due to its proximity to the city of Riohacha and in the absence of traditional healers in the area. People's reported experience of malaria converge in social imaginaries that translate into local practices related to protection, but not to malaria prevention in the communities. In relationship to cultural diseases, people seek cure with piaches, traditional healers, in their therapeutic itineraries. Conclusions Based on systems thinking, we identified through local therapeutic itineraries the relations between people's perceptions and decision-making processes at the time of symptom recognition and access to health services. This information is valuable in the context of Ecohealth interventions framed within the logic of social participation and knowledge to action translation to improve health conditions.

H4.3: From knowledge to action: understanding wild berries health benefits to implement community-based interventions linking public health and social innovation in Nunavik

Mélanie Lemire, Université Laval, Canada; Cory Harris, University of Ottawa; Alain Cuerrier, Institut de recherche en biologie végétale, Université, Maxim Tardif, Biopterre, Institut de technologie agroalimentaire; Elena Labranche, Nunavik Regional Board of Health and Social Services; Pascale Alary-Vézina, Kativik School Board; Eric Dewailly, Université Laval

Inuit traditional knowledge (TK) passed down through generations emphasizes the importance of wild plants in Inuit diet, medicine, and culture. From a scientific perspective, Nunavik wild berries may serve as an important local source of vitamins, as well as other antioxidants such as polyphenols, with unique potential for the prevention of diabetes and to improve food security. In 2012, we developed a research project to study the chemical composition of local berries from different Nunavik villages, to evaluate the impact of wild berries on insulin resistance and obesity in mice, and of wild berry intake on insulin resistance among Nunavik Inuit adults. Seeking to translate the combined TK and scientific support for wild berries into a community-based initiative, we engaged community stakeholders, regional government, health and school boards, and non-profit partners to develop the "Purple Tongue Project" in two schools. We developed novel wild berry products (baby puree, roll ups, dried berries, granola bars, sorbet and frozen yogurt) to be produced by Individual Path Learning (IPL) students in schools. Our objectives with this intervention are to improve wild berry consumption, distribution and availability throughout the year, propose attractive and local healthy alternatives to soft drinks and snacks, and stimulate youth empowerment and employment. Along with berry picking, we conducted several activities with IPL about TK of plants, nutritional benefits of Nunavik berries and cooking berry products. Understanding the benefits of country foods consumed in Nunavik and partnering with Inuit institutions is central to the implementation of community-based interventions aiming to address many issues at once: promote Inuit culture, improve food security, and minimize the emergence of obesity and diabetes. As reflected by student engagement and community feedback, investing in community initiatives to empower youth while generating social economic opportunities is invaluable to effective knowledge sharing, educational outreach, and capacity building.

H4.4: Plants and their traditional medicinal uses among the Sidama (Ethiopia): A service learning framework for understanding linkages between ecosystem and community health

Yuli Chen, University of Wisconsin-Madison, United States; Alex McAlvay, University of Wisconsin-Madison Department of Botany; Heidi Busse, University Of Madison, Girma Tefera, University of Wisconsin-Madison School of Medicine and Public Health

Knowledge of medicinal plants is a major part of traditional medicine, serving to meet health needs of people in many developing countries. In Ethiopia, more than 80% of the population relies on traditional medicine due to cultural acceptance, low cost, and limited access to modern health facilities. Understanding local disease constructs and medicinal plant use is an important step toward providing culturally appropriate health care to underserved Ethiopian communities. The goal of this project was to develop a service learning framework to document indigenous knowledge about traditional medicinal plants and their roles in conserving biological and cultural diversity with members of the Sidama tribe from southern Ethiopia. Three primary objectives of this study were to: 1) Document medicinal plant use among the Sidama people, 2) Understand autochthonous disease classifications, and 3) Identify locally available health care resources and barriers to access. A mixed methods approach was used combining botanical inventories; semi-structured and informal interviews; guided field walk with local plant experts; and participatory community mapping to understand barriers to health resources. The Sidama use ≥ 47 medicinal plant species from ≥ 30 families to treat ≥ 36 diseases, including 4 locally acknowledged conditions lacking direct equivalents in Western medicine. Follow-up research found 91.8% of the plant species documented have known pharmacological properties. Our findings could prove useful in informing health care, government, and research efforts to improve understanding of potential herb-drug interactions and may also provide information for biodiversity conservation. These are examples of how Western medicine can collaborate with indigenous peoples to build common knowledge and may help narrow the gap between limited health resources and the rural Sidama people who need improved services. Preservation of traditional medicine is important in ensuring continued access to medicine to underserved communities, preserving culture, reducing loss of biodiversity, and promoting environmental health.

H5 - Capacity building

H5.1: Contributions of the Knowledge Management Learning-Oriented Approach to Ecohealth Approach

Alain Santandreu, CoPEH-LAC/ECOSAD, Peru; Ruth Arroyo, ECOSAD/ COPEH-LAC/ UNMSM; Anita Lujan Gonzales, ECOSAD, Jose Valle, Investigador, Peru

In the LAC region, theoretical aspects of knowledge management processes have been little analyzed in health, environment and development implemented in projects. From theoretical conceptual and methodological points of view, learning-oriented knowledge management relies on qualitative epistemology and constructivism, the complex and systemic thinking and quasi-modal methodologies. This particular way of approaching the knowledge management (unlike other approaches such as the management of organizational knowledge) contributes to track and evaluate changes and motivated learning in research projects. From an analysis of systemic and complex contexts which the operator intervenes, the knowledge management approach lead to identify the points of change, as a step prior to the planning of activities and outcomes (changes) understood as products and scope. Supported by the use of the information and knowledge socially constructed in the projects and the systematization of the changes and learning, that contributes to the generation of a new type of evidence (not just scientific) that feeds the formulation of integrated policies in health and environment as part of trans-disciplinary, multi-actoral and multi-sectoral research action processes. Improve the understanding of both

approaches (Ecohealthans Knowledge Management) encouraged the design and implementation of socio-ecological systems action research projects, whose contributions could serve new interventions to identify, assess and scale their contributions to change, in a more comprehensive and sustainable manner.

H5.2: Innovations in Interdisciplinary Problem-based One Health Graduate Training

Bruce Reeder, University of Saskatchewan, Canada; Mary Jeanne Barrett, University of Saskatchewan; Hugh Townsend, University of Saskatchewan, Vikram Misra, University of Saskatchewan; Baljit Singh, University of Saskatchewan; Cheryl Waldner, University of Saskatchewan

With an NSERC CREATE grant, the University of Saskatchewan established a new Training Program in Infectious Disease, Food Safety and Public Policy in 2012. A central component of the program is a 3 credit one-term course in One Health which aims to enhance student skills in collaborative, interdisciplinary problem-solving for professional practice. This paper will focus on lessons learned from two years' implementation and evaluation of the course. From January-April 2013, 13 graduate students from 7 disciplines, 4 universities in 3 countries (Canada, Germany, India) participated by video-conference. Students were divided into two groups facilitated by a faculty member. A student-directed problem-based learning (PBL) approach was taken to examine two case studies: Nipah virus and West Nile Virus infection. At the end of the course, all students completed an anonymous on-line questionnaire and participated in two focus group discussions with a non-faculty facilitator. The recommendations were to provide: 1.) Training to assist students in group processes such as communication and conflict resolution, 2.) Frameworks to employ in the analysis of case studies and collaborative decision-making. The second offering of the course January-April 2014 involves 18 graduate students from 8 disciplines and 4 universities in 3 countries (Canada, Germany, India). Student-directed PBL small group discussion remains the core teaching method using three case studies: Nipah virus infection, public perception of contamination risk from various food commodities, and the investigation of water-borne disease. However, changes have been made to the curriculum: 1.) At the outset, the Policy Sciences Framework (Lasswell 1970) was introduced and applied to a case study of the sea otter population on the California coast, 2.) Four interactive seminars have been added during the course on the topics of collaboration, communication and conflict management. The course evaluation will be repeated at the end of the term, and results presented.

H5.3: Participatory development of One Health Core Competencies, curriculum maps, and One Health course content – an example from the South East Asia One Health University Network

Felicia Nutter, Cummings School of Veterinary Medicine at Tufts University, United States; Mary Y. Lee, Provost's Office, Tufts University; Raymond R. Hyatt, School of Medicine, Tufts University, Karin Hamilton, College of Veterinary Medicine, University of Minnesota; Jeein Chung, College of Veterinary Medicine, University of Minnesota; Ali Ghufon Mukti, Faculty of Medicine, University of Gadjah Mada; Louise Flynn, Ecology and Environment

Since 2009, the USAID RESPOND Project has supported the development of One Health capacity in Africa and Southeast Asia. RESPOND partners collaborate with universities to enhance the abilities of students, academicians and practitioners to work across disciplines to improve zoonotic disease prevention, detection and response. RESPOND's work has supported regional One Health university networks in Africa and Asia, including the South East Asia One Health University Network (SEAOHUN). Fourteen schools of veterinary medicine, public health, medicine, nursing and health sciences from Thailand, Malaysia, Indonesia, and Vietnam are collaborating to strengthen faculty and curricula, and to develop creative approaches to teaching and learning. SEAOHUN recently developed country and region-specific One Health Core Competency (OHCC) domains, a critical initial step in catalyzing effective teaching and practice of One Health. Faculty members from SEAOHUN universities participated in a series of workshops to identify common characteristics and competencies for professionals

working on prevention, surveillance, and response to zoonotic diseases. The OHCC domains provide a stable, flexible framework that does not require constant updating. New competencies can be added within a domain while preserving the power of the domains to aid in national and regional planning and dialogue across the SEAOHUN partner institutions and countries. The OHCC domains build upon the technical foundation of multiple health-related disciplines, acknowledge interdependencies, and strengthen the relationships among them. Initial applications have included mapping curriculum to the OHCC domains, and the development of a set of 15 One Health course modules based on the OHCC domains and related technical areas. The participatory approach in all of these activities has been key to developing a shared understanding of common as well as country-specific challenges and has facilitated the sharing of ideas and expertise across universities and countries.

H5.4: EcoHealth as a driver of a Global Land Grant Mission: The University of Minnesota Ecosystem Health Initiative

Katey Pelican, Ecosystem Health Initiative, University of Minnesota, United States; Michelle Willette, University of Minnesota College of Veterinary Medicine; Julia Ponder, University of Minnesota College of Veterinary Medicine; Dominic Travis, University of Minnesota College of Veterinary Medicine; Innocent Rwego, Makerere University; Nicholas Phelps, University of Minnesota College of Veterinary Medicine

EcoHealth is by definition global. By focusing on complex challenges emerging at the dynamic and changing intersection of animals, humans and the environment, EcoHealth drives a dialog of cross-disciplinary and cross-sectoral cooperation to manage risk associated with our changing environment. Universities have a unique role to play in advancing EcoHealth/One Health. Their core missions of research, education and outreach provide an opportunity to engage communities in understanding and solving emerging challenges while at the same time providing the next generation of professionals the skills needed to address the challenges in new and innovative ways. The University of Minnesota (UMN), College of Veterinary Medicine has established an Ecosystem Health Initiative focused on integrating the University missions of research, education and outreach and bringing together transdisciplinary teams across sectors to address EcoHealth challenges. Development of this new program was an inclusive process that engaged faculty, university leadership and external stakeholders through surveys, focus groups and a workshop. Model programs of this new initiative include: 1. Working with global One Health university networks to develop applied, experience based Ecosystem/One Health training programs; 2. Facilitating interagency cooperation through One Health Systems analysis in collaboration with Minnesota state agencies, federal agencies and intergovernmental agencies; 3. Integrating research, service and outreach to identify and address wildlife population health threats; and 4. Working to better understand and contain emerging and zoonotic disease threats in the US and globally. In the coming years, the UMN Ecosystem Health Initiative plans to build on these initial successes to capitalize on the potential of Universities as Global game changers in EcoHealth.

H6 - Land use and contaminants

H6.1: Impact of mining activities on Indigenous peoples' health

Aline Philibert, University of Ottawa, Canada; Laurie H.M. Chan, University of Ottawa

With increasing population growth and urbanization in developing countries and ongoing requirements for resources in developed countries, the demand for minerals and metals has steadily increased in the last decade. While mining activities can provide opportunity for economic and social development, it may also bring adverse health impacts, especially for communities living close to mining sites. Indigenous peoples are particularly

vulnerable, as they rely heavily on the land and its resources for economic, social and cultural purposes. The extent of the impacts on Indigenous populations has yet been probably reviewed and assessed. This paper provides an overview of the issues with respect to the health dimensions among Indigenous people in a mining context. A systematic literature review was conducted. A total of 931 publications (763 peer-reviewed articles and 168 grey literature) were found and 178 relevant publications were included. For each relevant publication we obtained information on study design, geographic location, mining type, ethnic group, and health attributes. Most of the studies (59%) were conducted in the Americas (33% in North America and 26% in South America), 10% and 9% were in Africa and Asia respectively and 8% were conducted in the Oceania. The majority of publications (57%) pertained to large-scale gold mining operations. Almost all the publications (97%) reported direct health effects of occupational and environmental health exposure to pollutants. The main health issues reported include respiratory, cardiovascular diseases, neurological performance, and increase in cancer risk. Only 6 papers reported (3%) reported indirect health effects such as HIV-AIDS, and socio-cultural impacts. There are only 17 publications (10%) reported and discussed the health risk versus the benefits on the studied populations. It is clear that more research is needed to comprehensively evaluate the health status of indigenous populations in a mining context and better evaluation tools are also required.

H6.2: Endotoxin associated to particulate matter (PM10) and inflammation markers in workers of a landfill facility in Cuautla, Morelos, Mexico

Maria Alejandra Terrazas Meraz, Universidad Autonoma Del Estado De Morelos, Mexico; Irma Aurora Rosas Pérez, Universidad Nacional Autónoma de México; Ernesto Alfaro Moreno, Instituto Nacional de Cancerología, Sonia Patricia Romano Riquer, Comisión Coordinadora de Institutos Nacionales de Salud y Hospitales de Alta Especialidad; Natividad Sara García Jiménez, Universidad Autónoma del Estado de Morelos; Margarita Sánchez Arias, Instituto Nacional de Salud Pública; Horacio Riojas Rodriguez, National Institute of Public Health

Background. Waste management is a public health concern because of multiple compounds emission especially in airborne particles, it is important to study workers health. **Objective.** To evaluate the relationship between systemic inflammation markers and exposure to endotoxin present in particulate matter less than 10 micrometers (PM10) in workers of a landfill facility (LF) and control populations. **Methods.** We assess environmental parameters of LF meteorological data and airborne particles (total suspended particles and endotoxin related to PM10). A cross-sectional study conducted to evaluate inflammation markers in 58 adult males between 18 to 40 years old 24 landfill workers and 34 control population. A questionnaire about socio-demographic factors was administered by trained staff, they took anthropometric, data blood pressure and blood samples in a standardized manner. Participants had previously read and signed the informed consent letter. Interleukin 6 (IL-6) and 8 (IL-8), tumor necrosis factor-alpha, white blood cell (WBC) count, lymphocytes, neutrophils and monocytes were biomarkers analyzed. Results of most winds from the southwest between 12:00 to 18:00 hours and winds from the northeast between 00:00 to 06:00. Workers in LF were exposed for approximately 12 hours per day, when high particles concentration is presented. Regression models were not for predicting inflammation markers values rather to examine the relationship with the exposure area and the components of the particles. Models were adjusted by exposure, endotoxin concentration, glucan, body mass index, age, smoke habit, and monocytes. Models results indicate that IL-6, WBC and neutrophils decrease significantly (p

H6.3: Adoption of practices aiming at reducing mercury mobility: study of the sustainability of an agroecology project linking human health and land use in the Amazon

Annie Béliveau, UQAM, Canada; Robert Davidson, UQAM; Marc Lucotte, UQAM, Frédéric Mertens, Universidade de Brasilia; Johanne Saint-Charles, Cinbiose UQAM; Sky Oestreicher, Université du Québec à Montréal; Leandra Fatorelli, Universidade de Brasilia – CDS

Forest conversion into agricultural land has important impacts on human health, namely by causing the transfer of natural soil mercury (Hg) into aquatic ecosystems. Agroforestry systems are an interesting alternative to slash-and burn short-cycle crop cultivation that could contribute to reduce soil erosion and Hg mobility. This hypothesis was tested in such systems implemented in family farms of the Tapajós region, in the Brazilian Amazon. Erosion plots of 2 x 5 m each were thus installed in an agroforestry system (AFS), a slashed-and-burnt cassava field (SB) and a mature forest (F). Runoff water was collected after 20 rain events, two years after the implementation of the agroforestry systems. Analyses showed that mean soil particle density was significantly higher ($p < 0.0001$) in runoff water of the SB field (45 g soil/L) than in the AFS (5.8 g of soil/L) and the F (2.7 g soil/L). Total loss of soil particles was 10 times higher in the SB than the in the AFS (Soil loss mean per rain event = 31 vs 3 g/m²), resulting in much higher ($p < 0.0001$) Hg outputs (Hg mean per rain event = 761 vs 86 ng/m²). AFS, showing Hg mobility levels similar to those observed in the natural environment (F mean = 115 ng/m²), indeed contributed in limiting soil erosion and soil Hg loss. In spite of obvious soil conservation advantages and reduced mercury mobility associated to agroforestry systems, interviews conducted with different groups (farmers participating and not participating in the plantation project, researchers) highlighted the challenges of promoting alternative practices that could reduce Hg exposure in a subsistence context. Contrasted perceptions about the advantages and disadvantages of different types of land use as well as varying levels of interest regarding agricultural experimentation were observed.

H6.4: Evidence that agricultural pesticides select for insecticide resistance in the malaria vector *Anopheles gambiae*

Luc Djogbenou, Institut Régional de Santé Publique/Université d'Abomey-Calavi, Benin; Jacques Saïzonou, Institut Régional de Santé Publique/Université d'Abomey-Calavi; Edgard-Marius Ouendo, Institut Régional de Santé Publique/Université d'Abomey-Calavi, Victoire Agueh, Institut Régional de Santé Publique/Université d'Abomey-Calavi; Laurette Djossou, Institut Régional de Santé Publique/Université d'Abomey-Calavi; Michel Makoutodé, Institut Régional de Santé Publique/Université d'Abomey-Calavi; Laurent Ouedraogo, Institut Régional de Santé Publique/Université d'Abomey-Calavi

The spread of pyrethroid resistance in malaria vectors is of concern as there are no alternative insecticides approved for use on insecticide treated nets. Although much of the current resistance can be attributed to massive scaling up of malaria control interventions, the role of insecticide use in agriculture cannot be ignored. The aim of the present study was to investigate the possible relation between the agricultural use of insecticides and the emergence and the evolution of insecticide resistance in *Anopheles gambiae*. Bioassays were conducted using simulated mosquito larval habitats to evaluate the effect of soil samples history trait of *Anopheles gambiae* with know insecticide resistance mechanisms. Soil samples were collected from vegetable farms areas of Houeyiho in Benin, including, site with recent insecticide use, site where insecticides had not been used for two months, and where insecticides had not been used (control). Pupation and emergence rates were very low in pyrethroid-susceptible strains when exposed to soil that had been recently treated. Pupation and emergence rates in strains with the *kdr* mutation were much higher, around 60 in strains with both the *kdr* and *ace-1* mutations and around 70 when *kdr* alone was present. The fact that strains with the *kdr* mutation survived at higher rates than strains without *kdr* is consistent with the reported use of pyrethroids at the site. This effect was not observed when soil from areas which was not treated in the previous two months, indicating degradation of the insecticide. Although this study is observational and does not take differences in soil

composition into account, use of pyrethroids is expected to play a role in the emergence and the evolution of insecticide resistance in Anopheles. This aspect should be taken into account to better use the insecticide in the context of integrated pest management programs.

H8 - Integrated thinking on sanitation and sustainability

H8.1: Opisthorchis Viverrini Infection Ecology And Fish Distribution Pattern In Lawa Wetland, Northeast Thailand

Banchob Sripa, Khon Kaen University, Thailand; Sasithorn Kaewkes, Khon Kaen University; Sirikachorn Tangkawattana, Khon Kaen University, Bruce Wilcox, Faculty of Public Health Studies, Mahidol University; Tropical Disease Research Laboratory, Faculty of Medicine, Khon Kaen University; Christina Kim, Khon Kaen University

Opisthorchis viverrini (OV) is a fish-borne zoonotic trematode, endemic in Northeast Thailand due to the traditional consumption of raw or undercooked cyprinid fish. The dynamic nature of OV insists on a more complete understanding of the physical ecological variables involved in the transmission through the environment and the interaction between social practice and the ecosystem. In this study, we (1) systematically sampling and measure water quality parameters and (2) the density of freshwater snails and fish in Lawa Wetland, an OV-endemic area in Northeast Thailand. Additionally, (3) GPS satellite loggers were distributed to fishermen and middlemen to track their daily activities such as distributing freshwater fish from Lawa Lake to those who prepare and sell ready-to-eat raw or undercooked freshwater fish. Our data demonstrates that density of fish and snail distribution as well as OV infection rates depended on location and water quality. Bithynia snails were abundance in shallow water with high salt concentration. Fish infection was mainly observed in areas proximity villages with high OV infection rate in human with high fecal coliform contamination. For fish logistics, fishermen who work from Lawa distributed fish to local villagers who prepare or eat raw fish dishes at home or distributed to local markets where fish are sold to local villagers. We conclude that the infection rates with OV-metacercariae in cyprinid fish are complicated due to (a) local distribution patterns, (b) various non-hygienic cultural norms, and (c) a cultural preference for eating raw fish. Preliminary tracking of cyprinid fish strongly suggests that OV-infection in the province of Khon Kaen is likely from local fish taken, at least from the Lawa Wetland where locally confined infection cycles are increasing infection rates.

H8.2: Ecohealth Study To Characterize Vector-Borne Diseases Among The Wayúu Indigenous Group Of Marbacella And El Horno, In La Guajira – Colombia

Natalia Gomez-Melendro, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Colombia; Laura Castro, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Daniel Garzon-Moreno, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Aura Sotelo, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Helena Brochero, Universidad Nacional de Colombia; Catalina González-Uribe, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Aura Sotelo, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá

INTRODUCTION: Indigenous groups in Colombia represent 3.43% of the total population. They are located in areas with socio-ecological contexts where vector borne diseases are an important public health issue. We present ecobiosocial aspects related to insect vectors for the Wayúu indigenous group of Marbacella and El Horno, in Riohacha-Colombia. **METHODOLOGY:** Associated to dwellings we collected triatomine and Anopheles spp. Chagas disease and malaria vectors respectively; characterized larval habitats for malaria and dengue

vectors, used light traps to capture leishmaniasis and malaria vectors. For the ecological and anthropological component we implemented, geo-referencing routes, 73 KAP surveys, 15 semi-structured interviews, three participatory workshops, and discussed all results with the locals. RESULTS: Anopheles albimanus a malaria vector was only associated with the rainy season, although their breeding sites remain active throughout the year. Triatoma maculata a Chagas disease vector was registered within peri-domiciles, being this the first report of the species for the municipality. Local people call the triatomines as Ishisü and the mosquitoes as Meii, they recognize biological and ecological characteristics of the insect vectors as their eating habits, and periods of high proliferation of mosquitoes perceived as a financial risk factor because they affect their livestock. Locals identify the rainy season, when the abundance of mosquitoes is high, as the time of the year when malaria cases occur. The vegetation is typical of tropical dry forests with predominance of Mimosaceae, Cactaceae, and Euphorbiaceae. CONCLUSIONS: Baseline information collected using an Ecohealth framework provides valuable information to define with the community participatory activities for the control and prevention of vector-borne diseases. Results suggest that in this context the strategy should be a set of ecological, biological and social interventions like cleaning herbaceous near to the houses, turning of unnecessary lights that attract mosquitoes, protecting livestock, and developing intercultural educational and sensitivity sessions.

H8.3: Knowledge, beliefs and perceptions of wildlife risks in rural Sri Lankan communities

B.M.A.O. Perera, University of Peradeniya, Sri Lanka; L.G.S. Lokugalappatti, University of Peradeniya; K.K.N. Laknath, University of Peradeniya, W.A.D.P. Wanigasundera, University of Peradeniya; I.M. Gunawardana, Independent Consultant; S.L.A. Daniel, Ministry of Livestock and Rural Community Development; Ryan Brook, University of Saskatchewan, College of Agriculture and Bioresources

Sri Lanka is a densely-populated island in the Indian Ocean. The designated protected areas for wildlife conservation comprise 12% of the land area and contain a rich diversity of wild animal species of high ecological, economic and social value. The rural communities living around these areas rely predominantly on crops and livestock for their livelihoods, and have close interactions with wild animals. This study was conducted to identify the knowledge, beliefs and perceptions of such communities about risks to health and livelihoods from wildlife, such as zoonotic diseases and crop damage, to give affected communities a voice in setting research priorities at the beginning of a four-year research and capacity development program. Four National Parks (NPs) located in the low-country dry zone region were purposively selected, and at least two villages adjacent to each NP were identified for study. Workshops based on the principles of participatory rural appraisal were conducted with key informants in six villages, individual interviews using a semi-structured questionnaire were done with representatives in four villages, and focus group discussions were done with livestock/crop farmers in two villages and indigenous communities in two villages. The species of wild animals most associated with crop and property damage included elephant (*Elephas maximus*), giant squirrel (*Ratufa macroura*), wild boar (*Sus scrofa*), toque monkey (*Macaca sinica*), peafowl (*Pavo cristatus*), jungle fowl (*Gallus lafayettii*) and fruit bats (*Pteropus* and *Cynopterus* spp.). Zoonotic diseases of importance identified by participants, and the animal species implicated by them for transmission, included rabies from dogs, cattle and jackals (*Canis aureus*); leptospirosis from wild boar; Japanese encephalitis from rats, cattle and buffalo; and skin diseases (including Leishmaniasis) from dogs and jackals. Further studies are planned with communities in the up-country wet zone region and to explore the implications of community perceptions and misperceptions of disease transmission.

H9 - Human-Animal interactions

H9.1: The Impact of Anthropogenic activities in the emergence and spread of Leptospirosis in Tana River County, Kenya

Enoch Ontiri, International Livestock Research Institute, Kenya

Emerging infectious diseases (EIDs) are defined as diseases that have recently increased in incidence or geographic range, recently moved into new host populations, recently been discovered or are caused by newly-evolved pathogens (Krause, 1992; Lederberg et al., 1992). Specific factors causing disease emergence include ecological, demographic or socio-economic which subject people to more exposure to new pathogens or promote infection of the already existing ones. Environmental changes and ecological disturbances, due to both natural phenomena and human intervention, have exerted and can be expected to continue to exert a marked influence on the emergence and proliferation of zoonotic parasitic diseases (Moss 2004). Each environmental change as a natural phenomenon or through human intervention alters the ecological balance and context within which vectors and their parasites breed, develop, and transmit disease (Daszak et al 2001). The mix of vectors, their biodiversity, abundance, vector competence and human biting behaviour can be affected by any one of the multifactorial changes occurring as ecological stability is disrupted. Using leptospirosis as a proxy, we explore the impact of anthropogenic activity in the Tana River County, on the emergence of spread of infectious diseases. We conducted socio-economic surveys, interviewed community members participatorily through focus group discussion and trapped small mammals (rats) to collect tissue samples. Metagenomic analysis was conducted in a lab to establish the presence of serovars and other disease causing pathogens. Model simplification in "R" was applied to establish the most proximate cause of the emergence of the diseases. GIS tools were used to demonstrate the land use and land cover change in the area over time. The results will be used to advise service providers and the government on the appropriate measures to mitigate the spread leptospirosis and the emergency of similar infectious diseases.

H9.2: Ecohealth approach to control *Schistosoma mekongi* and *Opisthorchis viverrini* in Cambodia

Sinoun Muth, National Centre for Malaria Control, Parasitology and Entomology/Ministry of Health, Cambodia; Virak Khieu, National Centre for Malaria Control, Parasitology and Entomology/Ministry of Health; Meng Chhur Char, National Centre for Malaria Control, Parasitology and Entomology/Ministry of Health, Peter Odermatt, Swiss Tropical and Public Health Institute

In the early 1990ties, *Schistosoma mekongi* led to high infection prevalence and severe disease outcomes, including death, in high risk communities along the Mekong River. A vertical control program using annual large-scale distribution of praziquantel and health education reduced *S. mekongi* prevalence below 5% but *Opisthorchis viverrini* was not addressed. An integrated control approach using ecohealth principles is currently being tested in villages where *S. mekongi* and *O. viverrini* are still co-existing. Two intervention and two control villages were selected in Kratié province. A cross-sectional survey on *S. mekongi* and *O. viverrini* infection status and related risk factors, health perceptions in humans was conducted in 2011. Of 2,175 participants, 4.8% and 2.6% were infected with *S. mekongi* and *O. viverrini* respectively. Furthermore, *S. mekongi* infection were detected in 0.2% of 4840 intermediate snail hosts *Neotricula aperta*, 1.3% of 75 dogs but in none of 42 examined pigs. *O. viverrini* infection was not found in 4700 *Bithynia* snails and in 21% of 87 Cyprinoid fresh water fishes. Leaders and key informants interviews showed that 74% of 2288 participants were leaving feces in the open area, 98.2% contacting water from Mekong River, 53.3% eating raw fresh water fish and 18% eating raw fish with alcohol. In the two intervention villages, an ecohealth approach intervention consisting of local stakeholder meetings regularly for carrying out MDA (praziquantel with mebendazole, single dose) and monthly health education by village health volunteers; environment improvement and animal management in order to create and achieve healthy living environment. In the two control villages convention control (MDA: one per year and health education campaign) was performed. In this presentation we will report on the results between the

interventions and control villages. We will also discuss whether elimination of *S. mekongi* is feasible with an integrated ecohealth approach to disease control.

H9.3: Using Ecohealth Approach to Identify Sources, Pathways and Drivers of Japanese Encephalitis in India's High Endemic District

Mannish Kakkar, Public Health Foundation of India, India; Sanjay Chaturvedi, University College of Medical Sciences; Vijay Kumar Saxena, Member, Ecohealth Research Core Group, Public Health Foundation of India, Tapan N Dhole, Sanjay Gandhi Postgraduate Institute of Medical Sciences; Ashok Kumar, Indian Veterinary Research Institute; Vidya Venkataramanan, Gilling School of Public Health, University of North Carolina at Chapel Hill

Japanese encephalitis (JE) is a major public health problem in India's endemic regions, persisting and expanding to newer areas. Sector-specific interventions have failed to reduce JE incidence, thus highlighting need for trans-disciplinary and cross-sectoral enquiries for better understanding of drivers of transmission and opportunities for control. We conducted the country's first comprehensive study on JE transmission using ecohealth approach. The study aimed to understand animal-vector-human interactions in micro-ecosystems of JE in a high endemic district, integrating these with social and environmental factors that influence disease transmission. A cross-sectional study was conducted in 12 villages (4 each in high, medium and low burden blocks) of the high endemic Kushinagar district, Uttar Pradesh, India. Villages were stratified by presence/absence of pigs. Key programme and community stakeholders were engaged to identify study sites and knowledge gaps. A transdisciplinary team of researchers drew a conceptual framework to identify items of enquiry and drivers to be studied for inclusion. The quantitative arm studied eco-environmental drivers through entomological surveys (pre-transmission and peak-transmission) household surveys for demographics and household characteristics besides pig surveys, human and pig blood sample collection for virus infection and ecological surveys for land use/land cover. All quantitative datasets were spatially correlated. Multivariate analysis of various parameters established most significant risk drivers that affect JEV transmission before modeling them in GIS environment using regression techniques. A qualitative arm mapped the perceptions of various stakeholders on social, cultural and systemic drivers besides evolving insights into the phenomena observed in the quantitative arm. JE is a developmental issue with linkages to poverty, socio-economic status, gender and environment. Our study generated evidence using Ecohealth approach to identify social, demographic, eco-environmental and systemic factors associated with its transmission in high endemic district. Findings, that are currently being validated, will inform proposed inter-ministerial National Acute Encephalitis Control Programme

H9.4: Parasite host-specificity and extinction risk in wild mammals: a comparative study of carnivores and ungulates

Maxwell Farrell, McGill University, Canada; Jonathan Davies, McGill University; Lea Berrang-Ford, McGill University

The number and types of hosts a pathogen infects (host-specificity) can influence the dynamics of transmission, outbreak, and the likelihood of emergence in novel hosts. While previous research has identified host traits associated with parasite richness in terrestrial mammals, our understanding of the ecological and evolutionary drivers of host-specificity remains poor. Theory predicts that parasite transmission rates should decline as hosts undergo decreases in population size or density, and resulting parasite co-extinctions are more likely to be observed for single-host parasites than for multi-host parasites. By merging data on host-parasite associations with information on the life histories, ecologies, and threat status of hosts, we examine the drivers of parasite host-specificity in terrestrial ungulates and carnivores, controlling for the evolutionary non-independence of hosts using phylogenetic comparative methods. Our results indicate that different factors explain the proportion

of single-host parasites in carnivores and ungulates and that observed host-parasite associations are altered by extinction processes beyond reductions in host population size or density. While average population density is an important factor for both groups, threatened ungulates are associated with a decreased richness of multi-host parasites rather than single-host parasites, which is in contrast with contemporary co-extinction theory.

I3 - Chagas and vector borne diseases

I3.1: Ecohealth interventions undertaken in Latin America to control Chagas

Sandra Martinez, Fundación Santa Fe de Bogotá, Colombia; Alwers Elizabeth, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Juan Pimentel, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Angelica Cendales, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Borrero Elizabeth, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá

Introduction: Multiple vectors and reservoirs of trypanosoma and different geopolitical, economic and ecologic factors of Latin American countries make the control of Chagas complex. The objective of this work is to identify disease control interventions with Ecohealth elements, their limiting and facilitating factors, and generate recommendations for future interventions. Methods: A systematic search was conducted in six databases: Medline, Scopus, Central, ISI Web of Knowledge, Embase and BVS-Lilacs. Additionally, we searched for grey literature and we identified cross-references from selected documents. Results: We identified 10 documents that described seven interventions. Out of the seven, two of them were in Colombia, 2 in the Gran Chaco region (Paraguay, Argentina and Bolivia), 1 in Guatemala, 1 in Brasil, and 1 in Honduras. The strategies evaluated in this revision combined education, community observation, improvement of living areas (intra-domicile or peri-domicile), and fumigation. These interventions demonstrate it is possible to diminish the levels of vector infestation with an equilibrium between passive activities, such as spraying, and active actions such as transdisciplinary investigation and community social participation to improve living areas or activities like entomologic surveying. The active interaction and participation between local leaders, municipal, academic and health authority associations facilitated the projects' activities, for example, in the attainment of materials for improving living area in towns from Guatemala. The participation of teachers and students from schools facilitated sustainability, credibility and confidence since the children and young adults acted as multipliers within their own families. Concerning limiting factors, we identified limited community interest for the disease and instability of stakeholders in political institutions. Conclusion: The interventions with the best results for the control of Chagas included education, transdisciplinarity, social participation, and involved the community and authorities from the start of the investigation to execute activities.

I3.2: Ecohealth Calendar As A Methodological Tool For The Design Of Dynamic Interventions For The Prevention, Surveillance And Control Of Vector-Borne Diseases In Two Indigenous Communities In Colombia

Andres Felipe SantoDomingo Jacome, Ecosalud ETV Colombia, Colombia; Laura Castro-Diaz, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá; Catalina González-Urbe, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Helena Brochero, Universidad Nacional de Colombia

Introduction Local ecological knowledge is recognized as one of the most important and detailed sources of information, because people have in their memory all the environmental, social and political events that happens in their community. These events, both anthropogenic and natural, produce ecological disturbances that have an important role in the emergence and proliferation of Vector-Borne Diseases. This study describes the importance

of knowing, graphically, the annual socio-ecological dynamics, perceived by the inhabitants of Karikachaboquira, a Bari indigenous group, and Marbacella and El Horno of the Wayuu indigenous group. Methodology A transdisciplinary team collected information through seasonal graphics, semi-structured interviews, geo referencing routes, and participatory observation. The research team triangulated and discussed all the information with the communities in order to validate and complement the results. Results An EcoHealth calendar was made for each community by linking socio-ecological dynamics with vector-borne diseases, especially malaria. We observed that local dynamics change depending on environmental conditions and that these determine the presence or absence of insect vectors. The rainy season is a period of high proliferation of mosquitoes, including *Anopheles* spp., which enhances or decreases the susceptibility of transmission. During this time people adapt and modify their socio-economic activities. The Wayuu close their doors early, do not sleep outdoors, clean the surrounding grass, and turn off lights to avoid attracting mosquitoes. In the same season, Bari people spend much of their time collecting the fruits of cocoa. This crop is known, locally, as one of the areas with the greatest abundance of mosquitoes. Conclusions The Ecohealth calendar allowed us to integrate local knowledge in the identification of key moments in the year where the susceptibility of malaria transmission increases or decreases. This information is crucial for the design of a dynamic Ecohealth intervention for the prevention, surveillance and control of vector-borne diseases.

I3.3: Diffusion Of Innovations: Social Networks Analysis To Control Chagas Disease In Honduras

Diana Rodriguez Triana, Universidad de Brasilia, Brazil; Frédéric Mertens, Centro de Desenvolvimento Sustentável - Universidade de Brasília; Maria Carlota Monroy Escobar, Universidad de San Carlos de Guatemala, Concepcion Zuñiga, Secretaria de Salud de Honduras; Yolanda Mendoza, Secretaria de Salud de Honduras; Anita Lujan Gonzales, ECOSAD; Alain Santandreu, ECOSAD-COPEHLAC

The most effective way to control and reduce risks of Chagas disease is improving traditional housing. However, as poor social conditions are the main reason why communities build houses with mud, different interventions have had limited success in improving houses. In Central America different institutions used an ecohealth approach to promote the use of local materials in traditional housing aiming at controlling Chagas exposure. In Honduras, many communities are highly exposed to Chagas and a participatory intervention started in 2011 to inform people about the transmission and prevention of the disease and to motivate them to adapt their houses using local materials. In this work, a social network analysis was used to investigate the adoption of the use of local materials in improving housing to reduce risk of Chagas. One village in Intibucá was selected to map two community social networks: the discussion network about Chagas issues and the collaboration network to improve housing. Half of the population had adopted the technique to improve housing to prevent the disease. Adoption was associated with the number of individuals in the collaboration personal networks for women and men. Some differences were found between genders. Women who collaborated with men were more likely to adopt the house intervention than those who did not. Socioeconomic conditions were found to be more important for women who adopte it, as opposed to men, who were more affected by education and participation in activities. On the contrary, men are more likely to communicate on Chagas issues than women. Besides the education and socioeconomic conditions, communication was associated with knowledge about transmission and disease prevention. Finally, research found that the perception of improved well-being is an important reason to adopt changes. The social network analysis helped identify successful strategies for adoption of the house improvements in Central America.

I3.4: Regime shifts and health risks in the Brazilian Amazon: the case of the PLUPH project and mercury and Chagas disease exposure

Sky Oestreicher, UQAM, Canada; Leandra Fatorelli, Universidade de Brasilia - CDS; Frédéric Mertens, Universidade de Brasilia, Johanne Saint-Charles, Cinbiose UQAM; Marc Lucotte, UQAM; Robert Davidson, UQAM; Christine Romana, Université Paris Descartes

Regime shifts describe the sometimes rapid and abrupt changes of a system to an alternative stable state, whereby the structure of the system is changed. Shifts are often triggered by an external event and involve the crossing of a critical threshold. The notion of regime shifts is well documented in the systems ecology literature but has rarely been applied to consider health outcomes in socio-ecological systems. To explore how regime shifts may be applied to understand human health dynamics, we draw on data and information from the PLUPH (Poor Land Use, Poor Health) project, an ecohealth research initiative in the Brazilian Amazon. In four fishing and farming communities, we describe how these systems are characterized by economic inequalities, the erosion of ecosystem services and, consequently, poor health. Specifically, we illustrate how resource-use and management practices control the positive feedback loop between land degradation and deforestation. This, in turn, creates complex landscape mosaics that increase the risk of Chagas disease and mercury exposure. As such, we describe a system that is locked into a deep basin of attraction, engendering both poverty and health traps for the communities. We then show how a variety of qualitative and quantitative tools offer evidence of a historical regime. Ecological surveys, focus group discussions, narratives, and cartography, among others, demonstrate that the shift was driven by external factors, such as sudden changes in development policies, as well as by gradual changes in internal variables, such disease vector cycling, geochemical cycling, and social norms and networks. We underscore the important challenges in identifying true alternative states and shifts, including lack of reliable data and robust indicators.

I4 - Food safety: molecular biology

I4.1: Molecular detection of *Mycobacterium bovis* in raw milk and feces using RD4 TaqMan real time PCR from cattle tested by tuberculin skin and gamma interferon assay in Morogoro, Tanzania

Joseph Malakalinga, Sokoine University of Agriculture, Tanzania; Goodluck Paul, Sokoine University of Agriculture; Annette Roug, University of California Davis, David Porter, University of Warwick; Elizabeth Wellington, University of Warwick; Woutrina Miller, University of California Davis; Rudovick Kazwala, Sokoine University of Agriculture

Introduction Bovine tuberculosis (bTB) is important disease of livestock and man. A concern has been raised as to the proper diagnostic and epidemiological study tools for bovine tuberculosis in live animals. The study was conducted at Livestock Institute Training Agency Farm (LITA). The aim of the study is to establish the potential of molecular techniques in detection of *Mycobacterium tuberculosis* complex (MTC) in raw milk and feces samples from animals tested by single comparative intradermal tuberculin Test (SCITT) and *M. bovis* gamma interferon test assay (Bovigam). The Region of Difference (RD4) Real time PCR is a molecular technique which is designed to detect *Mycobacterium bovis* (*M. bovis*) in biological samples, environmental samples etc. The techniques detect the absence of RD4, as the RD4 is absent in *M. bovis* and present in other *Mycobacterium tuberculosis* complex. A total of 41 cattle were tested, as 37 cows (23 Lactating cattle) and 4 bulls. Method and Results Heparinized blood, Feces and milk samples were collected aseptically. DNA was extracted in milk and feces using DNeasy blood and tissue kit and FastDNA SPIN Kit for Soil respectively. RD4 TaqMan Quantitative PCR uses specific probes and primers for *M. bovis* were used to detect *M. bovis* DNA in the sample. Two (4.8%) of the cattles were positive by both SCITT and gamma interferon test assay (Bovigam). RD4 Real time PCR detected

M.bovis DNA in milk in 14 (60.8%) of lactating cattle. The shedding of M.bovis in feces was detected in 4(16.6%) cattles Discussion and Conclusion The single intradermal test (SIT) is a worldwide diagnosis test, which is known to lack from both sensitivity and specificity (de la Rua-Domenech and others 2006).This study showed the ability of RD4 Real time PCR to detect the shedding of M. bovis through milk and feces, one positive cattle with SCITT was shedding M.bovis cells in feces. Animals that were positive in milk were all negative on SCITT. One cattle was shedding M.bovis cells in milk and feces. Since 2008 we observed several bTB outbreaks. Although cattle repeatedly were screened using the SICTT (Skin Intradermal comparative Tuberculin Test), and positive reactors removed by slaughtering, the disease has reoccurred multiple times. This implies that the tuberculin skin test does not accurately diagnose the disease in some infected cattle and act as the source of infection in the LITA farm. The detection of M.bovis in feaces indicates the risk of environmental contamination. Low number of positive animals by SCITT and Bovigam might be caused by other disease and stress factors resulted into immune response suppression which lead to false negative results by the tests. Thus, these supplement molecular techniques are needed to detect the disease in livestock for the better control and management of the bovine tuberculosis and monitoring environmental contamination.

14.2: Isolation and characterization of Methicillin Resistant Staphylococcus aureus from human and milk samples from pastoralist communities, Southwest Uganda

Benon Asiimwe, Makerere University School of Public Health, Uganda; Innocent Rwego, Makerere University

We investigated the the prevalence, drug susceptibility pattern and genotypic diversity of methicillin Resistant Staphylococcus aureus (MRSA) isolates from humans and milk/milk products in pastoralist communities surrounding Lake Mbuoro National Park, Southwest uganda. Of 600 isolates, 312 (52 percent) were MRSA. Moreover, 131 (42 perecent) of the MRSA isolates were further resistant to at least 6 of 16 other drugs tested. Pulsed Field gel Electrophoresis (PFGE) genotyping showed identical genotypes isolated from humans and milk/milk products, as well as shared genotypes between humans. The health as well as policy implications of the findings at the wildlife-domestic animals-human interface in a highly itinerant population and fragile ecosystem are discussed.

14.3: Multidrug-Resistant Fecal Bacteria and Host-associated qPCR Biomarkers in a Cattle Feedlot Wastewater Treatment System and Receiving Stream

Michael Jahne, Clarkson University, United States; Shane Rogers, U.S. Environmental Protection Agency, National Risk Management Research Laboratory; Ivan Ramler, St. Lawrence University, Department of Mathematics, Computer Science, and Statistics, Edith Holder, Pegasus Technical Services; Gina Hayes, Ohio Environmental Protection Agency; Lindsay Peed, U.S. Environmental Protection Agency, National Risk Management Research Laboratory; Orin Shanks, U.S. Environmental Protection Agency, National Risk Management Research Laboratory

Fecal indicator bacteria and host-associated qPCR biomarkers were monitored through an infiltration basin and constructed wetland process wastewater treatment system at a cattle feedlot in Iowa, as well as in the receiving stream. Samples were analyzed by real-time qPCR to determine presence and concentration of microbial source tracking markers associated with human (Bsteri, HumM2, HF183) and cattle (CowM2, CowM3) fecal bacteria. Although below detection limits in many samples, cattle markers were detected at all transition points in the treatment system and in system effluent, whereas human markers were detected in the stream. No human markers were detected within the treatment system and no cattle markers were detected downstream of system discharge. Isolates of fecal indicator bacteria were screened for resistance to human and veterinary antibiotics of clinical importance by broth microdilution methods. Forty two percent of E. coli and 77% of Enterococcus were resistant to at least one antibiotic in their respective panels; 22% and 46%, respectively, were multidrug-resistant. Hierarchical clustering was used to group isolates by resistance profiles and resistances that

commonly appeared together in these profiles. Large clusters included tetracycline (n=41), sulfisoxazole (n=24), tetracycline and sulfisoxazole (n=17), and cefoxitin (n=10) for *E. coli* and flavomycin (n=57), quinipristin/dalfopristin (n=20), lincomycin (n=16), quinipristin/dalfopristin and lincomycin (n=43), and flavomycin and bacitracin (n=15) for *Enterococcus*. Among *Enterococcus* isolates, co-resistance to vancomycin with linezolid and daptomycin (Jaccard similarity J=0.79 and 0.78, respectively) and linezolid with daptomycin (J=0.77) were common; these antibiotics are reserved for complicated clinical infections and have not been approved for animal use. This presents concern for environmental discharge of multidrug-resistant organisms relevant to public health.

15 - Avian influenza and wildlife health

15.1: Utilizing Clinical Wildlife Medicine to Advance Public Policy in Wildlife and Environmental Health

Michelle Willette, University of Minnesota College of Veterinary Medicine, United States; Dave McRuer, Wildlife Center of Virginia; Julia Ponder, University of Minnesota College of Veterinary Medicine, Edward Clark, Jr, Wildlife Center of Virginia; Andre Nault, Veterinary Clinical Sciences, University of Minnesota; Katey Pelican, Ecosystem Health Initiative, University of Minnesota

Wildlife health is recognized as a component of ecosystem health; the benefits of monitoring wildlife health are unquestionable. While there are systems in place for monitoring disease in humans and some domestic animals, there is currently no comprehensive system for monitoring wildlife health in the United States. Challenges to creating an effective system for such monitoring includes case acquisition and sampling strategies.

Professionally staffed wildlife care centers represent an untapped source of data on wildlife and environmental health. It is estimated that more than 500,000 amphibians, reptiles, birds, and marine and terrestrial mammals are seen at these wildlife care centers on an annual basis; a diverse array of wild animals from vast geographic area and a range of ecosystems. The Clinical Wildlife Health Initiative (CWHI) is an interdisciplinary collaborative formed to promote the infrastructure and analytical tools required to utilize data from wildlife in rehabilitation settings; data which can deepen our understanding of wildlife and environmental health issues and advance public policy. This presentation details CWHI's recent projects to advance the science of data collection in wildlife clinical care facilities including: a descriptive review of peer reviewed journal articles; the development of standardized terminology and data sets; and a descriptive review of Migratory Bird Treaty Act annual reports.

15.2: Avian Influenza: Opening Pandora's Box at the Roof of the World

Barbara Canavan, Oregon State University, United States

By means of a concise synthesis of a case study, this presentation aims to deepen knowledge about the ecological pathways of viruses that cross from animals to humans. The vast Qinghai-Tibet Plateau of western China, known as the Roof of the World, is at the center of a region that stores more snow and ice than anywhere outside the Polar Regions. Beginning in 2005, Qinghai Lake became an unlikely hotspot for the potential spread of avian influenza along the migratory routes of wild birds. The virus subsequently spread to chicken flocks and occasionally to humans in Asia, Europe, Africa and the Middle East, sparking energetic debates about the role of migratory birds in influenza epidemics. Alternative theories suggested that bird flu traces to the poultry trade and industrial production, to impacts from climate change, to agricultural practices, or even to viruses in rapidly melting permafrost. This presentation outlines the primary actors in the case study - - an aquatic bird that migrates over the Himalayas to reach Qinghai Lake; the changing geophysical environment of the Roof of the

World; a high-altitude railroad to Tibet that traverses the vast permafrost landscape; an avian virus that first appeared in 1997; and knowledge networks and new methods at the intersection of health and ecosystems. The Qinghai case study provides an opportunity to re-think disciplinary identities and interconnections of aquatic bird migration, environmental degradation, and practices in agriculture and food production. Actors and events at Qinghai serve as powerful heuristic tools to understand the past and the present of avian influenza. Although remote in location, Qinghai is a critical place enhance understanding of the interconnections of history, bioscience, ecology, climate change, geopolitics, and global health.

I5.3: Combating H7N9: Using Lessons Learned from APEIR's Studies on H5N1

Prasit Palittapongarnpim, Deputy Dean, Mahidol University, Thailand; Pornpit Silkavute, Asia Partnership on Emerging Infectious Disease Research; Parntep Ratanakorn, Mahidol University, Libin Wang, China Agricultural University; Andri Jatikusumah, Asia Partnership on Emerging Infectious Disease Research; Les Sims, Asia Pacific Veterinary Information Services

The influenza A (H1N1) pandemic in 2009 and the recent zoonotic disease caused by H7N9 avian influenza (AI) virus demonstrated the importance of adopting the lessons learn from earlier studies of AI. The Asia Partnership on Emerging Infectious Diseases Research (APEIR) implemented five simultaneous multi-country studies on AI conducted by researchers from APEIR member countries (Cambodia, China, Lao PDR, Indonesia, Thailand and Vietnam) from 2007 to 2011.. Messages extracted for policy makers from these studies which are highly relevant to the influenza A (H7N9) included: Regional policies and strategies for avian influenza control and prevention must recognize differences in the poultry sector and governance between countries. The use of wide area culling for AI control produces hardship for producers and the rural poor but no evidence was found to show it is more effective than limited culling. With H5N1 AI, smallholders suffered greater losses and were less resilient than backyard producers. Deficiencies in biosecurity measures, especially in small scale production systems, leave farms vulnerable to recurrence of AI. Technical support services for the smallholder sector remain weak. Occasional long distance transmission of H5N1 viruses by wild birds is expected to recur as long as the virus remains endemic in poultry. Sequence data are vital for understanding the genesis and epidemiology of influenza viruses but are not always made available. APEIR researchers were at the forefront of work on the genetics of the H7N9 AI viruses. APEIR emphasized to researchers the need for integrating knowledge translation into all projects, beginning with project design and this was evident in the sound policy guidance provided to decision makers on AI response, control and prevention

I6 - Knowledge to action

I6.1: Approaches to participatory-action research with EcohealthApproach: Experiences in the Left Bank of Rimac River (Lima-PERU)

Isaac Estrada, CoPEH-LAC/ECOSAD/UNMSM, Peru; Ruth Arroyo, ECOSAD/ COPEH-LAC/ UNMSM; Anita Lujan Gonzales, ECOSAD, Alain Santandreu, CoPEH-LAC/ECOSAD

The epistemological approaches of research with the participation have been crucial in the development of the Ecohealth Approach. For this, the research-action is essential, firstly for the generation of knowledge closely related to social participation and the notion of complexity. Secondly, it would be linked to the change (action), i.e. at the same time that new knowledge is generated; it can motivate or generate a change in the behaviour, relationships, policies and institutional practices or actions/activities of the actors. Study the process of implementation of the participatory action research within the EcohealthApproach in the framework of a project

with people working in segregation and recycling of solid waste located on the left bank of the Rimac River in the city of Lima - Peru, it is interesting to learn and reflect on the matter. Therefore was used a qualitative methodology through documentary analysis of activity reports set out in the framework of the project and interviews with the Team Coordinator (technical researchers and recyclingworkers). Along research participatory action has developed a process of reflection, while the interdisciplinary approaches were emerging. It was identified a cycle in the production of knowledge having as starting point the daily practice when applying the process of participatory action research to transformative praxis produced during the contentious dialogue between social knowledge and academic partners. From findings it was concluded that aspects such as the political dimension in the knowledge production process and the implication of researchers in the process of transforming praxis are still in strengthening.

I6.2: Exploring the relationship between human wellbeing and success of actions to address environmental degradation: the case of natural resource management in Australia

Jacki Schirmer, University of Canberra, Australia

Worldwide, large amounts are invested annually in programs intended to address problems of environmental degradation. These programs often involve large number of people, with landholders and interested citizens asked to take part in activities that improve the environment. Despite a large literature focused on the success of these strategies, and on how to convince stakeholders to adopt behaviours that protect the environment, very little work examines how the wellbeing of the people involved (i) affects the success of programs intended to address environmental degradation, or (ii) is affected by their participation in these programs. We explore these relationships through analysis of data from the first wave of the 'Regional Wellbeing Survey', a large-scale survey of residents living in rural Australia, which asked detailed questions about survey respondents' health and wellbeing, and their participation in and experience of 'natural resource management' (NRM) programs intended to address environmental degradation. Our findings highlight that a person's wellbeing is strongly linked to their likelihood of participating in such NRM programs. They also suggest that the effects of NRM programs on human wellbeing differ depending on the policy instruments used to design the NRM program, and we identify the critical design factors that appear strongly linked to differing impacts on wellbeing. We argue that the impacts of an NRM activity on a person's wellbeing should be a critical consideration when designing NRM programs, as should understanding existing wellbeing pressures within a community being targeted by these programs. Our findings, if applied, are likely to contribute to greater success in both addressing environmental degradation, and enhancing human health and wellbeing through doing this.

I6.3: Who is Really Invited to the Table?: Understanding Intersectorality through a Community-based Equity Lens

Kendra Mitchell-Foster, Health Arts Research Centre, Northern Medical Program, University of Northern British Columbia, Canada; Jerry Spiegel, Liu Institute for Global Issues & School for Population and Public Health; Efraín Beltrán Ayala, Universidad Técnica de Machala, Jaime Breilh, Universidad Andina Simón Bolívar; Robert Balshaw, BC Centres for Disease Control

Increasing focus and attention on social determinants of health at national and international levels, has lead to improved understanding of complex health issues like dengue, as well as innovation in prevention strategies. Both Eco-Bio-Social and EcoHealth approaches to dengue prevention and control incorporate an emphasis on social determinants, community participation and intersectoral collaboration to improve interventions and guide scale-up processes. Initial results of the social analysis arm of a TDR-IDRC Eco-Bio-Social project evaluating the feasibility and challenges to scale-up of a participatory dengue prevention and control program show that social, cultural and political dynamics may be more important determinants of the character of

intersectoral spaces and resulting collaboration and knowledge translation than previously considered. Conventional methods setting up opportunities for intersectorality by “inviting to the table” collapse within the often deep and complex web of power dynamics; hierarchical clustering analyses of indicator prioritization profiles of disparate collaborators show that stakeholder group is not a reliable predictor of interest, perspective or priorities in decision-making processes. Thus, both historical and contemporary, macro-level and local, cultural, social and political dynamics carry implications for the research-to-policy process, planning and executing scale-up strategies and sustaining a participatory planning-implementation-evaluation spiral for program improvement. Paternalistic assumptions at the core of many knowledge valuation systems and either tacit or explicit models for knowledge mobilization and translation that support policy and programming decision-making processes often disempower stakeholder groups who are thought to prioritize non-technical, qualitative and experiential knowledge. The proposed intersectoral decision-making aid built around the central premise that equitable participation of all stakeholder groups is crucial for the use of a wide spectrum of knowledge to improve intersectoral collaboration and problem-solving with respect to program design, policy recommendations and scale-up specific to participatory dengue prevention and control in Machala, Ecuador.

I6.4: Limited Understanding of Perceptions, Practices and Health seeking Behaviour constrain JE/AES Interventions in High Endemic District of North India: a qualitative enquiry

Sanjay Chaturvedi, University College of Medical Sciences, India; Neha Sharma, Department of Development Communication, University of Delhi; Mannish Kakkar, Public Health Foundation of India, Syed Abbas, Public Health Foundation of India

Commonly referred as ‘Mastishk Jwar’ or ‘Dimaghi Bukhar’ in north India, Japanese Encephalitis (JE) and Acute Encephalitis Syndrome (AES) stay as poorly understood phenomena, both at societal as well as biomedical levels. Social and cultural perception and practices, human interaction with animals, and health-seeking behavior are all important factors that have failed to grab attention of researchers and program managers and hence, not suitably informed the interventions for preventing JE/AES. Present qualitative enquiry was conducted in 3 community development blocks (high, medium and low prevalence) of an endemic north Indian district – Kushinagar. 17 IDIs (utilizers of AES care, health workers and managers from human and veterinary sides, NGO representatives, and pig owners) and 4 FGDs (farmers, community leaders, and students) were conducted, through non-probability, purposive sampling. JE/AES cases were traced with the help of the line list procured from the district health system. The core themes that emerged were: JE/AES is a deadly disease, but not a major health problem; filthy conditions, filthy water and mosquitoes result in JE/AES – overall filth being the main factor; pigs not seen as a source of infection; no social or cultural resistance to JE vaccination or mosquito control activities; minimal role of govt. health workers in the care of acute illness; no gender-based discrimination in the care of acute illness; and non-utilization of funds available with local self govt. Some themes of divergence between community and providers did also emerge, especially about JE vaccination activities. Divergences in views were also found within the health system stakeholders. Several challenges and systematic failures in delivery of care during acute illness, which can critically inform the health systems, were also identified. There is an immediate need for a cross-sector collaboration to raise awareness, augment preventive interventions, and to strengthen health facilities for early management of acute illness.

I7 - Human-Animal interactions

17.1: Zooprophylaxis: a realist review

Blanaid Donnelly, McGill University, Canada; Lea Berrang-Ford, McGill University; Nancy A. Ross, McGill University, Pascal Michel, Public Health Agency of Canada

Malaria is a preventable, treatable disease that is responsible for 500 million clinical cases resulting in 800,000 mortalities per year, 90% of which occur in Sub-Saharan Africa. The World Health Organization recommended zooprophylaxis, or the use of animals to divert mosquitoes from humans to reduce malaria risk, as a component of malaria control programs in 1982. However the evidence to support this strategy is conflicting. Some research shows that the presence of livestock and other animals may attract mosquitoes into close proximity with humans, thereby increasing human malaria risk. A realist review of the English language, peer-reviewed literature on zooprophylaxis was conducted to understand why this lack of consensus exists within the literature and under what circumstances animals increase or decrease human risk of malaria. Three electronic databases were searched, and forward and backward citation tracking used to identify articles relating to zooprophylaxis. Seventeen empirical studies were included and analyzed. The weight of evidence suggests that zooprophylaxis could be an effective strategy to reduce malaria transmission in specific contexts. Firstly, zooprophylaxis is only effective when the mosquito species present do not have a strong preference for humans. Secondly, in order to take advantage of mosquito preference for animals, animals must be kept out of human sleeping quarters at night. Thirdly, where bed nets are used, mosquitoes are more likely to feed on animal hosts as an alternative. Further study is needed to understand the role of socioeconomic status as well as that of distance on zooprophylactic success and how this varies by region, animal species, and number.

17.2: Mapping Of Human And Animals Toxoplasmosis Based On Geographical Information System In Indonesia Trough Ecohealth Approaches

Wayan T Artama, Gadjah Mada University, Indonesia; Barandi Sapta Widartono, EHRC-UGM; Mahardika Wijayanti, INDOHUN, Faculty of Medicine, UGM, Dyah Ayu Widiasih, EHRC-UGM; Tjut Sugandawati Djohan, EHRC-UGM, Ecology; Adhiheru Husodo, EHRC-UGM, Public Health; Fihiruddin Fihiruddin, Akademi Kesehatan Mataram

Toxoplasmosis in human is one of the public health problems due to high economic impact in relation to patient care, born defect such as hydrocephalus, microcephalus, mental retardation, and retinochoriditis. The relationship *Toxoplasma gondii* to humans, animals and the environment are interdependencies to keep the survival of their life. Changes in environmental conditions due to ecological change will affect the existence definitive and intermediate host of *T. gondii* that have an impact on the prevalence and distribution of toxoplasmosis. Risk factors that likely contributing to the spread of toxoplasmosis in Indonesia are the presence of definitive host, altitude, land surface temperature and climate condition that favours for the development of oocyst, but also eating habits, gender and occupation. The aims of this research are mapping of toxoplasmosis in Indonesia, study the prevalence of toxoplasmosis in the human and animals population and also identify potential risk factors trough the use of an EcoHealth approach. Five thousand five hundred samples from human and 2000 samples from animals were collected from April 2012 until January 2014 using double cluster design. Data on potential risk factors were obtained through interviews and participatory approaches on household level. For serological test based on ELISA (IgG) was performed. Risk factors analysis was performed and related odds ratio were calculated. Prevalence of human and animals toxoplasmosis were mapped using GIS. Serological prevalence of toxoplasmosis for the case in the Province of Yogyakarta was 61,5% with highest values for Kulonprogo District (78,6%), followed by Sleman (72,4%), the city of Yogyakarta (69,5%), and the District of Bantul (57,6) and Gunung Kidul (29,5%). The results from Bali province was 36%, Sumatera 47% and the other provinces still on going. There were differences in the prevalence of toxoplasmosis based on altitude, soil surface temperature and cat populations around the settlements. Identified risk factors significantly associated with prevalence of toxoplasmosis in the study area were gender, geography, contact with cat, goat meat, raw

vegetable consumption, occupation related to contact with raw meat, and activities related to contact with soil. Age, undercooked chicken and beef consumption, and raw vegetable consumption at home were not associated.

I7.3: Bushmeat trade in Cross River State, Nigeria: Pathways for zoonotic disease exposure

Sagan Friant, University of Wisconsin - Madison, United States; Tony Goldberg, University of Wisconsin-Madison

Bushmeat is an important cultural, nutritional and economic component of life in many rural areas of West and Central Africa. Increasing wildlife extraction rates over the past few decades led to a burgeoning concern for disease transmission between humans and wildlife. We conducted 327 interviews with 184 bushmeat hunters and 143 non-hunters in five rural hunting communities in Cross River State, Nigeria. We use responses from orally administered questionnaires to: 1) define transmission pathways by the nature and frequency of interactions between humans and wildlife, 2) measure perceived risk and its effectiveness in mitigating exposure and, 3) identify socio-economic factors that may put individuals at increased risk of zoonotic infections from wild animals. Ninety-nine percent of respondents reported eating bushmeat at some point in their lives, and 87% reported consuming primates. Hunters had higher rates of contact with wild animals through modes other than hunting, including: consumption (.05). Ninety-six percent of participants responded that they would prefer their children not to become hunters. These results demonstrate multiple transmission pathways and the presence of high risk groups, as well as providing insights into the socio-economic drivers that may ultimately put individuals at increased risk of zoonotic infections from wildlife.

I8 - Identifying risks

I8.1: High risk disease transmission interfaces for zoonotic viruses

Christine Johnson, University of California, United States; Peta Hitchens, University of California, Davis; Tierra Smiley, University of California, Davis; Tracey Goldstein, University of California, Davis; Damien Joly, Metabiota; William B Karesh, Ecohealth Alliance; Jonna Mazet, University of California

Effective prevention and control of many important infectious diseases require an appreciation of the biological, ecological, and social processes promoting disease transmission at the human-animal interface. Recent emerging infectious disease events involving wildlife have prompted large scale surveillance for novel zoonotic pathogens in areas where high density human populations coincide with rapid landscape change and high levels of wildlife biodiversity. Investigation of disease transmission interfaces common to zoonotic viruses will identify high-risk settings and ecological niches that should be further targeted for surveillance and disease prevention efforts. We characterized high risk interfaces involved in transmission of zoonotic viruses among wildlife, domestic animals and humans through a systematic review of the scientific literature to gather data on the human activities, circumstances, and animal hosts implicated at the point of zoonotic disease spillover. Wild animal hosts were implicated in pathogen spillover for the vast majority of viruses. High risk interfaces enabling transmission of viruses from wildlife to humans involved hunting, animal contact with veterinarians, researchers and workers in laboratory settings, and contact with animals in and around humans dwelling and agricultural fields. Broad host range among viruses was significantly associated with circumstances that enable mixing of divergent species, such as the wildlife trade, and vectorborne transmission that facilitates movement of viruses between hosts that are not typically in close contact. High risk interfaces represent specific ecological niches with increased opportunities for disease transmission and are being targeted for zoonotic pathogen discovery efforts in USAID's Emerging Pandemic Threats PREDICT Program. Through collaboration with local partners and government

ministries overseeing public health, animal health, and environmental resources, surveillance capacity is developing in many countries to identify wildlife viruses with the potential to cause disease in humans, towards a more preventive approach for surveillance in hotspots for disease emergence.

18.2: Risks with urban and peri-urban milk production in India

Johanna Lindahl, International Livestock Research Institute, Kenya; Mannish Kakkar, Public Health Foundation of India; Purvi Mehta-Bhatt, International Livestock Research Institute, Ram Deka, International Livestock Research Institute; Delia Grace, International Livestock Research Institute

The interface between human and animal health is never as evident as when it comes to animal-source food production and distribution in developing countries. Animal-source food production is critical for the livelihood of one billion smallholders, the majority of which live in South Asia. However, there are risks of food-borne diseases, which may contribute to 4% of total disease burden in low-income countries, where more than a million children die every year of diarrhoea. The human-livestock interface varies across countries and ecosystems, with urban ecosystems increasing worldwide. Milk is one animal-source food products of high importance for its nutritional properties, especially for children, but also its risks: not only pathogens but also chemical substances, such as aflatoxins and antibiotic residues can be transmitted. In India, dairy is important and most production goes through traditional market systems, especially in cities. However, most interventions to improve productivity and milk hygiene have been aimed at the formal sector. We have shown it is possible to influence the hygiene in the informal sector by interventions. In Assam state, milk producers and traders were trained to improve hygienic practices in 2011-2012 and then a survey was conducted to evaluate impact. Compared to untrained producers, significantly less trained milk thought that dirt in the milk was harmful, and fewer thought that it was possible to tell if the milk was safe by looking at it. The same difference was evident among traders, but not significant. A significantly higher proportion of both trained producers and traders used soap regularly to clean hands. Next we will evaluate the risks with transmission of a zoonotic disease, tuberculosis, and antibiotic residues within peri-urban settings, and identify possible interventions to reduce human exposure. By doing this we hope to further mitigate the risks associated with milk production and consumption in India.

18.3: Identifying risk behaviors and environments for Buruli ulcer infection in Ghana: The use of a simple questionnaire survey

Charles Quaye, Noguchi Memorial Institute for Medical Research, Ghana; Lydia Mosi, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire; Charles Narh, Noguchi Memorial Institute for Medical Research, Christelle Dassi, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire / Afrique One Consortium; Daniele Konan, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire; Bassirou Bonfoh, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire

The mode of transmission of Buruli ulcer (BU), a tropical mycobacterial infection of the skin, is still not known and this greatly hampers efforts at control and prevention. The one health concept offers an opportunity to study BU in a more systematic manner aimed at establishing routes of infections, reservoirs or vectors and human behaviours that poses a higher risk of infection, an approach recommended in several environmental and transmission studies. This study aims at using a simple structured questionnaire to identify risk environments and behaviors that predispose humans to BU infection. In total, 224 questionnaires were randomly administered in four BU endemic communities in the Amansie Central District of Ghana. Six active and 18 healed BU cases were observed. The main livelihood strategy was farming (96.5%) which was not a risk factor for BU infection. Crop farmed and field type was also found not to increase the risk of BU infection. Although all four communities had at least one functioning borewell, 50% of inhabitants use other water sources and bathing and swimming in

these water bodies increased the risk of BU infection (OR=3.2840, p=0.045). The Offin River was observed as the only water body that all four communities had the most contact with but six other water contact points were identified. Buruli ulcer awareness in the study community was very high (94%) with almost 70% attributing the infection to the use of surface water. Types of animals reared in households did not increase risk but the hunting of squirrels significantly correlated to an increased risk of acquiring BU infection (p=0.0099). In conclusion, contact activities in risk environments are important in BU infection as previously described. Other activities such as hunting for squirrels was shown to increase this risk, a development which needs further exploration.

I8.4: Reducing Vulnerability to the Threat of Japanese Encephalitis Transmission in High Risk Districts in Nepal

Minu Sharma, National Zoonoses and Food Hygiene Research Centre, Nepal; Minu Sharma, National Zoonoses and Food Hygiene Research Centre; Dhan Kumar Pant, National Zoonoses and Food Hygiene Research Centre, Minu Sharma, National Zoonoses and Food Hygiene Research Centre; Meena Dahal, National Zoonoses and Food Hygiene Research Centre

Introduction: Japanese encephalitis is a mosquito-borne disease that has pigs as the major amplifying hosts. It is the most important cause of viral encephalitis in Nepal and is spreading in its geographic distribution in the country. Pig farmers have been shown to have routine exposure to JE risk factors. **Objective:** To reduce the vulnerability of at risk population to the current JE threat and improve planning to become more resilient and prepared for anticipate change in JE epidemiology **Methods:** A cross sectional study was conducted in four districts of Nepal based on eco-health approach. Three scale data were collected and analyzed by SPSS and GIS software. **Result:** Exposure to JE risk factors was common across pig farm and pig farming districts but there were significant district level difference in knowledge and practice related to on farm JE risk reduction. JE vaccine up take was almost nonexistent (1/400) and mosquitoes control steps were uncommon across all four district. Pre-monsoon vector survey indicated that species diversity was high in Morang district (simpson'index=0.06). Spatial distribution of JE and AES seemed to be similar and amount of irrigated land use density and degree of landscape mixing with irrigated areas were positively associated with JE and AES. The human and pig sero-positivity were found to be 11.17(41/367) and 28.93 (149/515) in all four district on Nepal **Conclusions:** The low uptake of vaccine and lack of infrastructure or financial capacity to house pigs indoors and/or away from people suggest that farmer personal protection should be a priority target for education in Nepal.

I9 - Zoonosis and public health

I9.1: Resolving Dilemmas of Acute Encephalitis Syndrome Aetiology in India Through Systems Thinking and Ecohealth Approach

Mannish Kakkar, Public Health Foundation of India, India; Elizabeth T Rogawski, Gillings School of Public Health, University of North Carolina at Chapel Hill; Syed Abbas, Public Health Foundation of India, Sanjay Chaturvedi, University College of Medical Sciences; Tapan N Dhole, Sanjay Gandhi Postgraduate Institute of Medical Sciences; Shaikh Shah Hossain, Centre for Disease Prevention and Control, India; Sampath Kumar Krishnan, World Health Organization

Japanese encephalitis is a zoonoses with multiple host range and complex transmission cycle spanning across different sectors. Its drivers of transmission range from eco-epidemiological to social, cultural and systemic in nature. Failure to recognize their cross sectoral and transdisciplinary distribution can lead to ambiguity about JE

transmission dynamics and epidemiology. Quality of surveillance is one such systemic driver that when compromised, contributes to this ambiguity, besides impacting planning and estimating effect of interventions, effective utilization of public health resources, and developing policy. Not surprisingly therefore, despite introduction of JE vaccine, India continues to record higher number of AES cases, with spread to newer areas. Bulk of these cases are of unknown aetiology, questioning the assertion of JE being a leading cause of AES. We reviewed completeness and quality of AES surveillance data, as a reflection of quality of AES/JE surveillance, for January 2011 June 2012 from high JE endemic district of Kushinagar, Uttar Pradesh, India. Data was cleaned, incidence determined, and demographic characteristics of cases and data quality analysed. 812 AES case records were identified, of which 23 had illogical entries. Records for laboratory results (available for JE, not AES) and vaccination history were largely (>82%) incomplete, so inferences about AES epidemiology and aetiology could not be made. While response of India's scientific community has been to explore other aetiologies of AES, failure to recognize larger systemic issues, besides ignoring social, cultural and environmental determinants within and across sectors, have gone unaddressed. This is reflected in the poor quality surveillance data in Kushinagar. AES control efforts therefore are in urgent need for broader ecohealth type systems approach that can generate evidence, recognize the problem and identify solutions from a transdisciplinary and cross sectoral perspective for sustainable and

I9.2: EcoHealth: an Innovative Approach to the Control and Elimination of Schistosomiasis in Gonzaga, Cagayan, the Philippines

Lydia Leonardo, College of Public Health, University of the Philippines Manila, Philippines; Remigio Olveda, Research Institute for Tropical Medicine,; Veronica Tallo, Research Institute for Tropical Medicine, Daria Manalo, Research Institute for Tropical Medicine; Ligaya Picazo, Research Institute for Tropical Medicine; Louie Sunico, Rural Health Unit of Gonzaga

Schistosomiasis affects tropical and sub-tropical countries in Africa, Middle East, South America and Southeast Asia. The Philippines has 28 endemic provinces that are rural, poor and agricultural. Mass drug administration (MDA), the primary control measure successfully reduced prevalence but failed to eliminate schistosomiasis. Ecohealth involving a transdisciplinary and participatory approach might be the answer to this age-old public health problem perpetuated by poverty, favorable environmental conditions and risky behavior and practices of people. Gonzaga in the Philippines was found to be endemic for schistosomiasis in 2002. Using MDA, the prevalence dramatically went down in the first year but fluctuated thereafter depending on the participation of the people. The Ecohealth approach provides a renewed perspective and revives hope of the possibility of elimination of the disease in Gonzaga. Through the IDRC project, the Ecohealth approach allowed health authorities to dissect the schistosomiasis problem into many parts aside from biomedical aspect. There is deeper understanding of people's behavior especially why they continue to engage in risky behavior and yet refuse treatment. There is greater recognition of the contribution of livestock in transmission and animal owners are consulted on how they can best participate without prejudice to their livelihood. Farmers, a high risk group are able to explain the obstacles they face in participating. Educators develop the best way to communicate and impart knowledge of schistosomiasis to both schoolchildren and the community. Six meetings of stakeholders representing the health sector, local government, education, veterinary, agriculture, irrigation sectors, the academe and research sector and community representatives proved successful in intensifying awareness and obtaining commitment for a collaborative, participatory, multisectoral and holistic way of attacking this multifaceted problem and eventually eliminating it. Success is anticipated making the Ecohealth approach a model for control and elimination of the disease in other endemic areas in the

19.3: Impacts of Poultry Production Cluster (PPC) on Public Health Case Study in Subang and Ciamis Districts, West Java, Indonesia

Ratu Sartika, Faculty of Public Health, University of Indonesia, Jakarta, Indonesia; Edi Basuno, Indonesian Center for Socio Economic and Policy Studies; Nyak Ilham, Indonesian Center for Socio Economic and Policy Studies, Yusmichad Yusdja, Indonesian Center for Socio Economic and Policy Studies

Rapid growth and development of the poultry industry in Indonesia has been at the root of many challenges – from increased poultry disease to public health challenges. Research was conducted to find out if industry restructuring of poultry farms into clusters has impacted the health of young children (less than five years of age) who have a high vulnerability to respiratory, diarrhea and skin diseases. We collected and analyzed local patient data from West Java study sites, in conjunction with in-depth interviews with parents, health workers, public health practitioners and other local stakeholders. Results showed that health workers did not perceive an association between pediatric respiratory, diarrhea and skin diseases with chicken farm. However local villages were disturbed by flies and poor air quality from poultry farms, especially during the harvesting of poultry. Impacts of poultry farming on environment and health are locally sensitive issues with perspectives varying between informants. Some informants tend to uncover specific information and provide less consistent answers. In general, informants indicated that respiratory, diarrhea and skin diseases in children is caused by weather change, from dry to rainy season, and low hygienic and unhealthy behaviors. In one village, a cluster of skin disease cases were found within the close family of one poultry farmer. Further investigation found that all case subjects used the same water source near the chicken coop. Analysis of monthly patient data found that cases of diarrhea and respiratory disease in children were relatively higher in villages crowded with chicken coops than other villages; 39 vs.23 for diarrhea and 137 vs. 23 for respiratory disease. To understand the association between pediatric diarrhea and respiratory disease with clusters of poultry farms, further research is warranted to understand the risk factors for these diseases and their possible link to poultry farming.

19.4: Salmonella spp. Contamination in Pig Slaughterhouses and Pork Markets and Food Safety in Hung Yen, Vietnam

Sinh Dang Xuan, Center for Public Health and Ecosystem Research (CENPHER), Hanoi School of Public Health, Vietnam

Salmonella contamination along the pork production chain is a worldwide concern and interdisciplinary approach is important for food safety management. This study aimed to identify prevalence of Salmonella in pig slaughterhouses and markets, determined risk factors and explored perception and practices on food safety. From January to May 2013, 87 samples from slaughterhouses (carcass surface, workers' hands, cutting boards) and 87 samples from markets (pork, sellers' hands, cutting boards) were collected on 4 repeated visits in 3 districts in Hung Yen, Vietnam. Salmonella were isolated from 174 samples using ISO 6579:2002. Perception and practice related to food safety of slaughter workers, people living around slaughterhouse, pork sellers, consumers, veterinary and public health staffs were investigated using quantitative and qualitative approaches. Salmonella prevalence at slaughterhouse was 36.9%, while 34.9% found on pig carcasses. At market, Salmonella prevalence was 41.4%, whereas 42.9% identified in pork. *S. Typhimurium* and *S. Derby* were mostly found (19.4%) in slaughterhouses and at markets, respectively. Risk factors associated with Salmonella positive at market were using wooden surface table and bucket water, cutting pork directly on table and selling both retail and wholesale. Slaughter workers and pork sellers showed their perception on 2-3 pig zoonotic diseases and expressed the need of targeted training on food safety. People living around slaughterhouses stated that presence of the slaughterhouse provides jobs, whereas there are certain concerns on environment, human and animal health affect. Pork consumer groups concerned more on sensorial criteria when selecting pork. Veterinary and public health staff groups emphasized the gap on food safety management; need an effective collaboration with other sectors. This study underlines the interdisciplinary approach provides a better

understanding on and application to food safety management as well as contributes to further risk analysis of Salmonella in pork chain.

ABSTRACTS : Special sessions

A2 - From Creative Engagement to Critical Transform: Innovations in Digital Storytelling for Ecohealth Researchers and Educators

Organizer : Vanessa Sloan Morgan, University of Northern British Columbia, Canada

Presenters :

- 1) Heather Castleden - Associate Professor and CIHR New Investigator, School for Resource and Environmental Studies, Dalhousie University, Halifax, Nova Scotia, Canada
- 2) Ashlee Cunsolo Willox - Canada Research Chair, Determinants of Healthy Communities, Assistant Professor, Community Health Departments of Nursing & Indigenous Studies, Cape Breton University, Sydney, Nova Scotia, Canada
- 3) Inez Shiwak - Coordinator, 'My Word': Storytelling and Digital Media Lab, Rigolet, Nunatsiavut, Labrador, Canada
- 4) Vanessa Sloan Morgan - Research Associate, Ecohealth Knowledge to Action Research Group, School of Health Sciences, University of Northern British Columbia, Prince George, British Columbia, Canada - Presenter, Confirmed ;
- 5) Sandra Harris - Wet'suwet'en Nation & Steering Committee Member, Ecohealth and Watersheds in Northern BC, Smithers, British Columbia, Canada

Abstract :

Digital storytelling has emerged as a novel and innovative, yet relatively under-explored, strategy for ecohealth research and education. Capable of simultaneously communicating layers of visual, audio, and textual information through the integration of photographs, video, narratives, and music, digital storytelling places the voices and experiences of the storyteller at the forefront of the medium and the creation process. Breaking the bonds of conventional research and educational tools premised upon linear or one-dimensional approaches to communicating knowledge, digital storytelling has the ability to grapple with complex subject matter and transcend disciplinary boundaries and approaches. Digital stories themselves have the capacity to address multifaceted topics; the creation process translates the storyteller's thoughts into an accessible, yet complex form, illustrating lived experiences and place-based narratives. This participatory session will explore researchers' and storytellers' experiences with digital storytelling as a platform for research, knowledge integration, and mobilization in ecohealth and related contexts. Researchers and storytellers/co-presenters will present the outcome of three diverse digital storytelling projects: 1) a community-led capacity-building initiative with the five Inuit communities of Nunatsiavut, Labrador examining the climatic and environmental determinants of mental health; 2) a story made in partnership with the Office of the Wet'suwet'en concerning the inseparable connections of environment, community, and health; and 3) an educational tool used to engage settler-identified graduate students in Mi'kmaq perspectives concerning the environment, health, and wellbeing. Presentations will cover diverse research and educational processes and approaches to digital storytelling, while demonstrating how digital stories are able to highlight interconnections of ecosystems and health within distinct cultural and/or transformative learning environments. Audience members will then form breakout groups to generate discussion on logistics, ethics, and outcomes, concluding with an open-floor engagement session. Participatory activities seek to gather audience perspectives on the appropriateness of digital storytelling for future ecohealth initiatives.

A3 - The Question of “Communication” in Ecohealth

Organizers: Rachel Hirsch, Social Justice Research Institute, Brock University; Marie Eve Rioux-Pelletier, CINBIOSE, Université du Québec à Montréal, Canada

Presenters:

- 1) Rachel Hirsch - Brock University, St. Catharines, Canada (moderator);
- 2) Johanne Saint-Charles - Université du Québec à Montréal, Canada ;
- 3) Matt Feagan - International Development Research Centre, Ottawa, Canada ;
- 4) Martin Bunch - York University, Toronto, Canada ;
- 5) Frédéric Mertens - Universidade de Brasília, Brazil.
- 6) Oumar Kane - Université du Québec à Montréal, Canada
- 7) Marie Eve Rioux-Pelletier - Université du Québec à Montréal, Canada

Abstract :

Communication is implicitly woven into the central elements of ecosystem approaches to health and wellbeing (EAH) by, for example, encouraging scholars to transcend disciplines by sharing knowledge across and within diverse epistemic communities (transdisciplinarity) or a demonstrated tenacity for public engagement and the inclusion of diverse stakeholders (participation). There is a tendency for scholars and practitioners to conceptualize communication as a simple linear process without giving due consideration to the complex and dynamic nature of knowledge practices. We present a dialogue in three parts. Our discussion begins with an overview of major trends in the field of communication including environmental communication, communication as a social process, and dialectic approaches to communication. Second, we situate communication as a complexity science using the example of qualitative systems mapping to indicate how communication practices evolve in complex knowledge systems. Finally, we conclude with a facilitated discussion soliciting feedback from participants about the challenges or opportunities that they foresee in adopting a complexity-orientated approach to communication in their EAH practice and reflecting on different modes of communication.

Format: Workshop Language: English

A4 - Working together towards improving Indigenous health and well-being: an interactive story-sharing session with those that we have a lot to learn from

Organizers: Mélanie Lemire, Université Laval; Myriam Fillion, Université d'Ottawa - Canada; Sherilee Harper, University of Guelph, Canada

Presenters:

Mélanie Lemire, Université Laval, Canada (Moderator)

- 1) Stanley Volant, M.D., coordinator of the Aboriginal component at the Faculté de Médecine, Université de Montréal, Canada
- 2) Éric Loring, M.Sc., Senior Policy Advisor and Environment Researcher, Inuit TapiriitKanatami, Canada
- 3) Pierre Haddad, Ph.D., Professor, Département de pharmacologie, Université de Montréal, Canada
- 4) Sonia Wesche, Ph.D., Assistant Professor, Department of Geography, University of Ottawa, Canada
- 5) KhosrowFarahbakhsh, Ph.D., P. Eng., Associate Professor, School of Engineering, University of Guelph, Canada

Abstract :

A growing number of researchers, practitioners, NGOs, governmental agencies, and Aboriginal groups have been working together to develop innovative approaches to better encompass the multidimensional issues now faced by several Indigenous nations in Canada and elsewhere in the world. Indeed, Indigenous health research and

practice is increasingly contributing to understanding, enhancing, and expanding transdisciplinary approaches that embrace the complexities of the 21st Century. For graduate students, early career scientists, and practitioners from multiple sectors, however, much of this learning happens outside the classroom and outside the academic literature and professional practice manuals.

Often times, we learn through our own personal on-the-ground experience, or through the stories and lessons learned that are shared by our colleagues and mentors. Sharing stories from the field can provide a powerful platform to learn from each other, reflect on our own experiences and practice, and build relationships. As such, in this session, top researchers and practitioners in the field of Indigenous health will share their insights, experiences, and lessons learned from the field in an interactive, hands-on workshop setting. We have a lot to learn from each other and to share with the next generation of young academics and colleagues.

Format: Elevator and Coffee Machine Pitch Language: English

A5 - Unraveling the complexity of persistent health and gender inequalities through disciplinary dialogue: examples drawn from the (real) world of work

Organizers: Rachel Cox and Karen Messing, CINBIOSE, UQAM, Canada

Presenters:

- 1) Rachel Cox - Professeure, Département des sciences juridiques, UQAM, Montréal, Canada
- 2) Jessica Riel - Professeure, Département des relations industrielles, Université du Québec en Outaouais, Gatineau, Canada
- 3) Anne Renée Gravel - Professeure, École des sciences de l'administration, TELUQ, Montréal, Canada
- 4) Nathalie Houlfort - Professeure, Département de psychologie, UQAM, Montréal, Canada

Abstract :

In a project entitled " Looking at health at work through a gender and sex lens", feminist researchers from a range of disciplines (industrial relations, law, psychology, ergonomics, communications, economics) using a variety of methodologies (quantitative, qualitative and mixed) decided to work together to engage in an interdisciplinary dialogue in order to better understand the marked persistence of known health problems and blatant gender inequalities – themselves embedded in class and sometimes racial inequalities – in today's work environments. Work intensification and global competition have increased the hardship suffered by many workers at work and raised the prevalence of psychosocial risk factors and ergonomic hazards in the workplace. Jobs are more precarious, both in terms of job security but also in terms of physical work organization. At the same time, workers' "marge de manoeuvre" or ability to negotiate the various constraints associated with their work (job duties within the management-imposed framework of work organization but also schedule, family-work interface, and so on) has often been reduced. In order to try to better bridge the gap between public policy in the areas of women's equality and health at work and actual working conditions for many workers, the research team looked at several themes including : (1) precarious workers' capacity to affirm their rights in terms of minimum work standards and health and safety; and (2) the effectiveness of policies on psychological and sexual harassment at work in preventing harassment of women at work. By taking the time to share different disciplinary perspectives on a gendered and systemic approach to health at work, the researchers hope to uncover important clues about how to design and implement policies that are effective in creating healthier workplaces and in which workers' labour and equality rights can be enforced.

Format: Panel including discussion with session attendees Language: French and English

A6 - Increasing Resilience to Vector and/or Water-Borne Diseases from an Ecohealth perspective in Africa: Case studies in Côte d'Ivoire, Botswana and Tunisia

Organizers: Brama Koné, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Côte d'Ivoire ; Mouhamadou Seidou Chouaibou, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Côte d'Ivoire ; and Sid'Ahmed Dahdi, Département de Santé Publique, Faculté de Médecine, Université de Nouakchott, Mauritanie

Presenters:

- 1) Pr Guéladio Cissé - Swiss Tropical and Public Health Institute, Basel, Switzerland (Moderator)
- 2) Dr Brama Koné - Centre Suisse de Recherches Scientifiques (Abidjan) and University Péléforo Gon Coulibaly (Korhogo), Côte d'Ivoire ;
- 3) Dr Dieudonné Kigbafory Silué - Centre Suisse de Recherches Scientifiques and University Félix Houphouët Boigny, Abidjan, Côte d'Ivoire ;
- 4) Bernadette Ramirez - Special Program for Research and Training in Tropical Diseases (TDR), World Health Organization, Switzerland
- 5) Johannes Sommerfeld - Special Program for Research and Training in Tropical Diseases (TDR), World Health Organization, Switzerland
- 6) Emmanuel Easo et al. - Centre Suisse de Recherches Scientifiques, Côte d'Ivoire ;
- 7) Habib Ben Boubaker - University of Manouba, Tunisia
- 8) Mohamed Kouni Chahed - Faculty of Medicine of Tunis, Tunisia
- 9) Moses Chimbari et al. - College of Health Sciences, University of KwaZulu-Natal, South Africa

Abstract :

Africa is known to be one of the most vulnerable continents to climate change. Many poor, marginalized and vulnerable communities are exposed to a high burden of some water-related and vector-borne diseases. Climate and associated social changes are adding new pressures on these diseases for which the impacts in terms of related hazards, vulnerabilities and exposure are anticipated but not well described for better adaptation. The proposed symposium is on the basis of an ongoing TDR/IDRC research initiative on "Population Health Vulnerabilities to Vector-Borne Diseases: Increasing Resilience under Climate Change Conditions in Africa" and a recently completed IDRC/ACCA program (2009-2012) on "Innovation on Water, Health and Climate Change Adaptation in Africa".

The symposium aims to present conceptual and methodological issues and challenges in investigating multiple drivers of vulnerability and resilience in the context of environmental and social change and their implications for community-based adaptation in Africa. Case studies in Côte d'Ivoire, Botswana and Tunisia will constitute the framework for exchange of experiences on vulnerability and resilience assessment and, a common ground for discussion on sustainable adaptation strategies.

Format: Symposium Language: English

A7 - Intercultural design and implementation of an ecobiosocial research initiative with two indigenous communities: an Ecohealth experience from Colombia

Organizers : Catalina González-Uribe, Centro de Estudios e Investigación en Salud, FSFB; Helena Brochero, Universidad Nacional de Colombia, Colombia

Presenters:

- 1) Catalina González-Uribe MA MSc PhD, Centro de Estudios e Investigación en Salud, CEIS, Fundación Santa Fe de Bogotá, Colombia
- 2) Daniel Garzón (Anthropologist) Centro de Estudios e Investigación en Salud, CEIS, Fundación Santa Fe de Bogotá, Colombia
- 3) Laura Castro-Díaz (Ecologist), Centro de Estudios e Investigación en Salud, CEIS, Fundación Santa Fe de Bogotá, Colombia

Abstract :

We propose this special session to present with our own words, videos and photos theoretical and methodological lessons learned in the context of an ecobiosocial research initiative with two indigenous communities in Colombia: the Bari of Karikachaboquira in Norte de Santander and the Wayúu of Marbacella y El Horno. The overall objective of the research underway is to co-construct an Ecohealth intervention for the prevention and control of vector-borne diseases. During the first phase of this project (2013-2014) a transdisciplinary team conformed by ecologists, biologist, entomologists, anthropologist, members and leaders of the local communities and relevant stakeholders set out to consent objectives and instruments for the collection of eco-bio-social factors influencing transmission dynamics of malaria and Chagas disease, in high-priority settings.

We developed an analytical strategy to integrate ecological, biological and social factors of interest allowing complementarity and integration of the results into products such as the ecohealth calendar and vulnerability maps, routes of therapeutic itineraries, maps of actors and experiential training of vector recognition and surveillance with the locals. Social participation through all stages of research provided feedback to the research team about the research rationale, objectives, methodology and interpretation of results. The EcoHealth approach was widely applicable through the pillars of: transdisciplinarity, social participation, systems thinking, gender and social equity and research to action. An intercultural philosophy to our research practice provided deep understanding of the local communities in relationship to health and disease processes related to vector borne diseases of their interest. This process allowed us to integrate local knowledge in the identification of key moments in the year where the susceptibility of transmission of these diseases increases or decreases. The information obtained is crucial for the design of a dynamic Ecohealth intervention for the prevention, control and surveillance of these diseases widely applicable in similar contexts.

Format: Panel

Language: English

B1 - The Place of Critical Social Theory, Social Justice and Qualitative Methodologies in Ecohealth Cosmologies

Organizer : Maya Gislason, University of Sussex, United Kingdom and University of Northern British Columbia, Canada

Presenters:

- 1) Maya Gislason - University of Northern British Columbia, Canada (Moderator)
- 2) Christine Vavotec - University of Vermont, USA
- 3) Joleen Timko - University of British Columbia, Canada
- 4) Mardie Townsend - Deakin University, Australia
- 5) Crescentia Dakubo - Northern Ontario School of Medicine, Canada
- 6) Manuel Vallee - University of Auckland, New Zealand
- 7) Jonathan Kingsley -University of Melbourne, Australia

Abstract :

The key task of this presentation is to actively and explicitly grapple with current debates around the place of critical social theory, qualitative methodologies and social justice arising in Ecohealth theories, methods and practices. Specifically, the place of these three thematic arenas will be discussed in relation to a recently published edited collection titled 'Ecological Health: Society, Ecology and Health' (2013). In this presentation the editor and a select group of authors will briefly describe how they engaged with these themes and how this project has informed their thinking around how critical engagement may help the field of ecohealth strengthen its work at the interface between human, animal and ecological health. These questions will then be posed to the audience who will then be invited to join the dialogue, share observations and offer suggestions for the development of these three themes within Ecohealth theory building, research and practice.

Format: Panel & open discussion Language: English

B2 - Environments and Health Initiative

Organizers : Nancy Edwards and Emma Cohen, Institute of Population and Public Health, Canadian Institutes of Health Research, Canada

Presenters:

Nancy Edwards, Scientific Director, Institute of Population and Public Health, Canada

- (15-20 min): Introduction and Evolution of the Initiative

Mario Rivero-Huguet, Science and Innovation Officer, British Consulate-General Montreal, Canada

- (15-20 min): Factors to Consider in Characterizing Vulnerability to Environmental Contamination Across North America

Mathieu Valcke, Lead, Toxicological and Radiological Risk Assessment Group, Institut national de santé publique du Québec, Canada

- (15-20 min): public health research and practice perspective
- Discussion (30-45 min)

Abstract :

The environment—including its ecological, built, and social dimensions—has myriad and complex impacts on human health. Environmental change processes are accelerating and levels of connectedness from local to global scales are increasing. The Canadian Institutes of Health Research has developed a Signature Initiative on environments and health. Key objectives are to: support data enhancements and facilitate interoperability of existing data platforms for measurement, etiology, and intersectoral prevention research; examine environment-gene-microbiome interactions and the effects of cumulative exposures across the life course; and, examine and compare the impacts of intersectoral prevention-oriented strategies having positive and equitable effects on human health. There will be a focus on three nexus areas: agri-food, resource development and urban form. Anticipated impacts of the initiative include:

- Improved measures of multiple and cumulative environmental exposures;
- Advanced understanding of critical points for environmental intervention along the life-course;
- Evidence-informed intersectoral policy decision-making related to environments and health; and,
- Improved population health outcomes through health-enhancing environments.

This session will provide a unique opportunity for participants to learn about the evolution (from conception to implementation) of the Environments and Health Signature Initiative and to provide input on how this Initiative can optimally build on research advances and existing capacity in the field of ecohealth in Canada and globally. Speakers will present and provide reflections on current research examples on vulnerability assessments as they relate to the CIHR Environments and Health Signature Initiative and its nexus areas.

Format: Presentations followed by discussion Language: English

B3 - Nuts & bolts of EcoHealth research: building capacity in data integration for Ecohealth studies

Organizers: Aline Philibert and Tiff-Annie Kenny, University of Ottawa, Canada

Presenters:

1) Aline Philibert - Ph.D., Research associate, University of Ottawa, Ottawa, Canada

2) Nektaria Nicolakakis - Ph.D. post-doctoral fellow Department of Biological Sciences (CINBIOSE) and Department of Social & Preventive Medicine (CRCHUM), Montreal, Canada

3) Niladri Basu - Prof., University McGill, Montreal, Canada

4) Frédéric Mertens - Prof. University of Brazilia, Brazilia, Brasil

5) Jason Carney - MPH. IDRC/CRDI Advisory Committee on Research Ethics (ACRE), Ottawa, Canada

6) Nicole Atchessi, Ph.D. Montreal School of Public Health, Montreal, Canada

7) Prof. Benjamin Fayomi, Dean of the Public Health faculty, Cotonou, Benin

Abstract :

While Ecohealth approach allows for an integrated comprehension of a given situation, it also poses important methodological challenges, particularly for the integration of data coming from different disciplines, with different types of variables, scales and/or locations. Quality of results, which depends on the integration of these data, has become a bottleneck for the translation of research findings into practice and their use in decision-making. To this end, addressing the statistical issues related to data integration has considerable relevance for continued progress in EcoHealth research and presents exciting opportunities for further significant methodological advancement. However, challenges associated with statistical analysis in inter or trans-disciplinary studies are often viewed as being insurmountable, thereby limiting the potential value of capturing results in an ecosystem perspective. Not surprisingly, in order to consider such a wide variety of disciplines at both local and global scales, environmental health statistics cannot be just limited to exclusively traditional statistical approaches. All these analytical challenges point to the need to share knowledge and experience in integrative analyses between research teams. The main goal of this session is to illustrate, through several case studies, a series of analytical tools that are conceptually sound and produce results that are relevant and experimentally verifiable. Different areas of application will be covered (ecological studies, environmental and public health, including sex/gender modalities). The workshop will present the applicability of different analytical strategies for data integration, including for example, integrative assessment, creation of indices, spatial techniques and system dynamic modeling. Challenges and opportunities will be discussed. We believe this session will encourage the participants to address the integrated analysis of data across a wide spectrum of analytical tools.

Format: Panel discussion Language: English

B4 - What is Research Excellence on Health, Environment and Society?

Organizer : Andrés Sánchez, Acting Program Leader Ecosystems and Human Health, IDRC, Canada

Presenters :

Dominique Charron - International Development Research Centre, Ottawa, Canada (interviewer).

1) Peter Daszak - Ecohealth Alliance and Editor in Chief, Ecohealth Journal, New York, USA

2) Mario Henry Rodriguez - National Institute of Public Health, Cuernavaca, Mexico

3) Rima Afifi - American University of Beirut, Beirut, Lebanon

4) Pattamaporn Kittayapong - Mahidol University, Bangkok, Thailand; associate editor of PLOS Neglected Tropical Diseases; and past board member of the International Association for Ecology and Health

5) Nancy Doubleday - McMaster University, Canada

Abstract :

What does it mean to conduct excellent scientific research? Traditionally, metrics of research quality have exclusively focused on scientific publication, with the acceptance of research into a high-ranking scientific journal with a large number of citations seen as a 'gold standard' of research excellence. This perception has been changing, however, with the research excellence discourse shifting to acknowledge that the concept of research excellence itself, is ever-evolving, diverse, contextual and multi-faceted, and that research excellence must also include other more holistic and bottom-up measures of impact.

The session will articulate, critique and reflect upon the concept of research excellence, particularly when considering research that brings together health, environment and society. It will allow an exploration of what research excellence means in health, environment and society research, and if there are dimensions that are unique to this domain or to other perspectives (geographic, thematic, institutional). Other key questions to be explored include: Are there gaps in our understanding of excellent research?; Can we articulate a core set of

research excellence dimensions?; And if so, how can we build upon this understanding to envision, design, support, monitor and evaluate excellent research?

Using an interview format, an interviewer will question and challenge panelists from varied geographic and disciplinary backgrounds, and will also encourage cross discussions between panelists and the audience.

Format: Interview and discussion Language: English

B5 - (Re)-Framing Health in Watersheds: From Environmental Health to Health in Social-Ecological Systems

Organizer : Karen Morrison, York University, Canada

Presenters:

- 1) Dr. Kawabata Zen'ichiro - Research Institute for Humanity and Nature, Kyoto, Japan
- 2) Dr. Margot Parkes - University of Northern British Columbia, Canada
- 3) Leonel Córdoba - Ph.D. Candidate, National University of Costa Rica, Heredia, Costa Rica
- 4) Dr. Martin Bunch - York University, Canada
- 5) Dr. Pierre Horwitz - Edith Cowan University, Australia

Abstract :

Watersheds (or catchments) are increasingly being conceptualized and governed as social-ecological systems. There are significant challenges, however, in moving from a focus on environmental health to one that considers the health of social-ecological systems, including people. These include linking human health and well-being to the more traditional indicators and indices of ecosystem health, and expanding the network of actors involved. The social dimension is complicated by the different, yet interconnected, relationships of watershed citizens upstream and downstream in a catchment area. This panel will discuss current efforts to connect human health and well-being to the watershed construct, through examples from Japan, the Philippines, Canada, Costa Rica and Australia. The central thesis of the panel discussion is that there is a connection between human health and well-being and watershed governance that goes beyond concerns over human security (e.g. floods, drought, contaminants) to include other values. In conclusion, the viability of trying to understanding human health and well-being in a watershed setting will be addressed.

Format: Panel Discussion Language: English

B6 - Community-led Research as a Climate Change and Health Adaptation Strategy: Experiences and stories from the Canadian North

Organizer : Sherilee Harper, University of Guelph, Canada

Presenters:

- 1) Ashlee Cunsolo Willox - Canada Research Chair, Determinants of Healthy, Communities, Assistant Professor, Community Health, Cape Breton University, Sydney, Canada
- 2) Sherilee Harper - Assistant Professor, University of Guelph, Guelph, Canada
- 3) Erin Myers - Senior Program Officer, Climate Change and Health Adaptation in the North, First Nations Inuit Health Branch, Ottawa Canada
- 4) Inez Shiwak - Coordinator, 'My Word': Storytelling and Digital Media Lab, Rigolet, Nunatsiavut, Labrador, Canada

Abstract :

Local observations and scientific monitoring have documented rapid changes in climate and environment in the Circumpolar North—changes which impact health and wellbeing. As such, finding ways to adapt to the health effects of climate change has become both a priority and a necessity for many Indigenous communities across

the North. While tangible adaptation strategies and resources are important, many projects overlook the capacity that research, and getting involved in the research process, has for communities, not only to yield important results about climate-sensitive health outcomes, but also to become an important adaptation strategy in and of itself. Understanding the potential of research to become an important adaptation strategy, this session will 1) provide an overview of climate change and health adaptation across the North, and the importance of moving from community participation to community leadership in research; 2) share research design and delivery insights from community-led research initiatives conducted in Nunatsiavut, Labrador on climate-sensitive physical and mental health to inform health adaptation; and 3) discuss how innovative funding structures can foster, support, and mobilize community-led climate change and health adaptation research in Indigenous communities across the North. These presentations will illustrate how Inuit and Northern First Nations communities are taking control of their own research agenda, and actively undertakes projects which meet the needs and priorities of the community in meaningful and locally-appropriate manners—research that moves from a community-based to a community-led framework, allowing communities to increase their overall research capacity, respond rapidly to research questions and needs that emerge, and actively create evidence-based health adaptation strategies in the communities to respond to the challenges of a rapidly changing climate.

Format: Panel and Discussion

Language: English

B7 - Bridging Environmental and Occupational Health

Organizers : Lise Parent, TELUQ, Nicole Vézina, UQAM, and Johanne Saint-Charles, UQAM, Canada

Presenters:

- 1) Donna Mergler, Cinbiose, UQAM, Canada
- 2) Anne Rochon Ford, Canadian Women's Health Network, Canada
- 3) Karen Messing, Cinbiose, UQAM, Canada
- 4) Douglas Barraza, Universidad Nacional de Costa Rica, Costa Rica
- 5) Bénédicte Calvet, Cinbiose, UQAM, Canada
- 6) Mélanie Lefrançois (animatrice) Cinbiose,
- 7) Caroline Jolly, Institut de recherche Robert-Sauvé en santé et en sécurité du travail, Canada

Abstract :

Environmental Health issues and occupational health issues often overlap, such as when the polemic is around applying pesticides or working in an industry surrounded by plastic, additives and solvents known as carcinogens. What happens in the workplace affects and is affected by the environment at large. Moreover, issues related to both the natural and working environments are sometimes presented as oppositional such as when job creation is opposed to protecting the environment. Despite the obvious links between environmental and occupational health problems, collaboration and sharing of knowledge between the two domains remains rare. Yet, for researchers in environmental health, worker's health is one of the many facets of the individual in its ecosystem, and from the point of view of researchers in occupational health, the physical, social, political, economic and technological environment serves as the context for the work activity. Hence, the two fields of expertise are often complementary. In this special session, presenters will propose examples of issues linking environmental and occupational health. Common approaches include consideration of complexity, interdisciplinarity, mixed methods, gender analysis and participatory methods. Both domains face common roadblocks as well: access to research sites, emphasis on reducing costs, legal impasses, lobby groups, and politics. With so many commonalities these two groups have much to learn from each other.

Format: Panel ;

Language: English

D1 - From Research to Actions: Experiences and Lessons from Ecohealth Interventions in Poultry Production Clusters in Southeast Asia

Organizers : Libin Wang, China Agricultural University, China; Tuan Nguyen, Center for Agricultural Policy, Institute of Policy and Strategy for Agriculture and Rural Development; Worapol Aengwanich, Faculty of Veterinary Sciences, Maharakham University

Presenters:

- 1) Libin Wang - College of Humanities and Development Studies, China Agricultural University, Beijing, China
- 2) Edi Basuno - Indonesian Center for Agriculture Socio Economic and Policy Studies, Bogor, Indonesia
- 3) Tuan Nguyen - Center for Agricultural Policy, Institute of Policy and Strategy for Agriculture and Rural Development, Hanoi, Vietnam
- 4) Worapol Aengwanich - Faculty of Veterinary Sciences, Maharakham University, Muang, Thailand

Abstract :

After the outbreak of Avian Influenza in Southeast Asia since 2003, governments in many Southeast Asian countries issued a series of policies to promote the construction of poultry production clusters (PPCs) as an approach to enhance the bio-security and economies of scale for small poultry producers. Four countries (China, Indonesia, Vietnam, and Thailand) jointly implemented a research project with eco-health approaches, to study the multiple impacts of PPCs on small farmers' livelihoods and the implications for control of infectious diseases, and to pilot interventions to develop a viable and duplicable model for enhancing bio-security and improving farmers' livelihood in PPCs, and propose policy recommendations. This research found that many poultry farmers only considered PPCs as an advantage to expand the poultry scale to increase income, Farmers were less concerned about bio-security and environmental management. The level of farm bio-security was found to be low due to socio-economic factors and poor incentives for farmers to adopt strict bio-security standards. The research also showed a negative environmental impact from PPCs, and the PPC farmers tended to underestimate the risks of disease transmission between poultry and human beings and they do not always protect themselves. Based upon the research findings, interventions were piloted to improve PPC management. The main interventions included developing a systematic approach to enhance bio-security in PPCs, enhancing farmers' organization to facilitate the collective actions in PPCs, and engaging policy makers throughout the pilot process so as to influence the policies. This symposium will summarize how the design and implementation of the research interventions, as well as the results, experiences, and lessons from the PPC project. This research will provide valuable lessons on how to mobilize knowledge to benefit the animal health and human health for small poultry producers with an eco-health approach.

Format: Symposium Language: English

D2 - Integrative approaches to disease modelling

Organizers : Delia Grace, International Livestock Research Institute, Kenya; Catherine Grant, Institute of Development Studies, United Kingdom; Gianni Lo Iacono, International Livestock Research Institute, United Kingdom

Presenters:

- 1) Dr Delia Grace - ILRI, Nairobi, Kenya
- 2) Catherine Grant - Institute of Development Studies, Falmer, Brighton, UK
- 3) Dr Gianni Lo Iacono - University of Cambridge, Cambridge, UK
- 4) Dr David Redding - University College London, London, UK
- 5) Pr Peter Atkinson OR Simon Alderton - University of Southampton, Southampton, UK
- 6) Dr Johanna Lindahl - ILRI, Nairobi, Kenya

Abstract :

The Dynamic Drivers of Disease in Africa Consortium is an ESPA funded consortium of 20 research institutions based in Africa, Europe and America focusing on delivering much-needed, cutting edge research into the relationships between ecosystems, health and poverty. Our focus is emerging and re-emerging zoonotic diseases in Africa and the resulting public health problems at the people-wildlife-livestock interface, focusing on the inter-relationship between zoonoses, environmental change and poverty. Our panel will showcase the novel work members of our consortium are doing to integrate some of the modelling approaches traditionally used in epidemiological, ecological and development research. With respect to a set of target diseases, we examine the drivers and burdens of disease using a combination of three broad model types: process-based modelling of epidemiological and ecological interactions; empirical, correlative modelling of macro-scale disease drivers; and participatory modelling of human-animal-disease interactions in local settings. Our panel will include six presentations: participatory approaches to improve model design; political economy of knowledge; macroecological modelling; mechanistic models at the interface between epidemiology, ecology and environmental drivers; participatory approaches to modelling disease burden; and, integrative modelling. At present, zoonoses are poorly understood and under-measured, and therefore under-prioritised in national and international health systems. There is a need for better evidence to inform effective, integrated One Health approaches to disease control. Our research has shown how both high-level disciplinary and interdisciplinary science can stimulate new opportunities for policy, institutions and interventions, to help people move out of poverty. The ultimate beneficiaries will be communities living in the deprived regions of Africa where the impacts of zoonotic diseases on health and well-being are high.

Format: 6 presentations organised around a given theme Language: English

D3 - Ecology, Society and Disease: Dengue Disease Among Bangladeshi and Canadian Populations

Organizers : Emdad Haque and Parnali Dhar-Chowdhury, University of Manitoba, Canada

Presenters:

- 1) Parnali Dhar-Chowdhury, University of Manitoba, Canada
- 2) Michael Drebot, Public Health Agency of Canada, Winnipeg, Canada
- 3) Kishor Paul, ICDDR, Bangladesh
- 4) Bashar Kabirul and Gias Uddin Ahsan, Jahangirnagar University, Bangladesh
- 5) Afrosa Sultana, University of Manitoba, Winnipeg, Canada
- 6) Harvey Artsob, PHAC, Canada

Abstract :

The Problems: The increased incidence and rapid geographical spread of dengue disease across the tropical and sub-tropical world has been profoundly influenced by some recent phenomena including population growth, urbanization, inadequate basic housing, climate change, and air travel. Consequently, an estimated 3.61 billion people have become at risk of being infected in 124 countries worldwide. In Canada, each year 200-300 cases of travel associated fever are diagnosed each year. In Bangladesh, since with the first epidemic in 2000 causing 93 deaths, there have been 23,872 cases of dengue fever and dengue hemorrhagic fever, with 233 fatal cases, between 2000 and 2009. In the face of the continued risk of dengue transmission, public concerns regarding dengue have been mounting. The Debates: Understanding dengue transmission, as an emerging infectious disease, from disciplinary perspectives has proven inadequate and ineffective, and a call for cross- and transdisciplinary research led to numerous debates in the academic and research discourse. What are the appropriate methodologies and approaches to ensure transdisciplinarity How can disciplinary (e.g., virology, entomology, social sciences) knowledge and epistemologies for transdisciplinary research and knowledge be integrated? These questions led to the formulation of an international collaborative research project between Bangladeshi and Canadian partners, entitled Climatic Variability, Social-Ecological Changes, and Dengue Disease

in Bangladesh: Development of an Integrated Ecohealth and Adaptive Management (IEAM) Approach and was funded by IDRC, Canada for its implementation during 2010-2015. The Objectives: Presentation and discussion on methods, theoretical approaches, findings of the dengue project in Bangladesh, along with dengue and other mosquito-borne viruses of concern to Canadian travellers. It is expected that these deliberations will lead to the debates and better understanding of the strengths and weaknesses of transdisciplinary research tools and approaches to dengue research as well as of the scope and limitations of specific dengue prevention control interventions.

Format: Symposium paper presentation and discussion Language: English

D4 - What do we really mean by Scaling up Ecohealth interventions?

Organizer : Andrés Sánchez, International Development Research Centre, Canada;

Presenters:

Roberto Briceño-León - Universidad Central de Venezuela, Caracas, Venezuela (Chair & facilitator)

- 1) Fang Jing - Institute for Health Sciences, Kunming Medical University, Kunming, People's Republic of China
- 2) Carlota Monroy - Laboratory of Applied Entomology and Parasitology, Universidad de San Carlos de Guatemala, Guatemala City, Guatemala
- 3) Rachel Bezner Kerr, Lizzie Shumba or Esther Lupafya - Ekwendeni Hospital, Ekwendeni, Malawi
- 4) Mohamed Chahe Koun - Head of Epidemiology department. Mami Hospital, Faculté de Médecine de Tunis, Tunis, Tunisia

Abstract :

Site-specific ecohealth research can provide practical examples of how ecohealth interventions can bring positive change in people's health and livelihoods. However, bringing to scale social, technological or policy innovations rooted in ecohealth research is often challenging. Scaling up implies shifts in interests, visions, constituencies and trade-offs (costs and benefits) that involve interactions across multiple spatial (e.g. field, farm, watershed) and socio-political (e.g. household, community, municipality, region, country) scales. This special session aims to examine how ecohealth research interventions can be scaled up to effect change at higher geographic scales, or different communities. Some key questions that will guide the discussions at this session are: What happened? How did it happen? What are some challenges and lessons learned? What are some key insights and strategies which can be adopted by other researchers in other contexts? The proposed special session brings together ecohealth researchers from Africa, Asia, Middle East, and Latin America, who have worked on scaling up ecohealth interventions in a variety of topics such as prevention and control of vector borne diseases; food diversity and nutrition; land use change and public health among others.

Format: Panel Language: English and French

D5 - Ecohealth And Public Health Institutions : How To Bridge The Gap From Local Projects To Global Actions...For Strengthening Back Local Initiatives?

Organizers : Mathieu Valcke and Claire Laliberté, Institut national de santé publique du Québec, Canada

Presenters:

- 1) Mathieu Valcke - Direction de la santé environnementale et de la toxicologie, Institut national de santé publique du Québec (INSPQ), Montréal, Canada
- 2) Nolwenn Noisel - Département de santé environnementale, Direction de la santé publique de la Montérégie (DSPM), Longueuil, Canada
- 3) Vicky Huppé - Direction de la santé environnementale et de la toxicologie, Institut national de santé publique du Québec (INSPQ), Québec, Canada
- 4) Dr Denis Roy - Vice-présidence aux affaires scientifiques, Institut national de santé publique du Québec (INSPQ), Québec, Canada

Abstract :

Ecohealth concepts have generally been applied through collaborative actions in relatively small communities whereas public health institutions typically focus their actions at the macroregional level. This scale difference often precludes, or at least complicates, the inclusion of Ecohealth approaches within the strategic plans of public health institutions. However, some EcoHealth key concepts relate closely to critical targets relevant to many public health programmes, in particular those related to the determinants of health and health promotion. Such interconnecting concepts thus provide opportunities to overcome the scale issue mentioned above in order to further implement the Ecohealth concepts within governmental health programmes. This special session will present and comment two initiatives led by regional and supraregional public health institutions from the Province of Quebec, Canada, that relied on several elements recalling EcoHealth approaches. First, a DSPM-driven project consisted of empowering the stakeholders of a municipality and its surroundings in order to significantly reduce allergic rhinitis symptoms caused by ragweed pollen dispersal in a susceptible population. Second, the INSPQ used an innovative integrated approach developed by WHO in order to evaluate the health issues related to housing conditions and urban planning in a small town. Both projects illustrate that well-planned and coordinated intervention involving targeted local stakeholders can lead to successful priority setting and decision making, both at the municipal and governmental levels. A discussant will present a synthesis of the elements that can be retained from those case studies and implemented more globally in broader programmes and public health policies using schemes such as the diffusion of innovation models. In turn, such policies could strengthen and expand the development of local public health projects relying on some key Ecohealth concepts. This mutual support appears as a way of addressing the issue of scale differences between EcoHealth and public health.

Format: Special session Language: French with English visual support. Discussion bilingual.

D6 - EcoHealth in the Oceania Region: Perspectives on land-water-people relationships.

Organizers : Kerry Arabena, Centre for Health and Society, University of Melbourne, Australia; Helen Moewaka Barnes, Massey University, New Zealand; Pierre Horwitz, Edith Cowan University, Australia

Presenters:

- 1) Kerry Arabena, Onemda VicHealth Koori Health Unit Centre for Health and Society Melbourne School of Population and Global Health, The University of Melbourne. Victoria, Australia (Facilitator)
- 2) Aaron Jenkins, Wildlife Conservation Society Suva, Fiji, and School of Natural Sciences, Edith Cowan University, Joondalup WA Australia
- 3) Helen Moewaka Barnes (with Wendy Henwood), SHORE & Whariki Research Centre, Massey University, Auckland, Aotearoa/ New Zealand
- 4) Paul Blaschke, Blaschke & Rutherford, Wellington, New Zealand; and Department of Public Health, Wellington Medical School, University of Otago, New Zealand
- 5) Gail Tipa, Tipa and Associates Ltd, Te Runanga o Moeraki (with Maria Pera, Te Runanga o Awarua, Ngai Tahu Seafood, and Kyle Nelson, Tipa and Associates Ltd, Te Runanga o Moeraki.)
- 6) Anne Roiko, School of Medicine & Smart Water Research Centre, Griffith University, Brisbane, Queensland, Australia
- 7) Pierre Horwitz, School of Natural Sciences, Edith Cowan University. Joondalup WA Australia. Panelist.
- 8) Jonathan 'Yotti' Kingsley, School of Health and Social Development, Deakin University, Melbourne, Victoria, Australia

Abstract :

The symposium presents a series of geographically and culturally diverse perspectives on the land-water-people relationships in the Oceania Region (including the South Pacific, New Zealand and Australia), particularly where the perspectives are explicit about, or clearly imply, human health and well-being. In so doing the symposium

will enable a synthesis: to develop an understanding of the features of the Oceania region that demand an ecosystem approach to human health. Central to the synthesis will be a) an exploration of how land and water use is dictated according to contexts of Indigeneity, episodes of human movement, expressions of 'country' and 'sense of place' in ocean-dominated cultures, forces of (repeated) colonialism, the vulnerabilities associated with natural disasters, environmental restoration, and different governance arrangements; and b) an exploration of how these contexts manifest in terms of human health and well-being. The symposium will include a facilitated discussion on an agenda for the development of an EcoHealth Chapter for the Oceania Region, identifying priorities for research and innovation, and interventions involving an ecosystem approach to human health and well-being.

Format: Symposium: presentations with panel discussants Language: English

D7 - Ecohealth approaches to understand the impact of exposition to environmental contaminants on health and ecosystem: focus on population in vulnerable situations

Organizers: Cathy Vaillancourt, INRS-Institut Armand Frappier and Cinbiose, and Johanne Saint-Charles, Cinbiose UQAM, Canada

Presenters:

- 1) Daniel G Cyr - INRS-Institut Armand-Frappier, Laval, Canada
- 2) Rachel Cox - Université du Québec à Montréal, Montréal, Canada
- 3) Bonnie Campbell - Université du Québec à Montréal, Montréal, Canada
- 4) Cathy Vaillancourt - INRS-Institut Armand Frappier and Cinbiose, Canada

Abstract :

Environmental contaminants increase the risk of illness, hospitalization and death for all. However, some people - or groups of people - are more vulnerable to risks in the environment due to their physical characteristics, their behaviours, the place where they live, their socioeconomic status or their control over their environment. Despite this knowledge, there remain numerous gaps in our understanding of issues related to the environmental health for populations in vulnerable situations. On the other hand, the last decade has seen a growing interest for the exploitation of natural resources in Québec that have led, among other things, to an increased industrial development in certain regions. The economic benefits of these initiatives are often acknowledged but their social and environmental impacts, especially for population that is in vulnerable situations are often complex and difficult to assess and require transdisciplinary approaches.

With its concern with complexity, transdisciplinarity, equity and sustainability, an ecohealth approach appears highly relevant to understand and alleviate the social and environmental impacts for such population. However, working as a transdisciplinary team requires time and learning and most transdisciplinary teams embark in a project that may take years to fully develop and mature. In the context of the exploitation of natural resources and of population in vulnerable situation, time is often a luxury and there is a crucial need for a transdisciplinary team to be able to organize and conduct impacts analysis in this kind of complex situations and in a short time.

This is the challenge our team, composed of researchers from the natural, health and social sciences and humanities is addressing. Putting together our experiences in various transdisciplinary and participatory projects, we explore two paths: 1) How the relationships developed while working on less time-sensitive project can serve as a building-block for the formation of a "follow-up-team" for environmental exposure of population in vulnerable situations; 2) How to conceive of a project (and have it financed) that would insure a follow-up on the short and the long-term. By using ecohealth approaches one of our challenge is to draw the lessons that will lead to application on a much wider scale and, hopefully, not only to mitigation but to prevention as well.

Format: Round table with interactive discussion Language: English

E2 - Exploring the obstacles and opportunities for knowledge-to-action through the eyes of emerging EcoHealth scholars and practitioners

Organizers : Kaileah McKellar, University of Toronto; Matt Feagan, EcoHealth Research Awardee, International Development Research Centre (IDRC); Esther Tong, Dalla Lana School of Public Health, University of Toronto, Canada

Presenters :

- 1) Rachel Hirsch - Social Justice Research Institute, Brock University St. Catharines, Ontario, Canada
- 2) Chris Buse - Dalla Lana School of Public Health, University of Toronto, Toronto, Ontario, Canada
- 3) Lesley Johnston - Research and Policy Analyst Social Planning Toronto, Toronto, Ontario, Canada
- 4) Marta Berbes-Blazquez - York University, Toronto, Ontario, Canada
- 5) Liwei Philip Chen - CoPEH-CAN, Toronto, Ontario, Canada
- 6) Alexandra Belaskie - Faculty of Environmental Studies, York University, Canada

Abstract :

The centrality of knowledge-to-action in EcoHealth research and practice demonstrates a commitment to improving how research can drive program or policy development for social and environmental change and how researchers and practitioners can respond to change. Taking this commitment seriously, however, requires examining the obstacles that currently delay, distort or flat out deny the opportunities that an ecosystem approach to health offers. Pulled between proving themselves in relation to established research norms and advancing novel or innovative practices, newly emerging scholars and practitioners offer a unique vantage point from which to uncover the obstacles and opportunities for moving knowledge-to-action in EcoHealth. The goal of this workshop, therefore, is to open new spaces for dialogue and discovery by analyzing an EcoHealth case study from the perspective of emerging scholars and practitioners. Participants will learn from each other's challenges, build an understanding of common themes from promising practices, and reflect on the contexts that contribute to knowledge-to-action 'successes'. In a two-step process, participants will first analyze the case study to identify obstacles that prevent different forms of knowledge and expertise from working together to promote social change. Secondly, participants will begin developing short and long-term strategies for moving knowledge-to-action in relation to the obstacles identified. The session will close with a transdisciplinary panel of emerging EcoHealth scholars and practitioners fielding questions and offering their own insights into the obstacles and opportunities discussed; this will provide to debrief on the workshop proceedings while drawing out the implications for the continuing development of knowledge-to-action in EcoHealth research and practice.

Format: Workshop Language: English

E3 - An ecosystem approach to human health : how hospitals in North America and Europe are reducing their environmental and health impacts

Organizer : Jérôme Ribesse, Synergie Santé Environnement, Canada

Presenters:

- 1) Nathalie Robitaille - senior counsellor, Synergie Santé Environnement, Montréal, Quebec, Canada (in French)
- 2) Linda Varangu - executive director, Canadian Coalition for green healthcare, Toronto, Ontario, Canada (in English)
- 3) Olivier Toma - president, C2DS, Béziers, France - confirmed (in French, by videoconference)
- 4) Rachel Stancliffe - executive director, Centre for sustainable healthcare, London, UK (in English, by videoconference)
- 5) Nick Thorp - Global Green and Healthy Hospitals/Healthcare without harm, Seattle, USA (in English, by videoconference)

Abstract :

Healthcare institutions are different from any other organisation in many aspects since every issue can have huge impacts on their core mission. For example, if not treated properly, pharmaceuticals and biomedical waste, can have important impacts on the environment and on human health. In thinking about hospital food, it is important to consider not only about issues of food production i.e. local organic food, but also about good quality meals that can improve patient recovery rates. The healthcare system is in itself a huge paradox, as through its daily operations, it has many potential negative impacts on the environment and on human health. It is imperative that the healthcare sector understand the inextricable link between health and the environment and the urgent need to act to "First do no Harm.". Representatives from five nonprofit organisations, who are leaders in sustainable healthcare in Canada, the USA, the UK and France will discuss their experiences about how they see healthcare institutions working to reduce their impact on the environment, while protecting the health of employees, patients, and visitors. Even though these organisations have been created in different countries, they share an important similarity; i.e. they have been created by people from the healthcare sector for people within the healthcare sector. Their actions in hospitals are also guided by a similar systemic view of sustainable healthcare and by a transdisciplinary approach in implementing change. Reducing the amount of VOCs in hospitals, phasing out endocrine disruptors from medical supplies, improving the recovery rate of patients by serving them attractive and tasty food, selecting pharmaceuticals that are less harmful for the environment are all examples of what these organisations are doing in their respective countries.

Format: Panel

Language: French and English

E4 - EcoHealth Perspectives on Population Vulnerabilities and Innovative Prevention of Emerging Zoonotic, Parasitic, and Vector-Borne Diseases in Selected Asian Hotspots

Organisers: Xiao-Nong Zhou, National Institute of Parasitic Diseases, China; Pattamaporn Kittayapong, Center of Excellence for Vector and Vector-Borne Diseases, Faculty of Science, Mahidol University, Thailand; Zee Leung, International Development Research Centre, Canada

Presenters:

Xiao-Nong Zhou, National Institute for Parasitic Diseases, China (moderator)

Zee Leung, IDRC, Canada (moderator)

- 1) Muth Sinuon, National Centre for Malaria Control, Parasitology and Entomology, Ministry of Health, Phnom Penh, Cambodia
- 2) Somphou Sayasone, National Institute of Public Health, Ministry of Health, Vientiane, Lao PDR
- 3) Guo-Jing Yang, Jiangsu Institute of Parasitic Diseases, China
- 4) Fe Espino, Department of Parasitology, Research Institute for Tropical Medicine, Philippines
- 5) Vu Sinh Nam, Department of Preventive Medicine and Environment Health, Ministry of Health, Vietnam
- 6) Pattamaporn Kittayapong, Center of Excellence for Vectors and Vector-Borne Diseases, Mahidol University, Thailand (Documentary video)

Abstract :

The emerging and re-emerging infectious diseases that the world experiences today are the results of complex interactions within and among entwined natural and human systems. Throughout Asia, a number of zoonotic and parasitic diseases, such as cysticercosis, taeniasis, trichinellosis, clonorchiasis, echinococcosis and schistosomiasis, and zoonotic and vector-borne diseases such as dengue, malaria and rabies, constitute considerable public health problems. Today, many of these diseases are in the status of increase due to the interaction of multiple factors, including changing ecosystems, changing distribution systems, culturally determined human behaviour, and other eco-bio-social factors including factors related to the host-parasite interaction. Overall, the epidemiology of these diseases reflects rapid economic, environmental and social change in the region.

Abstract :

It is common knowledge that boys and girls, men and women, are biologically different and that throughout their lives, they face different social expectations and experiences. These differences are reflected in their interactions with the physical and social environments. Despite the recognition of the importance of gender, ecohealth research has been slow to translate these basic considerations into methodologically sound study design and analyses. Over the past five years, the Canadian Institutes of Health Research (CIHR) Team in Gender, Environment and Health has worked on the development of approaches and methods to better integrate sex and gender considerations in research, intervention and in the development of public policies.

This special session aims to present and discuss the innovative contributions of this pan-Canadian interdisciplinary team and more specifically, in the area of experimental research, analysis of large databases, theory and methods in the social sciences and mixed methods.

Note: The CIHR Team in Gender, Environment and Health is also hosting a workshop entitled: "Integrating sex and gender in ecohealth research: An interactive workshop on the methodological challenges in environmental and occupational health research and practice", on Thursday August 14, at 2 p.m, session F3.

Format: Panel

Language: English

E8 - Ecohealth in the Workplace: Strategies for Sensitizing Populations at Risk

Organizers : Lise Parent, Télé-université, Cinbiose, Réseau des femmes en environnement; Patricia Kearns, Breast Cancer Action Montreal; Anne Rochon-Ford, Canadian Women's Health Network, Canada

Presenters:

- 1) Jim Brophy – Adjunct professor, University of Windsor, Windsor, Ontario, Canada
- 2) Margaret Keith - Adjunct professor, University of Windsor, Windsor, Ontario, Canada
- 2) Charlotte Brody - Vice President of Health Initiatives, BlueGreen Alliance, USA
- 3) André Cicolella - President of Réseau Environnement Santé, Paris, France

Abstract :

The links between toxic substances and illness are growing more evident everyday. Without their knowledge, workers are routinely exposed to toxic substances. Should they become ill, they may ask themselves: "Does my workplace have anything to do with my illness? Have any of my colleagues been sick as well? Is there someone I can contact to find out if there is a link between my breast cancer and what I am exposed to all day? Does my union protect me?" This special session is directly linked to the conference theme ""Moving between research and action: Mobilizing knowledge to benefit health, ecosystems, and society"" as it will focus on best strategies for transferring scientific knowledge about the health risks associated with different workplace environments to workers, unions, employers, medical personnel and government. The workshop will bring together six specialists who will share with participants their "good practices", "lessons learned" and "challenges" focusing on the danger of exposure to chemical mixtures at low levels and during vulnerable periods in the life cycle. By educating key players on the risks in certain workplaces of developing cancers and other chronic illnesses, we can look forward to preventing the current rise of these diseases and disorders. Filmmaker Carole Poliquin (Homo Toxicus, 2007) will facilitate a focused discussion between the scientists, environmental and health activists, union representatives and students, on the actions that can be taken in the short and long term to modify the workplace so that it becomes a healthy environment. In order to begin developing strategies for prevention in the workplace, we will conclude the workshop by collectively participating in a brainstorm of essential actions that need to be taken, in diverse situations and divergent locations, in order to implement a proactive and participatory change process in the workplace.

Format: Workshop Language: English

F1 - WaSH and Wellbeing: Continuing A Different Dialogue

Organizers: Corinne Schuster-Wallace, United Nations University Institute for Water, Environment and Health, and Susan Watt, McMaster University, Canada

Presenters:

- 1) Corinne Schuster-Wallace, UNU INWEH, Canada
 - 2) Karen Morrison - EcoHealth, Canada
 - 3) Diana Karanja -Kenya Medical Research Institute, Kenya
 - 4) Chris Metcalfe - UNU INWEH and Trent University, Canada (Moderator)
 - 5) Zee Leung, IDRC, Canada
 - 6) Susan Watt, Professor Emeritus at McMaster University, Canada
- Rapporteur: Kate Cave, UNU INWEH

Abstract :

There is a critical need around the world – including in Canada and the USA - to address inadequate supplies of potable water and the management of human waste in rural, remote and otherwise marginalized communities to improve health. The focus brought to these issues by the Millennium Development Goals has resulted in some progress, albeit slow. Unfortunately, despite the availability of appropriate technologies as well as commitments to improve investment, capacity and coverage, millions of people around the world do not have access to these fundamental pillars of public health.

Moreover, poor access and management have exacerbated water supply issues, already stressed by the impacts of global environmental change. In November 2013 a group of sixty international experts from policy, practice and research came together to try a different approach to understanding the opportunities and barriers associated with access to drinking water, sanitation and hygiene (WaSH) as they influence our vision for health and wellbeing post-2015. The meeting applied the sandbox model to the WaSH and Wellbeing dialogue and resulted in key observations, including:

- Ø People have the basic skills and knowledge to take care of their problems; and
- Ø Frameworks and processes are in place to drive independent action.

But....

- Ø Scaling up and out proven solutions is failing;
- Ø We are not empowering local people to come with their own ideas and solutions (co-creation of research question, co-creation of knowledge, co-management, co-ownership);
- Ø We are not contextualizing WASH solutions;
- Ø We are not evaluating or monitoring our impacts; and
- Ø We are not sharing our failures or successes broadly enough.

Thus, we need to:

- Ø Situate WaSH within the business ecosystem;
- Ø Develop new mechanisms for replicating success;
- Ø Change the development paradigm; and,
- Ø Innovate, communicate and facilitate change.

This second dialogue will expand the range of the stakeholders, strengthen the network and bring additional perspectives to bear on a moral, economic and environmental crisis in our society that to the WaSH and Wellbeing dialogue and perpetuates inequities and unnecessarily costs hundreds of thousands of lives each year. Specific challenges include the scale up and out of successes and wider learning from failures.

Format: Interactive symposium Language: English

F2 - Strategies for building leadership in Ecohealth in vector-borne diseases prevention and control Latin America and the Caribbean.

Organizer : Mario Henry Rodriguez, INSP, Mexico

Presenters:

- 1) Roberto Briceño León - LACSO, Venezuela
- 2) Gabriel Carrasquilla - CEIS, Fundación Santa Fe de Bogotá, Colombia
- 3) Anita Luján - COPEH-LAC/INSP, Mexico
- 4) Laura Magaña - INSP, México
- 5) Carlota Monroy - Universidad de San Carlos, Guatemala

Abstract :

Strategies used in Central America for building leadership in Ecohealth in vector-borne diseases prevention and control, focusing on Chagas disease. Chagas disease is one of the most relevant vector-borne diseases in Latin America and the Caribbean. Traditional control is based on periodic insecticidal spraying. For endemic vector species as *T. dimidiata* in Central America, the traditional control proved not to be efficient enough, thus Ecohealth interventions based on the risk factors were developed. Three risk factors were addressed to develop the intervention: wall cracks in mud houses, dirt floor and animals inside the house. The interventions consisted in house improvements with local material integrating several stakeholder in the implementation. Mud houses are improved with: sand, clay, volcanic ashes and lime. Domestic animals are kept in a wire constructed chicken coops and wood is provided from a fruits or native trees community nursery. Previous Ecohealth-based interventions were tested in two communities in the department of Jutiapa, Guatemala. The interventions demonstrated significantly decrease of house infestation rates of *T. dimidiata* and the change of blood sources of the vector over time. Scaling up interventions in three countries of Central America (Guatemala, Honduras, El Salvador) allow us to invite Municipalities, International agencies, Health workers, NGOs, Developmental agencies, to apply the interventions not only Chagas disease but for their own objectives. The strategies we used in Central America for building leadership in Ecohealth; is to promote the community based interventions of house improvements for chagas disease taking in account that several risk factors are shared with other health problems and several institutions may be associated to implement a healthy intervention.

Format: Panel

Language: English

F3 - Integrating sex and gender in ecohealth research: An interactive workshop on the methodological challenges in environmental and occupational health research and practice

Organizers : Myriam Fillion, Université d'Ottawa; Bénédicte Calvet, UQAM - Cinbiose; Marc Fraser, INRS-Institut Armand-Frappier, Canada

Presenters:

- 1) Cathy Vaillancourt - Professor, INRS-Institut Armand-Frappier, Laval, Canada (moderator)
- 2) Donna Mergler - Professor Emerita, Université du Québec à Montréal, Montréal, Canada
- 3) Lise Parent - Professor, TÉLUQ, Montréal, Canada
- 4) Bénédicte Calvet - PhD candidate, Université du Québec à Montréal, Montréal, Canada
- 5) Marc Fraser - PhD candidate, INRS-Institut Armand-Frappier, Laval, Canada
- 6) Myriam Fillion - Postdoctoral fellow, University of Ottawa, Ottawa, Canada

Abstract :

One of the core principles of the ecosystem approaches to human health is the integration of gender and social equity. Indeed, "understanding differences in gender roles and power structures may be crucial to discovering new levers for implementing change" (Charron, 2012). Although sex and gender are increasingly being integrated in studies linking health, environment and society, their integration still poses methodological difficulties and dilemmas. In 2012 in Canada, the report of the Chief Public Health Officer on the State of Public

Health underlined the relevance and challenges of integrating sex and gender (s/g) at all stages of research and public health interventions. This workshop, developed from the interdisciplinary work of the Canadian Institutes of Health Research (CIHR) Team in Gender, Environment and Health, proposes a methodological reflection on new approaches and tools to better integrate s/g in research, intervention and in the development of public policies. In this interactive workshop, participants will take part in a 'World Café' to discuss their experience and challenges they face in integratings/g in research and practice in environmental health, including the work environment.

This workshop will discuss research strategies and innovative interventions to highlight relevant practices for integrating s/g that are coherent with the ecosystem approaches to human health. More specifically, the discussions will contribute to:

- Deepen and share knowledge on the integration of s/g in environmental and occupational health issues;
- Demonstrate the scientific importance of integrating s/g issues in research and interventions in environmental and occupational health.

Note: The CIHR Team in Gender, Environment and Health is also hosting a workshop entitled: "Integrating sex and gender in ecohealth research: development of new methodologies", on Thursday August 14, at 10 :20 a.m, session E6.

Format: World Café

Language: English

F4 - Resilience and Sustainability of Communities of Practice: What are we aiming for? How can we get there? How will we know we have arrived?

Organizers : Donald C Cole, DLSPH, EkoSanté, Canada, and Julia Medel, CEM, EkoSanté, Chile

Presenters:

- 1) Douglas Barraza - IRET-Universidad Nacional, Heredia, and Universidad Técnica Nacional-Sede San Carlos, San Carlos, Costa Rica
- 2) Johanne Saint-Charles - Directrice, Centre de recherche interdisciplinaire sur le bien-être, la santé, la société et l'environnement (CINBIOSE) et Professeure - Département de communication sociale et publique, Université du Québec à Montréal (Québec), Canada
- 3) Kaileah McKellar, EkoSanté fellow, University of Toronto, Canada

Abstract :

Context: Communities of Practice in Ecosystem Health coordinate ecohealth approaches to research and practice in both Latin America and Canada. A recently inaugurated formal collaboration (EkoSanté), between the two communities of practice CoPEH-LAC and CoPEH-Can, has posed resilience and sustainability as key goals. Among us, we have differing views and shared uncertainties about what these might mean and how to achieve them.

Objective: To explore the meaning of resilience and sustainability for CoPEHs and their collaborations and to debate options for their achievement and evaluation.

Methods/Implementation: We drew upon experience in each CoPEH, particularly for resiliency to changes of government, loss of individuals and other threats which required mitigation. A joint inaugural meeting raised key questions about our understanding of the two constructs of resilience and sustainability, and how we operationalize them. Consultation of existing literature provided some guidance for relevant parameters. We are now working on key indicators at the level of the Collaboration and design of an evaluation of the facilitators of and barriers to both resilience and sustainability for EkoSanté.

Challenges/Results: We foresee lots of challenges in resiliency, though each CoPEH has maintained activities, despite the loss of key senior members, difficult changes in governments and funding environments. Publication remains a challenge, as does integration with policy makers for national level funding (though CoPEH Can has

known some success). Strong linkages with practitioners and integration of them to build resiliency is an outreach challenge, in the face of multiple demands and academic and institutional requirements, though responsiveness to key civil society requests has been possible.

Implications/Learnings: As CoPEHs mature and come to grips with the challenges of maintaining resilience and achieving sustainability, open discussion on options and sharing of joint learning will be needed.

Format: Forum, with provocative presentations & discussion Language: English and Spanish, with French and Portuguese as needed

F5 - Socially Responsible Investment as a driver for a more balanced economic development

Organizer : Stéphanie Yates, UQAM, Canada

Presenters:

- 1) Olivier Gamache - President and Executive Officer, Groupe Investissement Responsable inc., Montreal, Canada
- 2) Rosalie Vendette - Principal Advisor, socially responsible investments, Mouvement Desjardins, Montreal, Canada
- 3) Claude Normandin - Responsible for strategic development and marketing, Fondation CSN, Montreal, Canada
- 4) Stephanie Yates - Professor, Université du Québec a Montreal
- 5) Amr Addas - Adjunct Professor of Finance with the Goodman Institute of Investment Management and the John Molson School of Business, Canada

Abstract :

Socially responsible investment, also known as ethical investing, encourages corporate practices that take into account the economic, environment and social aspects of business activities in an integrated way. Hence, it can contribute to a more sustainable economic development, where environmental stewardship, human rights, working conditions and consumer protection dovetail with financial return. Over the last ten years, a growing number of institutions have been offering this type of financial products. If this trend seems promising, several questions remain, notably the criteria for the composition of these ethical funds, which are hardly transparent; their concrete effects on corporate social responsibility; and the response they trigger in the market. The objectives of this special session are to present recent developments in ethical investing, discuss its shortcomings and consider avenues to enhance its impacts.

Format: Roundtable Language: English

ABSTRACTS : Poster-driven sessions

C1 - Climate change and ecohealth

C1.1: Issues of local and environmental governance on the Acadian coast of Atlantic Canada

Tiavina Rabeniaina, Université de Moncton, Canada; Omer Chouinard, Université de Moncton

Coastal development increases the vulnerability of spaces and coastal environments. This applies to most of the coastal regions in New Brunswick (Canada). Beyond demographic pressures and urbanization, the effects of climate change (such as sea level rise, increased temperatures) make coastal regions extremely sensitive to the impacts of storm surges and soil degradation due to erosion. Adaptation to climate change is a major challenge for the province. The proposed presentation focuses on different strategies adopted by two coastal communities in South Eastern New Brunswick: the Regional Service Commission (RSC) of Kent and the RSC of South-East. The aim of this study is to learn from each community's experience to share information and to strengthen their resilience. From this perspective, a comparative study is based on common issues and specific cases, and a mutual learning process that shares experiences and practices. The study also tries to understand how environmental issues influence territorial development and local governance of coastal communities. The research attempts to understand the local adaptation practices, to observe the interactions between the members of the community of interest in the coastal area, and to support residents of different communities in the decision-making process related to adaptation to climate change. This case study wants to express a new form of community engagement that takes into account the aspects of "environment", "governance", "planning" and "social cohesion". The project focuses on understanding the role of economic and social aspects in environmental issues. It encourages the participation of key players in the formulation and execution of action plans and in finding ways of adapting to change. Finally, the project aims to describe the importance of coordinating the local and the global perspectives in order to bring resilience within localities.

C1.2: Projection of the bioclimatic niche of the dengue virus in the state of Veracruz, Mexico.

Horacio Riojas Rodriguez, National Institute of Public Health, Mexico; Carlos Ibarra-Cerdeña, Center of Research and Advanced Studies of the National Polytechnic Institute; Magali Hurtado, National Institute of Public Health; Luis Antonio Arias-Medellin, National Institute of Public Health; Rosa Aurora Azamar-Arizmendi, Health Services of Veracruz; Grea Litai Moreno-Banda, National Institute of Public Health

It is well known that global climate change will produce fluctuations in temperature and precipitation, which can modify the range of the infection transmission of the dengue virus vector *Aedes* sp. The aim of this study is to project changes in climatic conditions and range of dengue incidence for the years 2020 and 2050 in the rural population of Veracruz, Mexico. Maps of the potential risk of transmission using ecological niche models of dengue incidence were produced with a focus on assemblage models produced by different algorithms of ecological niche. Two climatic scenarios (A2 and B2) and two General Circulation Models (CSIRO and HadCM3)

were used to make the projections. Comparisons of the present and 2050 climatic conditions show that in localities with annual cases of dengue the maximum temperature of the hottest month will increase while the mean annual precipitation will not have changes. With the actual climatic conditions 90% of Veracruz area has a suitable environment for the presence of dengue cases. From this area, 70%, 20% and 10% has a high, medium and low probability of dengue incidence. The projection models showed a drastic decrease of dengue incidence until 2050 where the area of high probability decreases 20% and the area of medium probability increases 30%. These changes differ more between General Circulation Models but no between climatic scenarios. The projection models showed that climate change will modify the optimal conditions of the distribution range of dengue incidence but will not limit it. The participation of researchers and decision makers throughout the project has been important because these results will be considered to improve the present programs for dengue vector control in Veracruz.

C1.3: Impact of Climate Factors on the Incidence of Zoonotic Cutaneous Leishmaniasis in Central Tunisia
Habib Ben Boubaker, University of Manouba, Tunisia; Mohamed Kouni Chahed, Faculty of Medecine- University El Manar

It is widely recognized that climate change will have major impacts on human health, by increasing weather-related disasters and changing the distribution of water- and vector-borne diseases. The development of early warning systems for epidemics of infectious diseases based on recurrent statistical patterns in other kinds of information, particularly data on climate, is an active area of research. From 1976 to 2000, Tunisia's climate warmed by over 1° C, with increases in both drought and flooding. At the same period, zoonotic cutaneous leishmaniasis (ZCL) became an emerging vector-borne disease with outbreaks every 5 to 7 years. This scarring disease is susceptible to changes in climate. Using a multidisciplinary ecosystem approach, we conduct an attempt to understand the local dynamics favouring disease transmission and in laying the groundwork for an early warning system based on monitoring of climate information and disease epidemiology. The objective was, at first, to define a statistical model of ZCL occurrence using monthly data, from 2009 to 2012, of number of ZCL cases and climatic variables of the study area in Sidi Bouzid governorate. In order to achieve our goals several statistical techniques were used. We mainly implemented the Generalized Additive Models (GAM) analysis and several models have been tested to identify the most relevant one explaining the relationship between the incidence of ZCL and climate and environmental parameters. Rainfall and humidity increase in a significant way the incidence of ZCL in the study area. Thus, models showed that ZCL incidence is raising by 4 % (95 % CI: 0.93 – 0.99) when there is 1 mm increase in the rainfall lagged by 6 months, and by 9 % (95 % CI: 1.00 – 1.01) when there is a 1 % increase in humidity from July to September in the same epidemiologic year.

C1.4: EcoHealth and climate change: multicriterial selection of areas for health vulnerability assessment.
Diana Caicedo, Universidad del Valle, Colombia; Daniel Cuartas, Universidad del Valle; Nathalie Abrahams, Grupo Epidemiología y Salud Poblacional-Universidad del Valle; Camilo Salcedo Jiménez, Epidemiology and Population Health Group - GESP; Fabian Mendez, Universidad del Valle

Assessment of health vulnerability to climate change involves the participation of different disciplines that need to approach and understand problems from a systems thinking perspective and to integrate community and stakeholders knowledge so they can design adaptation alternatives that are sustainable and consistent with local realities. Thus, the EcoHealth approach is relevant to understanding health vulnerability by providing the necessary information to address this emergent property of socio-environmental systems. However, selection of areas for evaluation is a difficult task that requires considering multiple criteria of health events under evaluation. Thus, to select and prioritize among 41 municipalities that are part of the Cauca river geographic

valley, a selection was carried out, which involved multiple criteria and indicators- like considering municipality size, dengue and acute diarrheal disease (ADD) occurrence, floods, landslides, droughts, housing conditions, basic needs, governance and economic factors-, then a descriptive spatial analysis and the determining criteria weighting was performed by researchers, decision makers and the community. The chosen criteria were summarized to obtain a final score for every municipality from which were prioritized according to their order in the evaluated criteria. As a result, five municipalities were prioritized in the study area, including municipalities with the highest occurrence of Dengue and ADD and presence of environmental and socio-economic hazards related to the events of interest. These municipalities will be areas of vulnerability analysis, taking into account the voice of the communities, their perceptions and practices, the surrounding environmental conditions that favor the occurrence of health events, and institutional and community capacity to address climate change, finally, from the evaluation, adaptation alternatives will be defined according to the specific local contexts This is a first step of the EcoHealth approach to vulnerability assessment.

E1 - Emerging infectious diseases: Ecohealth, one health, ecobiosocial

E1.1: Conflict Between the Need for Income and the Necessity of Controlling Endemic Malaria

Susan Imbahale, icipe, Kenya; Kennedy Abonyo, Ministry of Health; Polycarp Aduogo, International Centre of Insect Physiology and Ecology; John Githure, Abt Associates Inc.; Wolfgang Mukabana, International Centre of Insect Physiology and Ecology/ University of Nairobi

Malaria control in Africa mainly explores top-down Government-led initiatives (vertical) rather than horizontal approaches, which normally embrace active participation of communities. African malaria mosquitoes mainly breed in man-made habitats such as brick-making pits, fishponds, irrigation channels etc. This underscores the need to have communities living in affected areas to understand their role in propagating malaria and henceforth, how to contribute in its control. Malaria disproportionately affects poor people whose need for income to support basic survival far exceeds other needs. It is therefore important to integrate income generation activities (IGA) into disease control interventions. A cross-sectional survey was conducted using a questionnaire with open and closed ended questions to determine the potential integration of fish farming and mosquito control on Nyabondo plateau in western Kenya. Some of the questions asked included reasons for fish pond construction, pond condition (whether well maintained in productive state or abandoned), pond ownership (self or group), challenges faced and the respondent's biodata. A total of 115 fish ponds were visited during the survey. Seventy percent of these were self owned while 30% were owned by local groups. Ponds were either maintained in active productive state or abandoned depending on the education level of the owner. Abandoned fish ponds harbored more Anopheles (malaria) mosquito larvae than active ones. Ninety nine percent of the pond owners practiced fish farming solely for income generation. There were no observable indicators that active fish farming was integrated with mosquito control. There is need to create awareness among the local communities about the importance of deliberately incorporating fish farming practices in integrated vector management programs. This will ensure proper maintenance of the ponds, assure nutrition and improve the socio-economic status of malaria burdened rural communities.

E1.2: Is it a 'bad' mosquito, a 'defective' virus, a 'filthy' environment? It's an Ecohealth approach for dengue prevention and control

Parnali Dhar-Chowdhury, University of Manitoba, Canada; C. Emdad Haque, University of Manitoba; Shakhawat Hossain, University of Manitoba

Urban dengue fever is now considered a major public health threat in more than 124 countries. In the beginning of twenty-first century, dengue is considered as the most important arboviral disease as neither an effective vaccine nor an antiviral drugs or any successful vector control program is available for dengue control. Dengue vector control program with participatory processes encompasses mosquito control responsibilities both from public service authorities as well as local community members' behavior change at the household level. In our research particular emphasis was given on understanding how socio-ecological, economic, and cultural conditions interact to favor disease transmission at the household level even when people have sufficient knowledge to change their behavior and practice to control dengue. We applied an 'Ecohealth Approach' to understand how immediate degraded environmental conditions, social contexts, and other cultural and economic factors have failed to address behavior change in different socio economic conditions in the city of Dhaka, Bangladesh. We have conducted 12 focus group discussions (n = 107) and 18 key informant interviews in 3 purposefully selected wards. In addition, health experts and community members knowledge model were developed to capture the knowledge gaps in terms of addressing and communicating dengue disease risks. Findings of our study revealed that dengue burden in Bangladesh is linked to the broader socio-ecological environment beyond individual and household levels. Dengue disease problem is thus not an ailment of individuals to be primarily addressed by only behavior and practice change or technical inputs, but broader social, cultural and environmental conditions.

E1.3: Perceived Risk Factors And Risk Pathways Of Rift Valley Fever In Cattle In Ijara District, Kenya

Nelson Owange, University of Nairobi, Faculty of Veterinary Medicine, Kenya; William Ogara, University of Nairobi, Faculty of Veterinary Medicine; Jacqueline Kasiti, Ministry of Agriculture, Livestock, Fisheries, Department of Livestock, Directorate of Veterinary Services; Washington Onyango-Ouma, University of Nairobi, College of Humanities and Social Sciences; Hippolyte Affognon, International Centre of Insect Physiology and Ecology; Rosemary Sang, International Centre of Insect Physiology and Ecology; Mbaabu Murithi, Ministry of Agriculture, Livestock, Fisheries, Department of Livestock, Directorate of Veterinary Services

Ijara district in Kenya was one of the hotspots of Rift Valley Fever (RVF) during the 2006/2007 outbreak which led to human and animal deaths. The main constraint in the control and prevention of RVF is inadequate knowledge of its risks factors promoting its occurrence and maintenance. This study was aimed at understanding the perceived risk factors and risk pathways of RVF in cattle in Ijara to enable the development of improved community-based disease surveillance, prediction, control and prevention. Thirty one key informant interviews were conducted with relevant stakeholders from September 2012 to June 2013 to determine the local pastoralists' understanding of risk factors and risk pathways of RVF in cattle in Ijara district. There was agreement that the high presence of mosquitoes ($W=1, p=0.05$), high rainfall ($W=0.08, p=0.05$) leading to floods ($W=0.116, p=0.05$), presence of wildlife ($W=0.156, p=0.05$) and dambos ($W= 0.403, p=0.05$) to be the main risk factors contributing to occurrence of RVF. However there was disagreement on large herds of cattle ($W=-0.146, p=0.05$) and bushy vegetation ($-0.132, p=0.05$) as risk factors. The main risk pathways were infected mosquitoes that bite cattle while grazing, at watering points and close contact between domestic animals and wildlife. The findings pointed that availability of mosquitoes, livestock, wildlife, rainfall leading to floods were the main risk factors towards occurrence and maintenance of RVF in cattle in Ijara. On the other hand, the contact between livestock and wildlife around watering points and grazing fields were perceived to be the main risk pathways for RVF in cattle in Ijara. The perception that poor handling of carcasses is negligible pathway calls for regular

participatory community awareness on handling domestic and wildlife carcasses for preparedness of any possible RVF epizootics. Additionally, monitoring of environmental conditions to detect enhanced rainfall should be prioritized for preparedness.

E1.4: Associated Factors To Malaria Using The Ecohealth Approach In Latin America: A Systematic Review

Diana Higuera, Centro de Estudios e Investigación en Salud - Fundación Santa fe de Bogotá/ Project coordinator, Colombia; Alwers Elizabeth, Centro de Estudios e Investigación en Salud - Fundación Santa fe de Bogotá/ Researcher; Borrero Elizabeth, Centro de Estudios e Investigación en Salud - Fundación Santa fe de Bogotá/ Researcher; Gabriel Carrasquilla, Centro de Estudios e Investigación en Salud - Fundación Santa fe de Bogotá/ Director

INTRODUCTION Ecohealth approaches have been applied by researchers along Latin America to the study of associated factors to malaria. However, it is unknown at which extent the integration of systems thinking and other principles of the Ecohealth approach have been included in these studies. **METHODS** We conducted a systematic review of published and gray literature of studies using an Ecohealth approach for the characterization of factors related to the occurrence of malaria in Latin-America from 1995 to 2011. Published literature was searched in Medline, Scopus, Central, ISI Web of Knowledge, Embase and BVS-Lilacs and gray literature was identified from universities and health ministries of Brazil, Colombia, El Salvador, Guatemala, Mexico, Honduras, Peru and Venezuela. An assessment form was designed and applied to evaluate systems thinking and the Ecohealth principles stated by Lebel and Charron (Transdisciplinary research, participation, sustainability, gender and social equity and knowledge to action). **RESULTS** Among 166 studies addressing associated factors to malaria, we identified 36 relevant studies, 14 of which met our inclusion criteria (10 cross-sectional and 4 prospective). All studies based their research question on systems thinking, although 43 assessed these questions with epidemiologists and biologists working separately and described fragmented relationships between the ecosystems and health in their results. Three studies applied any kind of triangulation methodologies, half worked with a transdisciplinary team and less than 30 of the studies referred to the rest of the principles, including social participation. Only one study addressed the whole set of principles. **CONCLUSIONS** Despite systems thinking has been taken into account for the conception of the studies, methodologies and results did not reflect the assessment of ecosystems and health as a whole. It is necessary to integrate this principle by incorporating transdisciplinary research and other Ecohealth principles to achieve a better approach to the complexity of malaria

E1.5: An eco-bio-social approach applied to control dengue in Vang Vieng, Lao PDR, a Southeast Asian global outreach tourism hotspot

Somphone Soulahy, Division of Prevention, Department of Communicable Disease Control, Ministry of Health, Lao People's Democratic Republic; Chathavy Soulahy, National Center of Laboratory and Epidemiology, Ministry of Health; Sengaloune Inthavong, World Wild Fund; Singthong Noulam, Vang Vieng Health Office, Ministry of Health; Chanthavy Soulahy, National Center of Laboratory and Epidemiology, Ministry of Health

Over the last decade, Dengue Hemorrhagic Fever (DHF) has become an increasingly important public health issue across Southeast Asia. In 2010, a national epidemic of 22,912 DHF cases struck Lao PDR, one of the largest outbreaks in the nation's history. One of the major hotspots for dengue in Lao PDR is the popular international tourist destination of Vang Vieng. Through its natural beauty and cultural attractions, Vang Vieng attracts more than 148,696 tourists per year. In order to better understand the complex drivers of infectious disease emergence in tourist hotspots, like Vang Vieng, a multi-country research initiative was launched in Southeast

Asia. Using dengue as a proxy, this project examined the environmental, biological and social determinants of infectious disease emergence in Vang Vieng and their links to development and change driven by global tourism. Through primary and secondary collection of epidemiological, socio-economic, climatic and urban environmental data, this project analyzed the links between tourism-related development and the risk of this mosquito-borne infectious disease. Preliminary analyses found that rapid development due to tourism had substantial effects on local demographics, water and sanitation practices, and raised the risk of dengue transmission through increased breeding sites for mosquitoes which can spread this disease. Results of this research led to the development and implementation of a suite of interventions to enhance local vector control programs. Community resilience against dengue and other emerging infectious diseases was built; and national policies to militate against the negative consequences of tourism development was improved. This research increases our understanding of how rapid development and change driven by tourism may promote the emergence of infectious diseases in Southeast Asia.

E1.6: Migrant labor and vulnerability of disease emergence: A preliminary anthropological study from a case study of rubber plantation expansion and increased risk of vector-borne diseases

Luechai Sringeronyang, Department of Society and Health, Faculty of Social Science and Humanities, Mahidol University, Thailand; Pattamaporn Kittayapong, Center of Excellence for Vector and Vector-Borne Diseases, Faculty of Science, Mahidol University

Increasing cross-border and cross-continental movements of people that characterize globalization, together with other global trends, has affected the emergence and spread of infectious diseases worldwide. Millions of migrants especially the undocumented displacing from poor health care service and less effective disease control system countries to the wealthier destinations are widely reported to contribute to the emergence and reemergence of serious infectious diseases, for example, SARs, Ebola, Malaria, Dengue, and MDRTB, etc. (National Academy of Science 2006). Rubber plantations are expanding rapidly in Southeast Asia especially in areas where the crop was not historically found. Last decades, more than 1,000,000 ha have been converted in non-traditional rubber growing areas of China, Laos, Thailand, Vietnam, Cambodia, and Myanmar. Thailand is the second largest area of rubber plantation in the world (LDD 2005a). Rubber plantation is an important commercial crop in Thailand and Southeast Asia. It creates employment and income generation activities for local people; and also contributes to community development and to government revenues. However, according to the increasing demand of labor workers, hiring workers from other areas, Thai or non-Thai, is considered necessary. Population movement contributed toward the impact of expanding of rubber plantation should be monitored intensively. Growing rubber plantation in the new area was also suggested to be a feasible way to avoid serious outbreak of human epidemic diseases, especially vector-borne diseases that presented in traditional areas (Chantuma, et al. 2012). This paper presents primary results of the study that applied an ecohealth trans-disciplinary approach to determine whether the expansion of rubber plantation in eastern Thailand increases the risk for vector-borne diseases using chikungunya, dengue and malaria as a proxy disease. Focus of this paper is on to what extent labor migrants employed in the area contributing to the emergence of infectious diseases especially chikungunya, dengue and malaria.

G1 - Contaminant issues: agro chemicals, heavy metals, air quality

G1.1: Effects of environmental exposure to manganese on the perceptual function in Mexican children.

David Hernández Bonilla, Instituto Nacional de Salud Pública, Mexico; Consuelo Escamilla Nuñez, Instituto Nacional de Salud Pública; Horacio Riojas Rodriguez, National Institute of Public Health

Objective The Molango mining district located in the state of Hidalgo has important manganese (Mn) deposits. An ecosystem health approach has been used to study the factors that determine the population exposure using the interaction between social, environmental and health sciences. The objective of this study is to evaluate the effect of Mn exposure on perceptual skills in school-aged children. **Materials and methods** School-aged children between 7 and 11 years old were selected from two communities in the Molango mining district (100 children) and 95 children from non exposed communities with similar socioeconomic conditions. The Rey-Osterrieth complex figure was applied. The exposure to Mn was measured as blood Mn (MnB) and hair Mn (MnH). **Multivariate logistic models** were performed to assess the effect of Mn on the perceptual abilities adjusting by relevant covariables. For this analyses was necessary to use the natural logarithmic transform the variable dependent. **Results** Median MnH and MnB were significantly different between exposed (12.1 µg/g and 9.7 µg/L) and non exposed children (0.6 µg/g and 8.2 µg/L). After adjusting for blood lead levels, haemoglobin, gender, age and maternal education, the total number of go over a drawing (β 0.68, p. 0.07) and the total number of forgotten figures (β 0.07, p. 0.01) was associated with MnB. **Conclusions** The environmental exposure to Mn has an adverse effect on some aspects of perceptual organization in school-aged children.

G1.2: Heavy Metals In Cow Milk, Water Of Rivers, Sediments And Acuatic Specimens In The Southwest Of Ecuador: A Review

Hugo Romero, Universidad Técnica de machala, Ecuador; Byron Lapo Calderón, Universidad Técnica de Machala, Ecuador

The present work is a summary of several researches carried out from 2009 to 2012 in El Oro Province located in the southwest of Ecuador where the concentration of heavy metals such as Mercury, Lead, Arsenic, Cadmium, Iron were evaluated in different matrices including cow milk, freshwater, sediments, aquatic specimens in rivers and estuaries. In addition, other physical-chemical parameters like pH, DO, Total Phosphorous, Ammoniac nitrogen and algae were evaluated in freshwater. The samples were collected and analyzed in the laboratories of the Technical University of Machala using different chemical analytic techniques such as Atomic Absorption Spectrophotometry, uv-vis spectrophotometry, Neubauer chamber among others. Lead was the main heavy metal found, whose concentration of 210 mg/L was found in the sediments of Rio Siete river. Also Lead was found in shells of Jambelí, where it was 2,62 mg/Kg. Mercury was evaluated in sediments, cow milk and river water, whose concentration range were from 0.101 to 0.296 mg/kg to sediments, a maximum value of 0.018 mg/Kg to cow milk, whose values overpassed the normative in more than three times, and in river water the Mercury concentration was 0.005 mg/L in average (normative 0.003 mg/L). About the Cadmium and Arsenic it was found in the sediments of Rio 7 in 11.00 and 32.06 mg/kg respectively. The algae specimens such as diatoms, cyanophits and chlorophits were found in the Santa Rosa River, where the mean presence was of diatoms with 85,92%. Overall, the pollution caused by heavy metals in the south of Ecuador has become in a very worry trouble which main causes are due to the mining activities, farming, cattle rising and even the direct discharge of urban waste water on the rivers.

G1.3: Impacts of hydraulic fracturing on New Brunswick groundwater quality: an ecosystem approach

Véronique Arseneau, Université de Moncton, Canada; Olivier Clarisse, Université de Moncton; Céline Surette, Université de Moncton

Recently, the province of New Brunswick has announced its plan to pursue the development of the shale gas industry. As most of the rural population have private wells, concerns about the potential impacts of hydraulic fracturing on the quality and quantity of drinking water have been raised. For instance, methane, heavy metals and radionuclides contained naturally in shale rocks could be mobilized through the industrial exploitation process of this resource and may contaminate the groundwater reservoirs. Radionuclides have been targeted as potential indicators of groundwater contamination by hydraulic fracturing. Working along with different communities members of three New-Brunswick counties, we are monitoring radionuclides in groundwater before and after the industry implementation to define its real environmental impacts. Based on an ecosystemic approach, we also seek to understand, from a rural community point of view, the link between health, well-being and the surrounding natural environment: a photovoice approach has been specifically developed to encourage community participation, and to permit an interactive learning process. This sharing process also aims to facilitate the presentation of the project results in the communities. In this presentation, we will provide highlights on our original combined methodologies, based on a rural community needs, to address an emerging ecohealth issue. Preliminary results from the photovoice as well as from the measurements of radionuclides in groundwater will also be discussed.

G1.4: The chicken as an avian embryonic model for Pb contamination: Implications for wild bird species and humans

Theresa Johnston, McGill University, Canada; Niladri Basu, McGill University

Lead (Pb) has been used by humans for over 3,000 years, despite its known toxicity, due to its low-cost and ease of use. As a top 3 priority pollutant and a common contaminant worldwide, it continues to threaten the health of humans and wildlife. Despite regional regulations regarding the use of Pb, exposure is still an issue faced by wildlife and humans due to inconsistencies in these regulations. Birds are particularly susceptible to lead because of dietary exposure common in both water birds and scavengers. While contamination level data exist, our understanding of the developmental and neurological effects of these Pb levels on avian development is still poor. Additionally, in humans children are most sensitive to lead, but we have few tools to assess neurodevelopmental risk. The objective of our study was to examine the effects of Pb contamination on the development of chicken embryos by injecting lead nitrate (at ecologically relevant concentrations) into fertilized chicken eggs. Mortality and developmental malformations were examined, along with changes in neurochemistry. We found that even at our lowest dose of 1 ng/g, embryonic mortality was increased by 13% and the rate of malformations in living embryos increased by 7%. The malformations seen in embryos would likely prevent hatching or cause mortality post hatch. Data also suggest that Pb impairs cardiac response to temperature fluctuation. These data help support the notion that Pb can have damaging effects on population size and fitness of birds in the wild and that there is no “safe level” of Pb exposure. Developmental and cardiac effects of lead have also been observed in humans, and we will qualitatively compare/contrast findings between birds and humans. Thus here we use avian eggs as a model to increase understanding of human developmental exposures while also serving as sentinels for wildlife exposures.

H1 - Capacity building: community mobilisation and experiential learning

H1.1: Exploring the health and wellbeing experiences in accessing nature within an urban healthcare setting

Rona Weerasuriya, Deakin University, Australia; Mardie Townsend, Deakin University; Claire Henderson-Wilson, Deakin University; Steven Wells, Austin Health

A growing body of research has identified staff, patients and visitors in health care institutions as benefiting from viewing or having direct contact with nature within these settings (e.g. Ulrich 1984, 1999, 2002; Cooper Marcus & Barnes 1995). This evidence is important, given the growing global recognition of the need to provide opportunities, settings and infrastructure which will empower people to make health promoting choices (World Health Organisation 2013). The adoption of the Healthy Settings approach by the World Health Organisation, which embodies the health benefits of contact with nature, is a key example. Increased urbanisation, growing hospital admissions and rising numbers of health care staff has made city hospitals an excellent setting to implement research in this globally acknowledged but under-explored area. This is the first study in Australia to explore the experiences of those who view or visit nature within hospitals. The study is currently in the data collection stage. Preliminary findings from this phenomenological study exploring the experiences of staff, patients and visitors who view or visit gardens at Austin Health's three city campuses in Victoria will be presented and discussed. Preliminary analysis of the interviews indicates a number of health and well-being benefits to these groups similar to those suggested in the literature such as reduced anxiety, symptoms of depression, aggression, stress and increased relaxation (e.g. Maller et al. 2008). The presentation will also draw on staff responses from those identified as having direct (i.e. very close) access to nature (through gardens, courtyards and natural views) and others identified as having no direct (i.e. convenient and close) access to nature as well as the experiences of Acquired Brain Injury patients specifically. The implications of the findings for the inclusion of gardens in hospitals and health care settings from an ecosystems approach (Dakubo 2011) will also be discussed.

H1.2: Health Promotion & Environmental Activism: Haida Gwaii, Bc, The Northern Gateway Project, And A Model Of Collective Interest

Jessica Madrid, University of Northern British Columbia, Canada

This study reflects an inductive and deductive response to gaps in the literature related to health promotion and environmental activism. Inductively, this research explores the theoretical connections between these concepts, identifying how health promotion theory emphasizes the importance of grassroots endeavours that move beyond the healthcare sector to address determinants of health. Many issues of social and environmental concern arise from the implications of government policies and industrial practices, which are subject to public scrutiny. When the public perceives a health risk, one form of grassroots oppositional recourse on behalf of citizens can consist of activism. While a review of health promotion literature has revealed evidence promoting activism concerning certain social issues, there appears to be less evidence of the value of activism to address environmental issues, which generally concerns threats to habitat affecting one's biological or psychosocial health. Deductively, this study addresses a call for quantitative and case study research on the social dimensions of environmental activism and health, notably the use of a model of human behaviour related to this practice. An empirical model of collective interest, which has been traditionally used to investigate protest behaviour, was identified through the theoretical component of this study as a possible model to investigate environmental activism, given its apparent connection to health promotion theory. This model was applied to the case of the remote Canadian archipelago, Haida Gwaii, BC, and its communities' opposition towards a controversial

petrochemical project, the Enbridge Northern Gateway Project. This collective interest model was used to statistically analyse survey data through logistic regression techniques, which suggested predictors of activism in this context, framed through a health promotion perspective. Together, this study's inductive and deductive approaches address theoretical and practice-policy elements of two concepts that appear to create a rich foundation for inquiry.

H1.3: The transcultural dialogue of different kinds of knowledge in Ecosalud: a shift in the epistemic model for knowledge production.

Camilo Salcedo Jiménez, Epidemiology and Population Health Group - GESP, Colombia; Daniel Cuartas, Universidad del Valle; Diana caicedo, Universidad del Valle; Carolina Mendoza, Grupo Epidemiología y Salud Poblacional - Universidad del Valle; Fabian Mendez, Universidad del Valle

The idea of a world as a mechanic system composed by elemental blocks, the vision of the social reproduction as a competitive struggle for existence and the belief in the limited material progress have determined the way of studying, understanding and producing knowledge of diverse social, environmental, economic and politic phenomena. This vision has been the base of the epistemic model with which western science has produced knowledge in the last centuries, staying out of the world, in order to observe it without getting an organic glimpse of the studied phenomena. Among the principles for the application of the Ecosalud approach, it is established the transdisciplinarity and systemic thinking. Nevertheless, is it enough to get closer to an organic and integral glimpse of the studied phenomena? This article aims to give a hint about the use of complex thinking, transdisciplinarity and transcultural dialogue of different knowledge as components that facilitate the cognitive interchange between western science and other alternative ways of knowledge production. Hence, it is possible that different cultural visions of knowledge can coexist and complement each other in the execution of research oriented with Ecosalud approach; this model has been asserted, by philosophe Santiago Castro, as the transculturalization of knowledge. The implementation of implicative methodologies used in the processes of management of knowledge oriented to learning is a breaking point of the epistemic method because it gives an outstanding place to knowledge related to ancient traditions that are linked with corporality, senses and organization of the world. Diminishing the gap between the conceptualization of the principles mentioned above and their application in research oriented with Ecosalud approach, dialogues and articulatory practice (that include the different kinds of knowledge that were excluded from western science for having been considered "mythical", "organic" and "pre-rational",) could be fostered.

I1 - Capacity building: examples of collaborations

I1.1: One Health and EcoHealth: the same wine in different bottles?

Francois Roger, Cirad, France; Aurelie Binot, Cirad-AGIRs; Alexandre Caron, Cirad-AGIRs; Veronique Chevalier, Cirad-AGIRs; Muriel Figuié, Cirad-MOISA; Serge Morand, CNRS-ISEM; Marie-Noël de Visscher, Cirad-AGIRs; Michel de Garine-Wichatitsky, France

Although "One Health" and "EcoHealth" are both holistic approaches to health, their development has been driven by different scientific concerns and cultures. "One Health" appears to be mainly concerned with biomedical questions and historically more health science-driven. "EcoHealth" is defined more as an ecosystem approach to health, focusing more on environmental and socioeconomic issues and initially designed by disease ecologists working in the field of biodiversity conservation. Moreover, the field of "One Health" is evolving on a

large scale and at official levels while “Ecohealth” operates on a more grassroots, pragmatic level. Yet both approaches are informed by the conviction that health concerns must be addressed at the interface of human, animal natural and social environments. Both are trying to integrate scientific disciplines in multi-disciplinary and cross-disciplinary approaches. Both aim to mitigate risks threatening ecosystems and public health, including veterinary public health. Both struggle to properly define the boundaries of their concepts. If their points of origin differ, the relative synchrony of the success of both ideas is timely and not purely by chance: they are responding to a growing and common perception of the complexity of public health and conservation issues. In our view, the convergence, even the fusion, of the two concepts should be seriously considered and mutually beneficial. Such a move would deter the creation of new divisions among human and animal health experts, ecologists and conservationists, and would facilitate the incorporation of social sciences. In so doing, a sole paradigm, one that can be adapted to different socio-ecosystems and different operational levels, from the local to the global, could be defined to achieve greater efficiency in biosphere health management. Cirad teams and partners intend to implement field activities in the framework of their research and training platforms in partnership in Southeast Asia, Austral Africa and Madagascar.

I1.2: Conceptualizing Global Environmental Change and Human Health at the Research Institute for Humanity and Nature

Hein Mallee, Insitute for Human and Nature Kyoto, Japan; Jaime Galvez Tan, University of the Philippines Manila; Ryohei Kada, Research Institute for Humanity and Nature; Zen'ichiro Kawabata, Research Institute for Humanity and Nature; Kazuhiko Moji, Nagasaki University; Kiyohito Okumiya, Research Institute for Humanity and Nature

The objective of the Research Institute for Humanity and Nature (RIHN, Kyoto, Japan) is to conduct integrative research on key areas of interaction between humanity and nature. It does this by funding and hosting 3 to 5-year interdisciplinary research projects. Increasingly, these projects are adopting a more transdisciplinary stance oriented towards real-world problem solving. Human health is not specifically identified as a concrete area of research, but over the past 7-8 years, four projects have been examining human health in an ecosystem context. The concrete topics varied widely:

pathogen-human interactions, altitude environments, The effects of
 change and infectious disease in tropical Asia, and altitude environments, Environ
 Environm
 watersheds. Not every project adopted an explicit ecohealth framework, but discussions showed that such a framework helps bring out common approaches and concerns. This poster explores how these projects conceptualized their research and grappled with its positioning vis-a-vis public health, disease ecology, epidemiology, and environmental health. This led the projects to transcend narrow sectoral and disciplinary boundaries by seeking linkages with broad concepts such as human well-being, quality of life, and sustainable human ecosystems. At the same time, they grappled with contextualized, local “ecohealths” as they strived to facilitate community participation and public policy development.

I1.3: One Health – Ecohealth in Vietnam: a platform to exchange and foster communication among partners working with integrated approach

Hung Nguyen-Viet, Hanoi School of Public Health, Vietnam; PHUC Pham Duc, Hanoi School of Public Health; Tung Dinh Xuan, National Institute of Animal Sciences; Giang Pham, Vietnam Public Health Association; Khong Nguyen Viet, National Institute of Veterinary Research; Anh Vu Le, Vietnam Public Health Association

One Health and Ecohealth have been the key approaches not only in controlling diseases and bringing resources from human and animal health sectors but also in mobilizing the participation of many stakeholders from varied sectors. Currently, communication and exchange between One Health and Ecohealth activities in Vietnam are not

occurring frequently. Two coordination groups of the two programs namely the Vietnam One Health University Network (funded by the United States Agency for International Development – USAID) and the Field Building Leadership Initiative (FBLI): Advancing Ecohealth in South East Asia (funded by the International Research Development Center – IDRC, Canada) came up with an initiative of having a platform for information exchange between researchers in the two fields. One Health – Ecohealth in Vietnam, a 6-month brief, aims at gathering all forces from all the programs, projects and initiatives of One Health and Ecohealth in the country would have greater impact in improving human, animal in improving human, animal, environmental health. The brief consists of several sections including “in focus”, “activity highlights”, and “upcoming events” related to One Health and Ecohealth in Vietnam. We provide a map of all the One Health – Ecohealth projects/programs which are active in Vietnam through the introduction of the aforementioned brief. We also show this is one of the effective channels to better inform and foster collaboration among related researchers. Finally, challenges in the front of communication among researchers working in different integrated approaches in Vietnam are also presented.

I1.4: Interdisciplinary collaboration in EcoHealth education: Reflections on a United Nations externship Emma Gardner, Tufts University Center for Conservation Medicine, United States; Irene Maria Hoffmann, Food and Agriculture Organization of the United Nations

Tufts University Master of Science in Conservation Medicine is a graduate program designed to prepare professionals for a career at the human-animal-environmental health interface. The 12-month program includes training in communications, methodology, and conceptual issues related to an ecosystem approach to health. A month-long externship designed to immerse the student in an aspect of conservation medicine is a key requirement of the program. One such placement consisted of a research project at the Animal Genetic Resources Branch of the Animal Production and Health Division of the Food and Agriculture Organization of the United Nations (FAO) in Rome, Italy. This externship provided the student with valuable research experience; exposure to the international development sector and the structure and function of a global organization; the opportunity to explore the links between health, poverty, and food security; and professional network expansion. This externship furthermore allowed the Animal Genetic Resources Branch the opportunity for interdisciplinary collaboration and exploration of innovative approaches that could not be easily addressed within the normal work program. This experience resulted in a formal relationship between the Animal Genetic Resources Branch and Tufts University Cummings School of Veterinary Medicine Center for Conservation Medicine, thereby maintaining the continuity and viability of research in health and livestock breeds. Ecohealth externships that cross disciplines and sectors can be mutually beneficial by providing research activities to the host institution, while allowing the student to explore the links between ecohealth research, practice, and policy. The Tufts-FAO externship experience is one example of the interdisciplinary and cross-sector collaborations that must be fostered within ecohealth education.

I2 - Connections in agri-food systems

I2.1: Food for Thought: An EcoHealth Approach to Understanding Public Policy Initiatives Aimed at Improving Food-Related Health Outcomes

Shannon Majowicz, University of Waterloo, Canada; Sharon Kirkpatrick, University of Waterloo

Food and health are intimately intertwined: what we eat simultaneously impacts our exposure to foodborne pathogens and allergens, our nutritional status, our body composition, our mental health, and our chronic disease risks. And what we eat is influenced by a complex web of individual and environmental drivers, such as socioeconomic status and food security, preferences, culture, politics, economics, trade, industry, legislation, and our built and natural environments. To date, the fact that all food-related policies become fully integrated at the moment of individual consumption has been largely ignored. Rather, public policies aimed at influencing food-related outcomes are primarily developed within silos (e.g., food safety risk assessments, initiatives promoting sustainability, school allergy policies), each focused on optimizing a particular outcome. Since 'solving problems' in one domain may create new problems in another, understanding the complex interactions between public policy initiatives aimed at improving both specific food-related outcomes (such as human health) and the overall food system is imperative. To this end, we have integrated existing systems maps from the food safety, food security, obesity, and other literatures, to identify synergistic and antagonistic policy levers within the larger system. Drawing insights from key informant interviews, we will apply the integrated system map to a policy example (e.g., salt reduction) to illustrate the benefits and challenges of transdisciplinary approaches to food and health. Applying a participatory and transdisciplinary lens to the food-health nexus raises the question of whether simultaneous optimization of all food-related outcomes, or even all food-related health outcomes, is possible. This highlights a critical challenge for the application of EcoHealth approaches within population and public health: how do public policy makers communicate and achieve the benefits of a transdisciplinary approach when underlying organizational and political structures support uni-discipline decision making, and judge success using short-term, single outcome metrics?

I2.2: Watershed Diagnostics for Improved Adoption of Management Practices: Integrating Biophysical and Social Factors Across Urban and Agricultural Landscapes

Paul Leisnham, University of Maryland, United States; Yan Wang, University of Maryland; Daniel Schall, University of Maryland Baltimore County; Hubert Montas, University of Maryland; Kaye Brubaker, University of Maryland; Adel Shirmohammadi, University of Maryland; Victoria Chanse, University of Maryland

Chesapeake Bay is the largest and most productive estuary in the United States, but it has undergone considerable water quality degradation over the past 60 years. There has been little improvement in water quality with the focus of previous research and intervention on technological or social components alone. Sustained advances in watershed health need a fundamental shift away from discipline-specific research and intervention towards an integrative research, extension, education approach that embraces both biophysical and social dimensions of pollution transport and Best Management Practice (BMP) adoption. We describe an ongoing inter-disciplinary project that is developing next-generation GIS-based assistive tools that integrate both biophysical and social factors to target pollution hot spots and prescribe appropriate BMPs in urban and agricultural watersheds. Social research is being used to evaluate stakeholder attitudes and behaviors towards watershed health and BMP adoption, and is being combined with biophysical research within a Diagnostic Decision Support System (DDSS) to strengthen the technical abilities of community, State, and Federal partners at precisely targeting effective BMPs. Community Based Participatory Research, social marketing, ecosystem-orientated education programs, and technology transfer are being applied in cooperative partnership with community associations and State officials in study watersheds to improve effective outreach strategies and lower BMP adoption thresholds so that greater advancements and actions can be made towards watershed sustainability. Examples of outputs to date, and which are presented here, include maps of pollution hotspots and recommended BMPs under particular environmental conditions, and the identification of important socio-economic factors that pose as barriers to BMP implementation.

12.3: Using ecosystem approach to reduce pesticide use in agricultural production in Yuanmou County, China

Fang Jing, Kunming Medical University, China; Linbo Fan, Kunming Medical University; Min Zhu, Kunming Medical University; Guangan Wang, Yuanmou County Centre for Disease Control; Qibin Chen, Yunnan Agricultural University; Yiyang Wang, Kunming Medical University; Xia Xiao, Kunming Medical University

Agricultural intensification has been taking place in China since 1960s that largely improved food security and nutrition. However, intensified agricultural production also poses critical problems for ecosystems and health. Among others, excessive pesticide using has increasingly become a concern of researchers and the general public. Yuanmou County, Yunnan Province, China is a winter-seasonal vegetable production base in China where large amount of pesticides are used to promote vegetable plantation. Supported by IDRC and as part of the project “Field Building Leadership Initiative, Advancing EcoHealth in Asia”, we are undertaking an EcoHealth project in Yuanmou aiming at reducing pesticide use and promoting local sustainable development. The project is still ongoing and the preliminary findings show that large scale vegetable and fruit plantations have rapidly increased in Yuanmou in the last decade due to the increasing of urban financial capital investment; local agricultural production highly rely on pesticides that cause potential health and environment costs; a new professional group: agricultural workers has occurred but little attention was paid to the occupational health protection of this group; farmers and agricultural workers wear little protection when using pesticides; local health workers have low awareness and capacity in dealing with pesticide related health problems. The excessive use of pesticides in agricultural production in Yuanmou is caused by the complex interaction of different actors with diverse interests and aims that are deeply embedded in the institutional arrangements and agriculture development policy. Simply forbidding the use of high toxic pesticides cannot prevent the negative impact of pesticide using on human health and ecosystems. To effectively address the problems of excessive pesticide using need systems thinking and multi-stakeholder participation. Middleman of vegetable trade and consumers should be also involved in order to reduce the use of pesticides.

ABSTRACTS : Poster presentations

P1A – Poster session, Aug 12, 12 :30-14 :00

P1.1: Leptospira Spp Serogroups Identification In Human And Pigs Serum Samples From Two Provinces In Vietnam

Van Cao, Pasteur Institute, Vietnam; Minh-Anh Dang-Trinh, Pasteur Institute; Ma.Lucila Lapar, International Livestock Research Institute; Khang Duong Nguyen, Nong Lam University of Ho Chi Minh City; Silvia Alonso, International Livestock Research Institute; Jeffrey Gilbert, International Livestock Research Institute; Hiep Mai, Department of Animal Health

Between 2012 and 2013 - under the IDRC supported 'Ecosystems Approach for the control of zoonotic diseases in Southeast Asia project' - blood samples were collected from pigs at slaughterhouse in two southern provinces (Binh Phuoc and Tiengiang) in Vietnam (n=1005). By tracing their farm of origin, 202 pig-raising households were identified; subsequently interviews and human sample collection were conducted at household level. 882 of the sampled pigs belonged to the participating households that provided consent to sampling. The samples were processed in the laboratories of the Institut Pasteur in Ho Chi Minh City. Serum was extracted and tested for presence of antibodies against 18 different *Leptospira* serogroups by the Microscopic Agglutination Test (MAT; cut-off value $\geq 1:100$ considered positive). The proportion of positive human samples was higher in Binh Phuoc province (19.6%) than in Tien Giang province (9.7%). Conversely, more pigs were positive in the latter province (29% versus 22%). Men were more likely to be positive than women. In pigs, the serogroups Pyrogenes and Hustbridge were most common in Tien Giang, while Husbrige, Icterohaemorrhagiae and Louisiana serogroups were most frequently found in Binh Phuoc. In humans, 10 serogroups were found. Bataviae, Icterohaemorrhagiae and Panama were most commonly identified from humans in Tien Giang province, while Pyrogenes and Icterohaemorrhagiae were most common in Binh Phuoc. The paper presents a comparison of serovars distributions found in both hosts and the intra-household correlation and discusses environmental and other sources of infection for each type of host and whether pigs represent a significant risk factor.

P1.2: A survey to investigate leptospirosis transmission in pig farming households

Hiep Mai, International Livestock Research Institute, Vietnam; Khang Duong Nguyen, Nong Lam University of Ho Chi Minh City; Van Cao, Pasteur Institute; Solenne Costard, International Livestock Research Institute; Minh-Anh Dang-Trinh, Pasteur Institute; Ma.Lucila Lapar, International Livestock Research Institute; Jeffrey Gilbert, International Livestock Research Institute; Silvia Alonso, International Livestock Research Institute

Pig farming is among the most common livestock production activities in Vietnam. A study was undertaken to investigate the leptospirosis zoonotic transmission in pig farming communities in Vietnam. Five pig slaughterhouses in two provinces were recruited for the study. Blood samples were collected from 1005 pigs randomly selected among the batches present for slaughter during visits and information collected about the abattoir and its workers. Further, the households of origin of the sampled pigs were traced back and invited to

participate in a survey. A questionnaire on farming and hygiene practices was completed in consenting households (n=202; 882 animals) and blood collected from one to three healthy household members (n=420). Blood samples from animals and humans were tested for the presence of antibodies against 18 different serogroups of leptospirosis. 25.3% of pigs and 14.8% of humans carried antibodies against *Leptospira* spp, with differences between provinces. Among the 202 recruited households, 22 (10.9%) had both positive pigs and humans. The study identified potential household level risk factors associated with human exposure to *Leptospira* spp. A discussion is presented on the degree to which pig farming may contribute to the risk and mitigation strategies.

P1.3: Eco-One Health approaches to urban leptospirosis assessment in Yopougon, Abidjan

Bassirou Bonfoh, Centre Suisse de Recherches Scientifiques, Côte d'Ivoire; Mwanajaa Mwachui, Swiss TPH; Bertin Akpatou, CSRS; Kouassi Dongo, CSRS; Jan Hattendorf, Swiss TPH; Jakob Zinsstag, Swiss TPH

A cross-sectional sero-epidemiological survey was conducted in Yopougon, Ivory Coast between June and August 2012. A standardized questionnaire was administered to 131 patients focusing on location, sanitation, animal ownership and exposure to rodents. A total of 124 blood samples from febrile patients were collected in Yopougon hospitals and single Micro Agglutination Testing (MAT) titres of 1 100 coupled with literature symptoms and signs were used as a case- definition. The blood samples of 122 captured rodents in the area underwent a procedure similar to that applied to human samples. Of 124 febrile subjects, 5 (4) CI 0.6, 7.5 had anti- leptospiral antibody titers of above 1 100. Simultaneously a sero survey of 99 out of 122 captured rodents with adequate sampling material, 4/99 (4) CI 0.2, 7.9 were positive for anti-leptospiral antibodies. Prevalence of antibodies of individual serovars in humans included *L. icterohemorrhagiae* 2 (1.6), *L. canicola* 2 (1.6), *L. copenhageni* 3 (2.4), whereas *L. pomona*, *L. australis* and *L.grippityphosa* each had a prevalence of 1(0.8). In rodents the highest prevalence was *L. icterohemorrhagiae* 3 (3) followed by *L. copenhageni* 2 (2) while both *L. australis* and *L. bratislava* had 1 (1) respectively. Common serovars seen in both humans and rodents were *L.icterohemorrhagiae*, *L.copenhageni* and *L.australis*. All of the five human cases reported contact with rodents. They consisted of three women a pork vendor, a water vendor, and a student and two males the first one sold plastic and the second a male student. The latter reacted to the most number of serovars, which was recorded in the survey. This is the first report of human and rodent exposure to leptospirosis in Côte d'Ivoire. More research is however necessary to better assess the epidemiology and public health

P1.4: Transmission of Non-Tuberculous Mycobacteria (Buruli ulcer) from environment to humans in Côte d'Ivoire

Christelle Dassi, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire / Afrique One Consortium, Côte d'Ivoire; Lydia Mosi, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire; Charles Quaye, Noguchi Memorial Institute for Medical Research; Charles Narh, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire (CSRS) / Afrique One Consortium; Daniele Konan, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire; Joseph Djaman, UFR Biosciences, Université Félix Houphouët Boigny ; Bassirou Bonfoh, Centre Suisse de Recherches Scientifiques

The endemicity of Buruli ulcer (BU), a Non-Tuberculous Mycobacteria (NTM) infection, has significantly increased in Côte d'Ivoire (43.1% of worldwide new cases in 2012), where it is the second most important mycobacterial disease after tuberculosis. Epidemiological studies identified *Mycobacterium ulcerans* as causative agent and showed that aquatic environments represent the main source of infection. Potential reservoirs in the environment are suspected in NTM transmission to humans; however, the exact transmission mode remains unknown. Thus, assuming that NTM transmission depends on the overlapping ecology of human

and animal habitats, we aim to establish a relationship between their distribution, zoonotic risks of contamination in humans and BU potential transmission, using molecular biology tools. Different biological samples from five rural communities in two highly endemic areas in Côte d'Ivoire (Taabo and Daloa) were collected. Two hundred and ten samples (210) from aquatic environments (biofilms, soil, plants detritus and water filtrates), 36 fine needle aspirations and swabs from suspected lesions of 31 human cases, and 1183 organs and lesions samples from 111 trapped rodents living nearby with 8 suspected lesions, were collected. DNA extraction and PCR confirmed 94% of the 36 suspected human lesions. NTM, particularly *M. ulcerans*, were detected in 48% of environmental samples tested, mostly in biofilms. Interestingly, suspect animal lesions tested showed 3 positives for mycobacterial DNA with *M. ulcerans* putative infection. These results highlight NTM presence within investigated communities and suggest the role of environment in NTM dissemination and possible transmission pathways including rodents as hosts or potential reservoirs. Based on the precise identification of strains involved by sequencing and distribution assessment, risk models of infection to humans could be elucidated to ultimately promote control policies.

P1.5: Molecular epidemiology of *Brucella* spp isolates of humans and livestock in Mongolia

Jakob Zinsstag, Swiss TPH, Switzerland; Batbaatar Vanaabaatar, Institute of Veterinary Medicine, Mongolian State University of Agriculture; Ulziisaikhan Gombosuren, Institute of Veterinary Medicine, Mongolian State University of Agriculture; Khurtsbaatar Ochirbat, Institute of Veterinary Medicine, Mongolian State University of Agriculture

Brucellosis is one of the most common zoonotic diseases worldwide. In Mongolia, human brucellosis became an issue in the 1960s. During the 1970s, human incidence was reduced to less than 1 case / 100,000 thanks to livestock vaccination. In the 1990s, human brucellosis re-emerged and recent studies estimate a seroprevalence of 18% among the rural population. Even though, human prevalence is high, few strains have been typed using molecular methods and no molecular epidemiological analysis has been conducted. This study characterized 58 isolates from humans (n =12) and livestock (cattle= 2, goat =6, sheep= 38) from five provinces through typing, using a multi-locus variable-number tandem repeat analysis. All 53 *B.melitensis* and 5 *B.abortus* were confirmed as field strains, hence no vaccine strains were found despite on-going vaccination in the country. *B.melitensis* isolates from human patients shared the same genotype as sheep and goat isolates, confirming that small ruminants are the main reservoir host and most likely infection source for humans. We found *B. abortus* in cattle but not in humans. Panel 2B markers had a diversity index ranging from 0.62 to 0.75. Mongolian strains had high genetic diversity compared with bordering Chinese and Kyrgyz strains. These study results show the importance of disease ecology studies in the animal reservoir to inform about human brucellosis occurrence. This study confirms observations in parallel serological studies in humans and animals on the continuing animal - human transmission of brucellosis (reported separately). Our results support the strengthening of mass vaccination efforts for small ruminants, cattle and yaks. Sustained vaccination reaching high coverage for at least the production cycle of the livestock, following the recommendation of the World Organization for Animal Health (OIE), and proper monitoring of vaccination coverage are needed to achieve effective control of brucellosis.

P1.6: Bovine tuberculosis in Africa: A social-ecological challenge

Jakob Zinsstag, Swiss TPH, Switzerland

Bovine tuberculosis (BTB) due to *Mycobacterium bovis* is endemic in most African countries. It is a complex zoonotic disease infecting wildlife, livestock and humans. Besides a few wildlife species, cattle are the main reservoir of the disease. Depending on the livestock production system and breed, BTB in Africa is endemic at low level in rural sedentary and pastoral production systems. However, BTB prevalence can reach up to 60% in

intensive dairy production system in peri-urban areas of big cities. BTB can be transmitted to humans, but on average, less than five percent of human tuberculosis in Africa is due to *Mycobacterium bovis*. Three main genetically distinct lineages circulate in Africa. Current diagnosis in livestock is still mainly done by the tuberculin test for which a lower cut-off of the skinfold has proved to be more appropriate than the one currently recommended by the World Organization for Animal Health (OIE). Losses of BTB to the cattle production were estimated in Ethiopia. The cost of BTB does not exceed 6% of the net present value of production in intensive dairy systems. Human health cost has so far not been included in a cross-sector assessment because of the surprisingly low zoonotic transmission of BTB in Africa. Currently the culling of tuberculin positive animals seems not to be feasible in most African countries, because of the lack of diagnostic capacity, poor animal health services and the lack of compensation of farmers. Transdisciplinary participatory stakeholder approaches, involving all related actors are needed to develop locally adapted control in a given country or region. In the future a vaccine against BTB for cattle may be the most promising and cost-effective strategy for BTB control in Africa. A novel vaccine against BTB would also have an important positive effect on the development of human tuberculosis vaccines.

P1.7: Knowledge and Perceptions of brucellosis in the pastoral communities adjacent to Lake Mburo National Park, Kiruhura District, Uganda

Catherine Kansime, Makerere University, Uganda; Anthony Mugisha, College of Veterinary Medicine, Animal Resources and Bio-security, Makerere University; Fredrick Makumbi, Makerere University School of Public Health, College of Health Sciences.; Samuel Mugisha, Makerere University; Innocent B. Rwego, College of Veterinary Medicine, University of Minnesota; Benon B. Asiimwe, College of Health Sciences, Makerere University; Elizeus Rutebemberwa, Makerere University School of Public Health, College of Health Sciences

Lack of knowledge about brucellosis may affect the health-seeking behavior of patients, thus leading to sustained transmission in communities. In this study, we assessed knowledge and perceptions of brucellosis among pastoral communities adjacent Lake Mburo National Park (LMNP), Uganda. A community cross-sectional questionnaire survey involving 371 randomly selected household heads from three sub-counties adjacent LMNP were interviewed from June to August 2012. Data collected included knowledge and perceptions on causes, symptoms, transmission, treatment and prevention of brucellosis. Multivariable logistic regression analysis was performed to explore the association between overall knowledge of brucellosis and various individual factors using odds ratios and 95% confidence intervals. Only 70 (19%) knew the symptoms of brucellosis in animals, and (279, 75.5%) mentioned joint and muscle pain as a common symptom in humans. Almost all participants (370, 99.3%) had ever heard about brucellosis, majority (311, 84.7%) believed the disease affects all sexes. Nearly two thirds of the respondents (67.7%) believed close proximity to wildlife contributes to the presence of the disease in the area. Majority (352, 95.4%) knew that brucellosis in humans could be treatable using modern drugs. The main routes of infection in humans such as consumption of unpasteurized dairy products were known by 97% (360/371), eating of half-cooked meat by 91.4% and eating contaminated pasture (in animals) by 97.4%. There was moderate overall knowledge of brucellosis (174, 46.9%). Factors associated with higher overall knowledge were being agro-pastoralists (aOR:2.08, CI:1.17-3.71) compared to pure pastoralists. Those who reported that the disease was a health problem (aOR:0.18, CI:0.06-0.56) compared to those who said it was not were less likely to be knowledgeable. There was moderate overall knowledge on brucellosis in humans and animals. There is need for collaboration between public health, veterinary and wildlife sectors to provide health education about brucellosis for better management of the disease in the communities.

P1.8: Comparative analysis of perceptions of risk factors for contamination of Buruli ulcer in endemic areas of Taabo and Daloa

Daniele Konan, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Côte d'Ivoire; Lydia Mosi, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire; Gilbert Fokou, Centre Suisse de Recherches Scientifiques; N'Doumy Noël Abé, Université Alassane Ouattara de Bouaké, Côte d'Ivoire; BONFOH Bassirou, Centre Suisse de Recherches Scientifiques

Buruli ulcer (BU) is a major public health concern in Côte d'Ivoire constituting the second most important mycobacterial disease after tuberculosis. Despite efforts from researchers, transmission modes are still unknown. Environmental factors have been hypothesised as key elements in understanding transmission patterns *M. ulcerans* to humans. However, human factors as reflected in daily practices and behaviours of people interacting with the physical environment are still suspected. The question of social factors in BU transmission becomes then critically important. This study analysed the level of local knowledge on risk factors of contamination of BU; it relied on quantitative data collected through household questionnaires (n=500) and qualitative data using semi-structured interviews (n=57) and Focus Group Discussions (n=8) with patients, ex-patients, health personnel, traditional healers and parents of patients. Results showed that the etiology of BU is considered to be shared between natural and supernatural causes. Even though 1/4 of respondents still link causality of BU to witchcraft, they preferably identify environmental elements such as dirty water (42.4% in Taabo), contact with infected soil (27.8%) and bathing in the same water with patients. The consumption of rotten and contaminated fruits was also identified as a possible transmission route. Thus, for those communities, even if animals and insects are important in BU transmission, natural environment appears as the reservoir of *M. ulcerans*, constituting the main source of contamination for humans. It appears from the perception of risk factors of BU that human, animal and environmental factors are critically important in understanding transmission patterns. However, the real weight of each factor is still to be determined. For that, a case-control study will be carried out in both endemic and non-endemic areas to BU with the same geographical and human characteristics to better assess determinants of vulnerability and inform biologist on area of transmission investigation.

P1.9: Outcomes in a Kenyan smallholder pig farming industry subsequent to workshops and research as measured through interviews

Cate Dewey, University of Guelph, Canada; Jared Wohlgemut, University of Guelph; Florence Mutua, University of Nairobi; Mike Levy, University of Guelph

A retrospective examination of community changes following a longitudinal study involving pig farmers, butchers and government extension officers in remote villages of Western Kenya was conducted using outcome mapping (OM) methodologies. The 1st study in 2006-2007 included a random sample of 163 smallholder pig farmers in the Busia District, Western Kenya. The purpose was to describe pig management, teach pig husbandry, establish a system to estimate pig's weight, and determine the prevalence of *Taenia solium* (a tapeworm that causes epilepsy in people). Training of the trainers was used to present 2 one-day workshops (2006 and 2008) to government staff who were then facilitated to deliver farmer workshops. Outputs of the project included the development of training manuals and weight estimation charts, the delivery of workshops to government staff, farmers and butchers. The outcome mapping in 2010 began with a new random sample of farmers and a census of butchers. We interviewed 177 pig farmers, and 12 pig butchers to determine the outcomes first with an open ended question (what have you changed?) and then with probing questions. Farmers reported improved pig feeding regimes [adding variety, increased frequency and more protein (small dried fish)], record keeping, estimating pig weights, timely breeding of sows, and preventing human epilepsy due to *Taenia solium* by confining the pig and cooking pork longer and buying pork from butchers rather than from a

neighbour's back yard. Butchers estimated pig weights, maintained records, cooked pork longer, used a slaughter slab and had pork inspected, some butchers put pork behind a fly screen, and many increased hygiene by washing the knife and store counter surface with hot water and soap. Through outcome mapping, we measured how the research project influenced behaviour among the different players in the pork value chain in Western Kenya.

P1.10: Benefits of an eco-health research approach to improving small dairy farm production in Indonesia

Wiku Adisasmito, Universitas Indonesia, Indonesia; Allan Lauder, Universitas Indonesia

A much studied problem is the poor productivity of small-scale dairy farms in South East Asia. The study applies an eco-health approach, which combines research and social change objectives. Eco-health studies can reveal the multi-faceted aspects of problems to allow change to take place. The methodology involved providing 17 cows in Bogor, West Java with an improved complete feed mixture consisting of alfalfa, concentrates, and supplements. The cows were fed the new mixture over a two month period. The results of the treatment showed a 20% increase in milk produced and improvements in fat and protein content. This eco-health study contributes new insights in the behavior of the farmers taking part in the study. Although the trend from the beginning and through the first month was obviously towards better productivity which would have been thought to improve their income, during the second month, the farmers did not fully comply with the instruction to use the new feed. Rather, they returned to using their regular feed of king grass, various ingredients of concentrate locally mixed. This obviously had the result of depressing the potential gains in our results. Because we were using an eco-health approach, we were able to determine that the reason for this behavior was to avoid losing income they were obtaining from controlling the supply of their regular feed. If they changed to the new feed they would lose this and therefore they rebelled against it. We therefore learned that to make a change, we would have to factor in this kind of practice.

P1.11: Impacts Of Poultry Production Cluster (PPC) On Environment

Eny Martindah, Indonesian Research Centre for Veterinary Science, Indonesia; Nyak Ilham, Indonesian Center for Socio Economic and Policy Studies (ICASEPS), Bogor, Indonesia; Edi Basuno, Indonesian Center for Agricultural Socio Economic and Policy Studies (ICASEPS); Yusmichad YUSDJA, Indonesian Center for Socio Economic and Policy Studies (ICASEPS), Bogor, Indonesia

Research to assess the environmental impact of industry restructuring of poultry farms into clusters (poultry production cluster or PPCs) was conducted in two districts of Subang and Ciamis, in West Java Province, Indonesia in 2012. Field observation and qualitative survey through focus group discussion (FGD) and participatory rural appraisal (PRA) were carried out to collect information on environmental pollution and sanitation issues related to the existence of PPC. Laboratory testing was done for air and water pollution, such as ammonia level, and possible contamination of Coliform and Salmonella sp. Results showed that the distance between residential area and pen location affects environment problems, especially water and air quality. More than 80% of surveyed farmers did not provide a special place to store feces. Dust and ammonia emissions from feces pollute the environment surrounding the pens and increases flies population that create unpleasant daily life. Ammonia level analysis was found in Subang in the range of 300-450ppm, and in Ciamis is 25-525ppm. Ammonia level of 200-400ppm could cause nasopharyngeal irritation, while >400ppm is harmful for animal and human health, especially for farm workers. Analysis of water quality surrounding PPCs (well, ponds, artesian-well) indicated that salmonella sp contamination was unproven, however all samples are contaminated with coliform bacteria, with most samples from Subang and Ciamis in the range of

P1.12: Expansion of rubber plantations and Chikungunya outbreaks in eastern Thailand

Uruyakorn Chansang, National Institute of Health, Dept. of Medical Science, Ministry of Public Health, Thailand; Mir S. Mulla, Department of Entomology, University of California; Chitti Chansang, National Institute of Health, Department of Medical Science, Ministry of Public Health; Somchai Sangkitporn, National Institute of Health, Department of Medical Science, Ministry of Public Health; Pattamaporn Kittayapong, Center of Excellence for Vector and Vector-Borne Diseases, Faculty of Science, Mahidol University

Rubber plantations, one of important agricultural lands in Thailand, were found firstly only in the South (11,906,882 m²), but they were expanded over time to other parts of Thailand especially to the East (1,746,070 m²). Chikungunya, a vector-borne disease transmitted by *Aedes albopictus*, was found to be endemic in the southern part of Thailand. This disease has been added into the national epidemiological surveillance reports as the re-emerging disease due to its outbreak that occurred all over Thailand since 2008. So far, there has been no report on the impact of the spread of rubber plantations on Chikungunya outbreaks. Therefore, our study was initiated to determine this relationship by focusing on the distribution and density of *Ae. albopictus* in rubber plantations. The rubber plantations associated with rural residential and woodland areas next to forests in Rayong, Chonburi and Chachoengsao Provinces were selected as study sites based on the top-ten incidence rate of Chikungunya (0.19-5.6/100,000, in 2012). Mosquitoes were surveyed and sampling with appropriate tools and techniques. Our results indicated that *Ae. albopictus* was prevalent in most of mature tree lands in all rubber plantations that located in rural residential and woodland areas (18-29 mosquitoes per one minute captured) in the studied provinces with high incidence rates. The study areas in two other provinces, i.e., Chanthaburi and Trat, in the East with no rubber plantations were also studied for comparison. The incidence rates of Chikungunya in these two provinces were low (0.03/100,000 and 0.02/100,000, respectively) while the average number of *Ae. albopictus* varied from 3-9 mosquitoes per one minute captured. Chikungunya virus infection in this mosquito vector species was also evidenced. Our study demonstrated that the expansion of rubber plantations into the East could be one of the drivers of Chikungunya outbreaks in eastern Thailand.

P1.13: Impact of expansion of wet rice fields on the risk of liver fluke infection in Lao P.D.R.

Moji Kazuhiko, Nagasaki University School of International Health Development, Japan

Liver fluke *Opisthorchis viverrini* (Ov) infection is a serious public health problem in Lao P.D.R. We conducted the following researches to understand the reality of transmission cycle of the parasite in Songkhone district, Savannakhet Province, by establishing a health and demographic surveillance system (HDSS) : 1) parasitological stool examination, 2) human defecation pattern in the open area, 3) ecological study of intermediate host snail and fish, 4) fishing activities of villagers, 5) agricultural practice and development/expansion, 6) diet study (raw and under-cooked fish consumption), and 7) land cover and land use change. Wet rice fields, irrigation channels without concrete cover (mud bottom) and ponds were identified as the area where transmission is mostly occurring. Recent agricultural expansion has created more snail habitat by making artificial ponds, irrigation channels, and irrigated wet rice field in the dry season. We reconstructed their expansion by using remote sensing data in 1960s and 2000s. As the potential risk of infection has been increased, effective ecohealth education and practice to reduce the Ov transmission is needed for reducing Ov infection. As it is not a easy task, active and effective community mobilization and participation are indispensable for the sustainable control of the transmission.

P1.14: Impact of climatic factors on dengue incidence in a global outreach tourist setting: A case study of Svay Leu District, Siem Reap Province, Cambodia

Srey Teng, Ministry of Health, Cambodia; Touch Sok, Ministry of Health; Rekol Huy, Ministry of Health; Chantha Ngan, Ministry of Health

Impact of climatic factors on dengue incidence in a global outreach tourist setting A case study of Svay Leu District, Siem Reap Province, Cambodia Srey Teng, Touch Sok, Rekol Huy, Chantha Ngan Dengue, a vector-borne disease, has posed major public health concerns in more than 100 countries in tropical and subtropical. In Cambodia, dengue became endemic-epidemic during several years. In 2007, a big dengue outbreak occurred in whole nationwide even dry season. Likewise, Svay Leu District had experienced with dengue outbreak during 2007 and 2012. In recent years increased reports of epidemic dengue, dengue hemorrhagic fever (DHF) were closely related with socio-economic development, environments and climate change (temperature, rainfall, rainy day and humidity) are the main challenges that lead to the increase incidence of this disease. The objective of this study was to investigate the relationship between dengue disease incidence and local climate parameters at Svay Leu District, Siem Reap Province, a global outreach tourist destination in Cambodia. A retrospective study of epidemiological data on dengue and climatic factors (temperature, rainfall, rainy day and humidity) from 2005 to 2013 at Svay Leu District of Siem Reap Province was investigated. Seasonal distribution of disease incidence and its correlation with climatic factors was analyzed at monthly basic by using the spearman s rank correlation. Analysis was performed in a time lag series from time t-0 to t-6 when t was the month when the first case of dengue occurred. Dengue transmission usually occurs during rainy season. Climatic factors (maximum temperature, minimum temperature, mean temperature, rainy day, rainfall, and humidity) had correlation with dengue monthly incidence. The mean temperature, rainy day, and humidity were predictors of dengue incidence. Results provide the useful evidence for health authorities when making their decisions regarding the surveillance and prevention of emerging infectious diseases in the Svay Leu

P1.15: Domestic dogs and dengue in rubber plantations in eastern Thailand

Suporn Thongyuan, Department of Veterinary Public Health, Faculty of Veterinary Medicine, Kasetsart University, Thailand; Pattamaporn Kittayapong, Center of Excellence for Vector and Vector-Borne Diseases, Faculty of Science, Mahidol University

Urbanization and expansion of agricultural land use into forest areas are the major causes of widely spread of dengue due to an increase in man-made or artificial breeding sites of Aedes mosquitoes, the major dengue vectors. Transmission cycle of dengue can be either urban or sylvatic. Several vertebrates had been reported as the main reservoirs for dengue viruses. Domestic animals are identified as the reservoir of zoonotic diseases as they share both habitats and vectors with humans. Molecular surveys, followed with virus isolation have been performed to investigate dengue virus infection in domestic dogs living in rubber plantation areas in the eastern part of Thailand. We collected their blood samples, recorded their characteristics such as breed, age, sex, health status, and observed their housing status and habitats. Our results indicated that dengue virus type III was circulated in domestic dog populations. Partial gene phylogeny revealed that it was closely related to those strains circulated in human populations. Most domestic dogs are free range, wide territory, living both indoors and outdoors; especially they can freely run through the rubber plantation areas around or close to their owners' houses. Various species of mosquitoes with high density was reported in this area. Therefore, sylvatic transmission involving domestic dogs may play an important role in dengue transmission. Focus only on eradication of mosquito breeding sites or vector control by treatment of standing water sources may not be sufficient for dengue prevention and control. Surveillance in domestic dogs as dengue sentinel should be attempted. In addition, the role of domestic dogs in dengue transmission should be further investigated.

P1.16: Ecohealth approach for dengue control in Catba Islands, Vietnam

Phong Tran, National institute of hygiene and epidemiology, Vietnam; tran cong tu, National Institute of hygiene and epidemiology; Tran Hien Nguyen, NIHE; Nam Vu Sinh, NIHE

The famous tourist destinations in Southeast Asia are prone regions affected by the spread of globalization epidemics for tourists from many regions, many countries who travel as well as be able to bring by the pathogen. Catba Island was chosen as 1 of the 6 most popular tourist destinations in Southeast Asia for the application of biological - ecological - social models in infectious diseases control including dengue hemorrhagic fever. The objective of the study was conducting a pilot study on vulnerabilities of communities for dengue control using the eco-bio-social approach. In year one-data collection phase, the results of the analysis of biological, ecological and sociological factors showed the development of tourism, water consuming behavior, changing in land-use and occupation had affected to mosquito vector populations and increase exchange between human-vector and pathogens in Catba Island in recent years. In year one-implementation phase, the Dengue Prevention Model was conducted with two components. In the first component, 22 health collaborators were selected to manage and practice dengue activities for 1000 local households as an Ecohealth-House network. In the second component, 103/185 hotels agreed to participate to an Ecohealth-hotel network. A Community Management Committee was established including four main stakeholders Local Authority, Health, Tourist management office and Cat Ba National Park. To increase awareness to disease risk in Eco-Hotels network such as organizing a communication point to advertise the project in tourism events developing the project logo and present it in all hotels as well as in the banners which were hang in public areas in Cat Ba Distributing 1000 hand-poster to the hotels and tourists to introduce the project s activities. From the year of 2014, we will apply the eco-bio-social approach in developing comprehensive, community-based, inter-sectoral strategies to empower vulnerable human populations in Cat Ba as a global outreach hotspots.

P1.17: Chagas disease in Brazil and its relation to the Human Development Index

Natália de Fátima Gonçalves Amâncio, University of Franca. Graduate Programme on Health Promotion; Franca-SP; Brazil, Brazil; Mônica Andrade, University of Franca. Graduate Programme on Health Promotion; Franca-SP; Brazil; José de Paula Silva, University of Franca. Graduate Programme on Health Promotion; Franca-SP; Brazil

Chagas disease (CD) is a zoonosis that affects about 10 million people worldwide, and in Brazil, 2 to 3 million infected . It is considered the fourth leading cause of death in Brazil between infectious and parasitic diseases . The aim of this study was to relate the incidence of Chagas disease in the Brazilian states with the Human Development Index (HDI). It is a quantitative research carried out by raising the databases of the Information System for Notifiable Diseases in the period 2009-2013 (SINAN). The results shows that between 2009 to 2013 760 cases of Chagas disease have been recorded in Brazil. Among the states with the most representative figures of DC are Para with 595 cases and HDI 0.646 (medium-low), Amap with 46 cases of DC and HDI 0.708 (medium-high) , Amazon with 31 cases of DC and HDI 0.674 (medium - low). The incidence of Chagas disease in 2009 was 2.74cases/100.000hab Par , Amap and Amazonas 1.95 cases/100.000hab cases/100.000hab 0.11 , in 2010 0.28 cases/100.000hab Par , Amazonas 0.68cases/100,000 hab and Amap had no record of DC , in 2011 2.65cases/100.000hab in Para, 3.21 cases/100.000hab in Amap and Amazonas state had no record of DC, introduced incidence in 2012 to 1.96 cases /100,000hab, Amap 1.43cases/100.000hab and 0.08cases/100.000hab Amazonas, and in 2013 the state of Amazonas has provided no record of DC , the state of Par had an incidence of 0.11 cases/100.000hab and Amap 0,13casos/100.000hab. The decrease in incidence may be associated with the improvement of housing, healthy habits and behavior conditions, as well as establishing policies, programs and effective urban development projects. The increase in HDI helps to prevent and control these diseases and promote health of the population to whom they are addressed such actions.

P1.18: Increasing capacity in disease vector modelling to improve malaria and arbovirus mitigation strategies

Rachelle Desrochers, HealthBridge, Canada; Michael Mahande, Kilimanjaro Christian Medical University College; Filemon Tenu, Kilimanjaro Christian Medical University College; Debora Charles, Kilimanjaro Christian Medical University College; Franklin Mosha, Kilimanjaro Christian Medical University College; Jeremy Kerr, University of Ottawa, Department of Biology; Manisha Kulkarni, University of Ottawa, Epidemiology and Community Medicine

Malaria is the leading cause of child mortality in sub-Saharan Africa, but its diagnosis and case management are challenging, particularly in areas where arboviruses such as Dengue and Rift Valley Fever are also endemic. These viruses also cause fever, and since capacity for diagnostic testing is often lacking they contribute greatly to malaria misdiagnosis and overtreatment leading to poor patient outcomes and development of antimalarial drug resistance. Monitoring disease vector (mosquito) populations is key in identifying risk areas for arboviral and malarial infections; this can provide critical knowledge to health workers to guide appropriate case management, while informing local authorities to better target public health action. Species distribution modelling, using remote sensing data and Maximum Entropy modelling, offers a promising avenue for monitoring disease vector habitat, a proxy for disease risk. We are undertaking a project to improve the capacity of researchers at Kilimanjaro Christian Medical University College (KCMUC) in Tanzania to undertake species distribution modelling and identify areas of disease risk. Together, we are developing maps of suitable vector habitat (*Anopheles* spp. and *Aedes* spp.) that will be field validated and related to disease prevalence to confirm the key environmental factors that govern the distribution of suitable vector habitat and thereby disease risk. The resulting risk maps for the mosquitoes that transmit malaria relative to those that transmit arbovirus infections, as well as improved understanding of the relationships between vector habitat and disease prevalence, will be invaluable to guide vector control strategies and clinical management of these diseases.

P1.19: Benefit of pathogen infection to blacklegged tick (*Ixodes scapularis*) longevity?

Justin Pool, Fordham University, United States; Richard C. Falco, New York State Department of Health; Thomas J. Daniels, Fordham University

Lyme disease is the most prevalent vector-borne disease in the United States, infecting more than 20,000 people each year. The blacklegged tick (*Ixodes scapularis*) is the primary vector of the spirochete, *Borrelia burgdorferi sensu stricto*, the causative agent of Lyme disease. It is also the vector for two emerging pathogens, *Anaplasma phagocytophilum* and *Babesia microti*, the causative agents of human granulocytic anaplasmosis and babesiosis, respectively. *Borrelia burgdorferi* is the best-studied *I. scapularis*-transmitted bacterium and is maintained via a horizontal transmission cycle between *I. scapularis* and various reservoir host species. This study attempts to determine if there is a benefit to being infected for *Ixodes scapularis* by: 1) examining the relationship between tick survival and infection for all three (larvae, nymph, adult) active life stages of *I. scapularis*, 2) comparing the physiological age ratio between infected and uninfected ticks, and 3) examining why warmer winters (e.g., 2011-12) decrease the population size of *I. scapularis*. These questions are addressed by a series of field and laboratory experiments using *I. scapularis* from Armonk, NY, an area where *B. burgdorferi*, *A. phagocytophilum*, and *B. microti* are endemic, and pathogen-free *I. scapularis* nymphs from a Centers for Disease Control and Prevention (CDC) colony. Knowledge about the role that weather factors and pathogen prevalence have in tick survival will help public health officials predict the risk of exposure to tick-borne diseases in endemic areas and better quantify risk from year-to-year.

P1.20: Can an ecohealth approach be a novel control strategy toward elimination of *Schistosoma mekongi* in Lao People's Democratic Republic

Somphou Sayasone, National Institute of Public Health, Lao People's Democratic Republic; Youthanavanh Vonghachack, University of Health Sciences; Peter Odermatt, Swiss Tropical and Public Health Institute; Kongsap Akkhavong, National Institute of Public Health

Schistosoma mekongi is endemic in two districts (Khong and Mounlapamok district, Champasack province) of the most Southern province of Lao People's Democratic Republic (Lao PDR). Lao Ministry of Health target to eliminate schistosomiasis as public health problem by 2016 and interrupt the transmission by 2025. However, the parasite remains highly prevalent in specific foci where it is transmitting in these endemic communities. There in 2012, our baseline study showed that *S. mekongi* was prevalent as high as 30% in human and 14% in the animal dogs. Infections were also identified in the intermediate host snails *Neotricula aperta*. An ecohealth control approaches are currently tested as an alternative to the current control activities in the country. We selected three communities to compare the effect of different integrated control approaches: (1) mass drug administration in human combined with promotion of sanitation facility, (2) mass drug administration in both human and animal reservoirs combined with promotion of sanitation facility, intensive health education, including warning signs to water contact sites in risk area), and (3) mass drug administration in human which is currently the national strategy. The intervention was performed between 2012 and 2013. The post-intervention survey has been performed and is being currently analyzed. In this presentation, we will present the impact of the three intervention strategies on *S. mekongi* infection and transmission indicators, e.g., prevalence in human and animals, people's behavioral change and infection in intermediate hosts. The most effective strategy will be proposed as National control strategy.

P1.21: Approach of eco-zone classification related to parasitic diseases in Asia

Guojing Yang, Jiangsu Institute of Parasitic Diseases, China; Shang Xia, National Institute of Parasitic Diseases, China CDC; Luu Liu, Jiangsu Institute of Parasitic Diseases; Xiaonong Zhou, National Institute of Parasitic Diseases, China CDC

In order to examine the transmission patterns of the targeted NIDs in areas with different social-ecosystems, we have developed a classification system for targeted disease-endemic areas with respect to the identified environmental and socio-economic determinants. Specifically, we have collected the data in terms of Land Surface Temperature (LST) and Normalized Difference Vegetation Index (NDVI) for all of the seven targeted EIDs areas. Based on that, we have utilized computational approaches to clustering the geographical regions into certain Eco-Zones with respect their two dimensional environmental data (i.e., LST and NDVI). By doing so, we can represent the environmental and socio-economic characteristics of each EIDs area and, furthermore, to promote our study results in other areas with a similar social-ecosystem from the study.

P1.22: Matching Ecohealth and One Health attributes to research needs for emerging infectious diseases in Asia

Theresa Burns, Center for Coastal Health, Canada; David Stephen, Center for Coastal Health; Mannish Kakkar, Public Health Foundation of India; Purvi Mehta-Bhatt, International Livestock Research Institute; Hung Nguyen-Viet, Hanoi School of Public Health; Jennifer Dawson-Coates, Center for Coastal Health; Craig Stephen, Center for Coastal Health

One Health and EcoHealth have no universal definitions. Use of these terms in advocating for or describing projects is often interchangeable or inconsistent and terms are interpreted differently by different individuals

and institutions. This creates problems when trying to precisely communicate about research strategies and evaluation. We examined prevailing themes and practices to see how One Health and Ecohealth aligned with emerging infectious disease (EID) priorities in Asia. We created word clouds using key words extracted from online description of One Health and Ecohealth programs to identify differentiating features of the two approaches. One Health themes focused more on issues of discovery and response and were akin to Veterinary Public Health. Ecohealth was more focused on equity and coping and was more alike health promotion. EID priorities were determined by reviewing World Health Organization Country Cooperation Strategies, publicly available EID strategy documents from national and multi-national agencies, and articles in the peer-reviewed literature. The most common EID priorities clustered around One Health themes including surveillance, response, regulations and laboratory services. These priorities were common across nations except for those of some least developed countries. Priorities linked to Ecohealth themes such as systems thinking, socio-ecological drivers, and transdisciplinarity were discussed less often and were less clearly articulated but were sometimes included in priorities around preparedness when these included examination of population vulnerability and resilience. In Country Cooperation Strategy documents, few countries specifically used the terms One Health or Ecohealth, however priorities associated with these concepts were frequently listed. This emphasizes the importance of considering practices rather than terminology when selecting a research approach for EIDs. This project concluded that future strategies should focus on matching practices to the nature and scale of the EID priority rather than developing research opportunities affiliated with specific terminology or fields of study.

P1.23: Global ecosystemic approach of cholera epidemics

Michèle Legeas, EHESP, France

The current burden of cholera epidemics in the World, and mainly in Africa, remains very important. It induces not only immediate lives costs but also a considerable loss of chance for developing for many children. This disease has already been the purpose of a very large amount of research programs, as well in ecology, microbiology, medicine or sociology, etc. All the authors agree to say that it is necessary to build complex global models for succeeding preventing epidemics or limiting their growth. However, these models generally take only a part of the interrelationships. Indeed, models need gathering knowledge concerning bacterium, its ecosystems (human and aquatics) related to climate or geographical parameters, human beings (age, gender, way of life, level of development and equipment, wars and displaced people ...) and biological individual factors of sensitivity (as level of nutrition or stress for example). Otherwise, African's continent is different from India for human and natural ecosystems for cholera. One of these differences is that in Africa, today's, regions can be endemics, epidemics, hyper-epidemics or free from cholera reported cases, while India is widely endemoepidemic. The other can be found in the differences between the levels of peace and forced movements of population between the two continents. The present communication tries to collect and gather all known factors related to the birth and the expansion of cholera, needing to be inserted in such model, in Africa and the level of quantitative knowledge about their respective weights. The aim is to suggest and prioritize indicators of vigilance depending of 1) the level of risk of appearance of first cases and 2) existing means for risk management, among the local context of the regions.

P1.24: Spatio-temporal analysis of infectious diseases and its association with variables related to climatic and housing conditions in Ecuador

Emmanuelle Quentin, INSPI, Ecuador; Andrea Lobato, Instituto Nacional de Eficiencia Energética y Energías Renovables (INER, Ecuador); Varsovia Cevallos, Instituto Nacional de Investigación en Salud Pública (INSPI, Ecuador); Patricio Ponce, Universidad de las Américas (UDLA) – Centro de Investigación Traslacional

The link between environment, housing conditions and human health has not been much explored, specifically in Ecuador for being a poor-data region. But there is some information which only has to be exploited in order to identify its usefulness and future needs in more complete and structured databases. Using an eco-health framework implemented in a Geographical Information System (GIS), the present application is oriented to use available data a national level in order to calculate various related indices and analyze their association. Regarding environmental aspects, mainly climatologic satellite data is usable (precipitation, temperature, land cover or vegetation indices) with 0.25 to 25 km resolution. From the 2010 census of population and housing, important information on construction material and basic services access can be obtained at a parroquial level. The dependent variable to correlate consists of the cases and deaths from infectious diseases, the more relevant actually being acute respiratory infections and dengue fever. The proposed methodology synthetize each aspect in indices that allow the mapping of critical zones where a more local study should be realized.

P1.25: Collaborative Research on Emerging Infectious Diseases in Southeast Asia Region: 3M approach (Multi-Country, Multi-Sector and Multi-Discipline)

Pornpit Silkavute, Asia Partnership on Emerging Infectious Disease Research, Thailand; Andri Jatikusumah, Asia Partnership on Emerging Infectious Disease Research; Les Sims, Asia Pacific Veterinary Information Services; Prasit Palittapongarnpim, Deputy Dean, Mahidol University; Arlyne Beeche, International Development Research Center

Southeast Asia is one of the most important hot spots of emerging infectious diseases (EIDs) including those with pandemic potential. Several EIDs in the past 10 years have underscored their importance in the region and many of them are trans-boundary diseases that spread or could spread to new areas. The EID outbreaks in the last decade have profoundly affected many countries in the region. Those events also showed the importance of collaboration among countries in the region on the preventive and control measures to respond to EID threats. The Asia Partnership on Emerging Infectious Diseases Research (APEIR) is a research network initiated in 2006 to promote regional collaboration in avian influenza research. In 2009, the network expanded its research area to include all emerging infectious diseases. APEIR is composed of researchers, practitioners and senior government officials from Cambodia, China, Lao PDR, Indonesia, Thailand and Vietnam. Three strategic objectives of APEIR are to generate multi-country collaborative research; to build research capacity; and to promote knowledge translation and social advocacy. Projects that have been supported include studies on Avian Influenza (AI) H5N1 (commenced in 2006 and 2010), research on the Antimicrobial Resistance (AMR) and Wildlife Trade (WLT) (commenced in 2013). The multi-disciplinary, multi-sectoral collaborative research within the country members of APEIR has significantly contributed to the understanding of EID response, prevention and control at the regional level. Moreover, APEIR focuses on operational and intervention research, working closely with key stakeholders and policy makers throughout the study process. This type of research showed the importance of collaboration between countries on the preventive and control measure effort on EIDs and emphasized to researchers the need for a multi-disciplinary and multi-sector approach to tackle the challenges posed by research on EIDs.

P1.26: Has the Time Come for Big Science in Wildlife Health?

Jonathan Sleeman, USGS National Wildlife Health Center, United States

The consequences of wildlife emerging diseases are global and profound with increased burden on the public health system, negative impacts on the global economy, declines and extinctions of wildlife species, and subsequent loss of ecological integrity. Examples of health threats to wildlife include *Batrachochytrium dendrobatidis*, which causes a cutaneous fungal infection of amphibians and is linked to declines of amphibians

globally; and the recently discovered *Pseudogymnoascus* (*Geomyces*) *destructans*, the etiologic agent of white nose syndrome which has caused precipitous declines of North American bat species. Of particular concern are the novel pathogens that have emerged as they are devastating and challenging to manage. A big science approach, through sustained investments in, and application of, new technology and science, and the development of the physical infrastructures and operational networks will create the necessary transformations to make significant and enduring progress in addressing this global issue. The advent of new analytical models and bench assays will provide us with the mathematical and molecular tools to identify and anticipate threats to wildlife, and understand the ecology and epidemiology of these diseases. Specifically, new molecular diagnostic techniques have opened up avenues for pathogen discovery, and the application of spatially referenced databases allows for risk assessments that can assist in targeting surveillance. Long-term, systematic collection of data for wildlife health and integration with other datasets is also essential. Multidisciplinary research programs will increase our understanding of the drivers of emerging diseases and allow for the development of better disease prevention and management tools, such as vaccines. Finally, we need to create a National Fish and Wildlife Health Network that provides the operational framework (governance, policies, procedures, etc.) by which entities with a stake in wildlife health cooperate and collaborate to achieve optimal outcomes for human, animal, and ecosystem health.

P1.27: Applying an eco-bio-social approach to emerging disease transmission in Denpasar Bali, Indonesia

Tana Susilowati, Center for Health Policy and Social Change, Indonesia

Dengue is a re-emerging arboviral disease while rabies is emerging zoonotic disease that occurred in Bali. Denpasar city is the gateway to Bali, and a center of governance and education. Rapid urban development increases risk of emerging disease transmission in Denpasar. This project is part of the EcoEID initiative which examined ecological, biological and social factors influencing dengue transmission in tourism and non-tourism areas in Denpasar, Bali. Both primary and secondary data were collected through a variety of qualitative and quantitative methods. Statistical and GIS analysis of this data informed the design and piloting of interventions. The environmental conditions in Denpasar were found to be suitable for dengue vector development linked to rapid urban development. GIS analysis showed that the distribution of DHF/DF cases in South Denpasar was not random and the direction was correlated to rapid development in the area. Analysis showed significant contribution of local housing conditions to dengue risk. In contrast to the high economic growth, rapid development triggered by tourism development resulted in high population density which has consequences on poverty, social inequality, presence of slum, loss of traditional values, and negatively affecting control of emerging diseases. As part of project interventions, research team facilitated collaboration between health and veterinary sectors in improving multiple disease surveillance and rapid response through a pilot program. Evaluation showed that the pilot program increased networking among different sectors, enhanced core functions of the local surveillance and rapid response system and was found to have high acceptability among stakeholders. However, it has not yet improved the ability of the health and veterinary sectors to collaboratively respond to disease outbreaks.

P1.28: Water infrastructure and household drinking water purification system: implications for translating knowledge into best practices in peri-urban eco-setting

Khin Thet Wai, Department of Medical Research (Lower Myanmar), Myanmar; Wah Wah Aung, CRDI; Su Latt-Tun-Myint, Department of Medical Research (Lower Myanmar); Tin-Oo, Department of Medical Research (Lower Myanmar)

There is a growing recognition that improved household-based water treatment and safe storage could reduce diarrheal diseases. This study being conducted in March 2013 included slums of one peri-urban eco-setting from Yangon Region, Myanmar. Altogether 211 households with 262 under-five children participated in the cross-sectional study. The purpose was to examine the sources of drinking water and their reported actions for water purification by structured interviews, informal discussions, and observation. Municipal pipe water supply (45%) remained as the major source for drinking water followed by tube wells (37%). Nearly half of respondents lacked awareness of acceptable drinking water good for health. For drinking water purification, chlorine tablets and liquid chlorine were least known compared to other methods. Water from ponds, taps, and tube wells were perceived as unsafe to drink without any purification (72%). On the contrary, a quarter of households (53/211) never used any method for drinking water purification. Sixty two percent (98/158) of households preferred cloth filter to cleanse drinking water. There was a gap in knowledge and practice of boiling water for drinking (54.5% vs. 25%). Less than 10% of householders prepared chlorine disinfectants during drinking water storage. Nine percent of households (19/211) reported acute diarrhea in under-five children within past one month. Drinking water purification system in low income households was not up to satisfactory level. The system required strengthening to prevent acute diarrhea in addition to improved sanitary facilities, waste management, and personal hygiene. Ecosystem specific approaches are desirable to deal with complexity in know-do gaps for drinking water purification at point of use.

P1.29: Social capital, collective action and access to water and sanitation in Rural Kenya

Elijah Bisung, University of Waterloo, Canada; Susan J. Elliott, University of Waterloo; Corinne Schuster-Wallace, United Nations University Institute for Water, Environment and Health; Diana M. Karanja, Kenya Medical Research Institute

Globally, an estimated 768 million people remain without access to improved sources of drinking water and close to 1 billion people practice open defecation (WHO/UNICEF, 2013). The lack of access to safe water and adequate sanitation presents significant health and development challenges to individuals and communities, especially in low and middle income countries. Recent research indicates that aside from financial challenges, the lack of social capital is a barrier to collective action for community based water and sanitation initiatives (Levison et al., 2011). This paper reports results of a case study on the relationships between elements of social capital and participation in collective action in the context of addressing water and sanitation issues in the lakeshore village of Usoma, North Western Kenya. The paper uses household data collected (N = 485, 91% response rate) with a modified version of the social capital assessment tool (Krishna and Shrader, 2000). Preliminary findings indicate that some indicators of trust, networks and group participation are predictors of collective action. The findings suggest that investment in social capital may have some contextual benefits for collective action to address common environmental challenges. These findings could inform policy interventions and practice in water and sanitation delivery in low and middle income countries, environmental health promotion and community development. References Cited Krishna, A. and Shrader, E. (2000). Cross cultural measure of social capital: a tool and results from India and Panama. Social Capital Initiative. Working Paper No. 21. The World Bank, Washington, D.C. Levison, M. et al. (2011). You cannot prevent a disease; you only treat diseases when they occur: knowledge, attitudes and practices to water-health in a rural Kenyan community East African Journal of Public Health, 8: 103-111. World Health Organisation/United Nations Children Fund (2013). Progress on drinking water and sanitation: 2012 update. UNICEF. New York

P1B – Poster session, Aug 12, 12 :30-14 :00

P1.31: Evaluating the impact of small water-based NGO's in securing safe water and sanitation in marginalized communities

Stephanie K Lu, University of Waterloo, Canada; Susan J. Elliott, University of Waterloo

In their 2013 update, the Joint Monitoring Programme reported that the Millennium Development Goal (MDG) for safe drinking water had been met. However, 768 million people are still without improved drinking-water sources. It is also anticipated that the MDG for sanitation will miss its 2015 target by more than half a billion people. While numerous NGO's have made it their mission to meet these global needs, the solution to universal access to water, sanitation, hygiene, and well-being eludes us. Part of the problem for NGO's, particularly operational ones that design and implement their own development projects, is that they rarely have the financial means to support program evaluation. Evaluation research can provide useful strategies to help NGO's refine their operations and measure the impact of their initiatives with respect to indicators of health and well-being. In addition, transparency in evaluation research findings from one NGO to another can help us learn from previous successes and failures when applying new technologies in rural, remote, and marginalized communities, each with their unique cultural nuances and challenges. Thus, this oral presentation will outline a protocol design initiative for evaluating the impact of small water-based NGO's on the global problem of lack of safe water and sanitation.

P1.32: Knowledge, Risk Perception, Behavior on diarrhea among villagers in High and Low Diarrheal Incidence Areas of Northern Thailand

Akeau Unahalekhaka, Faculty of Nursing, Chiang Mai University, Thailand; Tongkorn Meeyam, Chiang Mai University; Unger Fred, International Livestock Research Institute; Duangporn Pichpol, Faculty of Veterinary Medicine, Chiang Mai University

Foodborne disease is one of the most important public health problems in northern region of Thailand. This study aimed to investigate differences in knowledge and risk perceptions on diarrhea, food consumption habits and risk behaviors among people in high and low diarrheal incident areas. The study was conducted under the EcoHealth Resource Center by different faculties of Chiang Mai University during December 2012 to June 2013. Two villages with high and two with low diarrheal incident areas in Chiang Mai were selected based on surveillance information. Data were collected using a questionnaire and environmental survey forms. Two hundred and 124 household members of high and low diarrheal incident areas were interviewed, respectively. Differences in knowledge among these two groups were 'eating contaminated food or drinking water could cause diarrhea' and 'disposing of refuse properly can prevent diarrhea' with a better knowledge in the low incident areas. Household members in both areas perceived differently that eating meat from sick animals could cause the disease and that risk of diarrhea depends on individual eating practices. In household food consumption, statistically differences included among others 'purchasing raw food' and 'eating food outside the home'. Also sanitary practices varied between both areas with better practices in the low incident areas such as "washing hands with soap and clean water before eating and after defecating", "washing fresh fruit and vegetable before eating", and 'keeping uneaten food in refrigerator". Disposing of food scraps and all refuse in containers with lids were also more often practiced in the low incident areas. We conclude that knowledge, risk perception and prevention practices varied among people in high and low diarrheal incident areas. These findings are expected to support more targeted community directed prevention measures.

P1.33: Public health surveillance of toxic cyanobacteria in freshwater using remote sensing

Trina Mackie, Touro University California, United States

Cyanotoxins, produced by the cyanobacteria that can proliferate in fresh and salt-water, cause a range of harmful health effects. Cyanobacterial blooms are now increasingly prevalent in freshwaters as eutrophication becomes ever more common with anthropogenic drivers like climate change, hydroelectric dams and agricultural waste. This research evaluated the efficacy of remote sensors to assist in characterizing the presence, distribution, and concentration of toxic algae in freshwater systems for surveillance and early detection, which are keys to effective public health disease prevention. Public health professionals are dependent upon early and reliable information characterizing cyanobacterial blooms to notify the public and act to prevent exposure. This information can also inform appropriate monitoring, research, and resource management for longer-term change. For this study, three different remote imagery platforms (hyperspectral airborne SpecTIR imagery, multispectral IKONOS satellite imagery, and multispectral Landsat satellite imagery), ranging in spectral and spatial resolution, were compared in terms of their ability to identify surface blooms and to distinguish gradients in cell density or intensity of blooms in the Klamath River reservoirs of Northern California. Classification methods were compared and decision trees provided the highest accuracy. The results show that even relatively coarse spectral resolution images (4-7 different bands dividing the electromagnetic spectrum) can identify both the presence and density of cyanobacteria, and that increased spectral resolution improves classification accuracy more than increased spatial resolution. The synoptic data from remote sensing may be used to help better select sites on the ground where samples should be collected. The research improves our ability to predict and monitor toxic cyanobacteria presence and intensity. A better understanding of how the natural and altered characteristics of an ecosystem contribute to new community exposures to waterborne contaminants like cyanotoxins will allow future development and restoration activities to take into account the public health implications.

P1.34: Influence of the season of birth on juvenile growth of *Helix aperta* snails submitted to controlled conditions of temperature and photoperiod -- Saida Tafoughalt-Benbellil, Laboratory of Ecology and Environment, Faculty of Nature and Life Sciences, University A. Mira of Be, Algeria

Aissa Moali, Laboratory of Ecology and Environment, Faculty of Nature and Life Sciences, University A. Mira of Bejaïa

Body growth of *Helix aperta* snails was studied in laboratory conditions, from hatching to maturity, under four combinations of temperature and photoperiod (20°C, 16hL:8hD ; 20°C, 8hL:16hD ; 15°C, 16hL:8hD and 15°C, 8hL:16hD). The study of the growth is undertaken on three samples of snails all born in laboratory: the samples 1 and 2 were obtained from parents collected from nature in autumn and in spring respectively; the sample 3 was constituted of individuals of the fourth generation of parents reared in the laboratory. The results show clearly that the season of birth have significant effect on growth of *Helix aperta* snails. The subjects from parents collected in spring, with heavier mean body weights at birth, have a faster growth compared with the individuals born in the laboratory and those from parents collected in autumn. Under the four different combinations of temperature and photoperiod, the end of the growth phase, which coincides with the onset of mating, marking the age of sexual maturity, was only of 21 weeks in sample 2 (born in spring) but of 23 weeks in sample 1 and 3. In fact, snails born in spring reached maturity and started to mate after 21 weeks of growth, while in samples 1 and 3, this was observed 2 weeks later. However, at each of the four combinations of temperature and photoperiod used, even if the animals born in spring have faster growth than the other two samples, all weights obtained at the end of the growth phase are significantly similar. This suggests that the difference in the rate of juvenile growth in snails of the three samples affects the duration of the growth period but not the weight of the animals in adulthood.

P1.35: Values of Yitenga watershed ecosystem services and health of the local populations in Burkina Faso

Tibi Didier Zoungrana, Université Aube Nouvelle, Burkina Faso; Samuel Yonkeu, Université Aube Nouvelle

An ecosystem is all the physical and biological factors present in an environment. According to Limoges (2009), environmental services ecosystem functions that benefit humans, and are generally grouped into four categories: regulatory, procurement, ontogenetic and sociocultural. Their contributions can be direct and indirect on human well-being. Thus, the benefits of ecosystems are the advantages that ecosystems provide to human on health and productive level. However, the causal links between environmental change, deterioration or preservation of goods and ecosystem health are complex, because there are often indirect. Currently, ecosystem services are not enough to adequately meet the needs of the society, resulting in impacts on human and animal health, social cohesion, migration and wealth creation. In terms of health, more than 5 million children and 14 million adults die each year from diseases caused by the environment (Kouchner, 2003). In Burkina Faso, there are several watersheds with high biological diversity important for human life by their contributions in terms of income generation. However, these watersheds are often poorly maintained and the initial benefits become dangers to local residents. In Yitenga watershed, ecosystem services such as water resources (water retention) are experiencing the phenomena of silting and pollution, leading to the deterioration of human health and conditions of wealth creation (Yonkeu et al, 2005). However, Yitenga watershed offers real opportunities for wealth creation through activities gardening, farming, fishing. That is why this paper will examine the measures to promote the protection of the ecosystem dam, evaluate monetarily services, health benefits and income generation.

P1.36: The strengths and weaknesses of Health Impact Assessment in a Brazilian case study

Karina Abe, Universidade Federal de Sao Paulo, Brazil; Simone Miraglia, Universidade Federal de Sao Paulo

The Health Impact Assessment (HIA) has been developed in many countries. The World Health Organization has defined HIA, since 1999, as a combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population (Gothemburg Consensus, 1999). In Brazil, there are no legislative rules or guidelines to address how the professional should conduct an independent HIA or within an Environmental Impact Assessment study. However, the HIA practice must add value to decision making and conduct to better decisions in health sectors. Due to limited national implementation of HIA, a case study in a Brazilian hydropower construction has performed to analyze some points of HIA methodology and its applicability within the country. This work presents some strengths and weaknesses of HIA methodology including the analysis of the most common and potential health effects on local population and the effects on local health services. This is the first time that a HIA was conducted in major construction in Brazil and this study opens a new challenge in national impact assessment. This work shows that the HIA in Brazil has positive results for policy formation and has great challenges in respect to involve stakeholders, decision makers, health services and the affected population. In addition, HIA in Brazil needs a clear legislative regulation to ensure that health is being considered in all major projects.

P1.37: Collaboration C-LAC: First steps in establishing a deeper understanding of applied Ecohealth research from across Canada, Latin America and the Caribbean

Kendra Mitchell-Foster, Health Arts Research Centre, Northern Medical Program, University of Northern British Columbia, Canada; Maya Gislason, University of Sussex; Rosario Quesada, Universidad Nacional de Costa Rica; Douglas Barraza, Universidad Nacional de Costa Rica; EkoSanté Team, A joint working group of CoPEH-LAC and CoPEH-Canada

Communities of practice for ecosystem approaches to health research in Latin America (CoPEH-LAC) and Canada (CoPEH-Can) have joined to form a new Collaboration across Canada, Latin America and the Caribbean [EkoSanté]. This collaboration explicitly engages with a diverse and evolving body of research involving multiple disciplines, wide ranging issues, and a range of innovative methodological and theoretical developments. In light of the growing numbers of researchers and projects affiliated with Ecohealth communities of practice, and the increasing complexity of how principles of Ecohealth are applied in “real-world” settings, an important and timely effort is being made to deepen understanding around the common themes, elements, strategies and outcomes that drive progress in these projects. This presentation will share insights from an early phase in the EkoSanté collaboration, focused on the work of a multi-regional working group and the initial design and of a common database. This jointly designed database is intended to collect information and experiences of projects associated with CoPEH-LAC and CoPEH-Canada, with specific attention to research, practice and policy impacts, and the elements of i) ways of thinking, ii) ways of doing, and iii) ways of relating. Using a web-based tool to compile data in a step-wise fashion, specific focus was paid to considerations for gender, social equity, participation, transdisciplinarity, systems thinking, sustainability, and knowledge to action. The database supports a living compendium of Ecohealth work, profiling organically occurring clusters of methodological trends, areas of interest or thematic issues, and geographic and cultural locations through both comparative and case-study analyses.

P1.38: Tools for Knowledge Management Systems to demonstrate changes in Ecohealth Projects

Ruth Arroyo, ECOSAD/ COPEH-LAC/ UNMSM/investigadora, Peru; Alain Santandreu, CoPEH-LAC/ECOSAD/ Investigador; Anita Lujan Gonzales, ECOSAD; Jose Valle, Investigador

Knowledge management systems, as well as the monitoring and evaluation of action research projects contribute to joint, the social construction of knowledge with the change, in a practical way on development projects. Its contributions to the health and environment projects developed in Latin America have been little analyzed. Some experiences such as: prevention of Chagas and Ecohealth in Central America and the leadership initiative in Ecohealth and Vector Borne Diseases have been integrating Knowledge Management Learning-Oriented Systems. The implemented systems considered four interlinked components: a) information and communication of results, b) research and systematization of knowledge and learning, c) monitoring and evaluation of changes, and d) analysis of social networks for the assessment of the quality of the changes. Analysis of the tools designed and used in management systems allows to understand the results achieved, understood these as synergic articulation (measured with indicators of activity or result) to outcomes (measured with progress markers), contributing to quality and sustainability of the changes achieved in the various areas of intervention of the projec: 1) Sphere of control (project) which includes activities and changes provided directly by the project, 2) Sphere of influence (Ecohealth project/field), which includes changes in the direct project partners and other key actors and 3) Sphere of interest (Ecohealth field), which includes changes in the socio-ecological interactions, encouraged, facilitated and/or appropriate for different groups of actors further than the control of direct partners in the project area.

P1.39: Developing Quality Assurance plan for multidisciplinary, multistage and complex community-based ecohealth research study in India

Sanjay Chaturvedi, University College of Medical Sciences, India; Mannish Kakkar, Public Health Foundation of India; Syed Abbas, Public Health Foundation of India

Ecohealth research is transdisciplinary, cross-sectoral, participatory and systems thinking. Though a complex 'field of practice', these principles ensure sustainable knowledge translation. In spite of Quality Assurance (QA) being a vital component in administering research studies, there is little guidance for it in ecohealth research. We designed a QA plan for an ecohealth study involving entomological, environmental, microbiological and veterinary enquires for Japanese encephalitis in Kushinagar, India. A multidisciplinary team of experts developed research protocols. Items of enquiry and study protocols were validated technically and ethically by national regulatory agencies and in consultation with national/local programme managers and community representatives during field visits. These were harmonised in accordance with ecohealth methodology in a South Asia regional protocol development workshop with facilitation from international experts. Data collection began with surveyors undergoing training and assessment for specific competencies. Field QA plan involved multiple quality checks. Standard questionnaires, formats and checklists for data collection and a transdisciplinary database with link ID were developed. QA specialists accompanied teams to conduct spot checks of ongoing survey, validating previous day's collection, examining forms for completeness and biological samples for labelling/storage. Field supervisors and project coordinators were trained for supportive supervision and researchers from coordinating centre documented findings. The QA pilot identified sources of error at different stages of data collection, standardising QA strategy for subsequent rounds of collection. It spotted points of vulnerability, namely required refresher training of data collection team (vector diagnosis), modification in study protocols (inventory management, labelling and QA logs), incorporating mechanisms through study design/execution phases allowing early identification of problems and corrective measures, helping achieve total quality management. The systematic approach of developing and executing a QA plan, ensured adherence to principles of ecohealth research while maintaining core elements of QA. Similar studies will help develop good QA practices in data collection.

P1.40: Building Capacity for EcoHealth Practitioners – A Conservation Medicine Professional Masters' program at the Cummings School of Veterinary Medicine at Tufts University

Alison Robbins, Cummings School of Veterinary Medicine at Tufts University, United States; Christopher Whittier, Cummings School of Veterinary Medicine at Tufts University; Joann Lindenmayer, Cummings School of Veterinary Medicine at Tufts University; Elena Nauvoma, Tufts University; Mark Pokras, Cummings School of Veterinary Medicine at Tufts University; Florina Tseng, Cummings School of Veterinary Medicine at Tufts University; Gretchen Kaufman, Paul G. Allen School for Global Animal Health, Washington State University

A Master of Science in Conservation Medicine was designed at The Center for Conservation Medicine at Tufts University to prepare students from varied backgrounds for a career in conservation medicine and ecohealth (Kaufman, G. E., Epstein, J.H., Paul-Murphy, J., Modrall, J.D. Designing Graduate Training Programs in Conservation Medicine—Producing the Right Professionals with the Right Tools, EcoHealth, Volume 5, December, 2008:519-527). This twelve-month non-thesis program builds upon an individual student's disciplinary strengths, and integrates foundational knowledge in the various contributing fields for conservation medicine. Emerging conservation medicine issues from local, international, and global scales are presented and analyzed throughout the curriculum. Students develop multidisciplinary integrated analyses with practical solution oriented applications through a year-long case study written review. As knowledge alone is not enough to solve complex health problems facing our planet, the program also focuses on creating opportunities to practice and master skills to become successful leaders in the conservation health arena through fostering

transdisciplinary collaborations, promoting team work practices, developing well-rounded communication skills, and practicing conflict resolution. In May of 2014, the program will have completed 3 full years of curriculum delivery, and graduated 2 classes. Challenges of delivering a wide ranging applied curriculum will be discussed and include recruiting and educating lecturers to work in a multidisciplinary setting, balancing content depth with breadth, and teaching a one health science curriculum to students of varied educational backgrounds. A review of student backgrounds, areas of interest and case study focus, and post-graduation employment will be presented.

P1.42: Human well-being, ecosystem services and watershed management in the Credit River Valley: Web-distributed mechanisms and indicators for communication and

S. Mitchell Harrow, York University, Canada; Martin Bunch, York University; Karen Morrison, University of Guelph; Tatiana Kovishnikova, Credit Valley Conservation; Mike Puddister, Credit Valley Conservation Authority; Alexandra Belaski, York University; Julie Mallette, York University

There is a great divide between watershed management and conservation activities undertaken by conservation authorities and the perception of the impact of these activities on health and well-being by watershed residents. The purpose of this research is to provide a tool that can effectively communicate how watershed health affects well-being and how conservation authority activities and community engagement relate to overall health of the watershed and its residents. Using information generated by Credit Valley Conservation (CVC) and University researchers in Southern Ontario (surveys, reports, and focus groups) meaningful "ecosystem-based indicators of well-being" that connect ecosystem services to the overall well-being of individuals and communities have been identified. For this data to be useful it needed to speak in a language appropriate to the community, and visually demonstrate the interconnectedness of their well-being and that of the watershed. Watershed information and indicators will be disseminated through the development of the CVC browser, which is a web-based integrated GIS database, linking human well-being to environmental indicators. This tool provides a means to show residents how Conservation Authority work comes to influence residents' daily lives, using examples of local places, projects and people. Engaging and involving the community in designing the CVC browser ensures that chosen indicators and means of representation are accessible and meaningful. This browser will be a bridge between static data and dynamic learning, enabling the CVC to communicate stewardship programs and vital information to the community in an engaging manner, and promoting understanding of environment-health relationships within the watershed.

P1.43: How well are we doing? - Using Outcome Harvesting to assess the building of the EcoHealth field

Ricardo Wilson-Grau, IDRC EcoHealth developmental evaluator, Brazil; Bob Williams, New Zealand

Over the past 20 years, EcoHealth has sought to establish itself as an identifiable field. It has built structures that enable ecohealth to operate, it has developed means by which parts of the EcoHealth field can communicate with each other, it has recognisable principles, practices and rules that distinguish it from other fields, it has leaders and supporters, it is recognised internationally as a valid endeavour, it has a base of skills, funding and other resources that enable it to undertake ecohealth activities. However, the means by which these features of the field have been and continue to be constructed vary from place to place and from time to time. Given this variety and unpredictability how can the field of EcoHealth evaluate how well it is being built and sustained? For the past three years, Ricardo Wilson-Grau and Bob Williams have been using Outcome Harvesting to address that question in the framework of the IDRC EcoHealth Fieldbuilding Leadership Initiative. Outcome Harvesting is an evaluation approach that appears suited to the emergent nature of EcoHealth projects. Unlike many evaluation approaches Outcome Harvesting does not measure progress towards predetermined outcomes or objectives, but

rather collects evidence of what has been achieved (or not), and works backward to determine whether and how specific ecohealth activities contributed to the change. In this sense, it is analogous to sciences such as forensics, anthropology, or geology, which interpret events or contributing factors that led to a particular outcome or result by collecting evidence and answering specific questions. In this presentation, Ricardo and Bob reflect on their experience of using Outcome Harvesting to evaluate the development of the EcoHealth field; where it has worked well, where it has been difficult and what it tells us about the state of the ecohealth field in 2014.

P1.44: Puerto Princesa City, a Philippine global outreach hotspot: trials, triumphs and tribulations of the eco-, bio-, and social approach

Fe Esperanza Espino, Department of Parasitology, Research Institute for Tropical Medicine, Philippines

Puerto Princesa City, Palawan, the last frontier of the Philippines, is among the top destinations for local and foreign tourists. It has undergone rapid changes to meet the demands of the tourist industry in the past decade. From three daily commercial flights in 2006, 18 flights now land during peak tourist season, and direct flights from regional countries have started. Dengue was selected as a proxy disease to understand the effect of development changes in the city. The number of cases has risen since 2000 in Puerto Princesa and in almost all municipalities; outbreaks of chikungunya have been reported, too. Four barangays (villages) were purposively selected to illustrate these changes in detail. The methods applied were: (a) an exhaustive search for secondary data and information on population, commerce, environment and health; (b) interviews with key informants; (c) surveys carried out during the rainy and dry season of 2012 and 2013, respectively, for immature forms of *Aedes* sp. and preferred breeding areas; and (d) geo-location of serologically confirmed dengue cases. Findings prompted a city ordinance prohibiting the use of bamboo as fences. A stakeholder analysis is currently underway for the city government and other local agencies and health facilities to integrate the enhanced vector and dengue case surveillance. One tourist destination contributes more than 40% to the Puerto Princesa city revenue: the St. Paul subterranean river national park. Commonly called the underground river, each day 800-1,000 people take the 45-minute, 1.2 km route on a paddle boat. It is home to an estimated 50,000 bats and is a protected area under the management of the city government. Although approval has been secured from a national agency to collect bat derivatives to examine for zoonotic viral pathogens, negotiations are underway to obtain city government approval, and alternative strategies are being explored.

P1.45: Inside Of The Field: Triggering Factors To Develop Scaling Up Projects

Tatiana García-Betancourt, Centro de Estudios e Investigación en Salud- Fundación Santa Fe de Bogotá, Colombia; Borrero Elizabeth, Centro de Estudios e Investigación en Salud - Fundación Santa fe de Bogotá/ Researcher; Gabriel Carrasquilla-Gutierrez, Centro de Estudios e Investigación en Salud-Fundación Santa Fe de Bogotá

Introduction: Scaling up has increased in the last decade since the call to expand coverage of effective strategies actions from the World Health Organization, in the framework of the Millennium Development Goals. Therefore, understanding key triggering factors of successful scale up processes is essential for future projects that want to expand its coverage and sustainability. Methods: Based on a literature review, six principal investigators were contacted for a semi structure interview. The objective of these was to identify singularities and local elements during the scaling up process, aspects that facilitated the process or essential factors to take into account in scaling up actions. Thus, achieving a basic guideline based on researchers recommendations for future scaling up projects. Results: Interviewees exposed the importance of knowing cultural elements as kinship relationships, roles, beliefs and social and cultural agendas (agricultural times) to achieve a successful scaling up process. The researchers suggested including a model of what is going to scale, in other to familiarize the community and

making them an active part of the whole process. They emphasized that training should not be a single workshop, it should be an educational process in which concepts, attitudes and behavior will be change. Leadership from the Health Ministries, cooperation between the institution and the project also was identified as a factor that facilitates the implementation. The interviews provided information in depth about scaling up projects, exemplifying relevant factors to be considered to develop a scaling up. Conclusions: Scaling up is a complex process which requires the identification of several elements for successful implementation. Hence, knowing these elements can facilitate future scaling up projects.

P1.46: Pro-social preferences in health among Wayúu indigenous groups in La Guajira, Colombia

Sebastian Cortes, Centro de Estudios e Investigación en Salud (CEIS), Fundación Santafé de Bogotá, Colombia; Catalina González-Uribe, Centro de Estudios e Investigación en Salud, FSFB

Introduction The aim of this study was to analyze the cooperative behavior in the context of possible Ecohealth interventions for the control of vector-borne diseases in Marbacella and El Horno ranches of the Wayúu indigenous group in La Guajira. To achieve this, different instruments of behavioral economics were applied. **Methodology** Specifically, the author proposes the development of a Mitigation Game, based on the public goods game with the Voluntary Contribution Mechanism and the Ultimatum Game proposed by Guth et al. (1982). This work creates cooperation indicators in the contexts of community-based prevention activities for the control of malaria. The author explores the individual's decisions when faced with community based preventive measures in terms of individual and group contributions with sequential learning. This work shows an Ecohealth framework linking experimental economics and health strategies in a complementary way when applied to interventions in the social dynamics of communities. **Results and Conclusions** As a result, it was found that the members of the community do not choose the dominant strategy of the Nash equilibrium (i.e. the Free-Rider strategy). In addition, the author found that there was a divergence between the level of cooperation in the clean-up of the floating vegetation of jagüeyes* and the improvement of the pens in which the goats are kept and lastly on the filling of holes located near the residences. The rewards were divided into two categories: consumption goods and prevention goods (repellents). Through the choice between these two goods, the author saw the revealed preferences of the individuals, where 91.5% and 91.8% of the points were exchanged for consumption goods while 8.5% and 8.8% were exchanged for malaria prevention products in the Ultimatum and Mitigation games, respectively. *an artificial lake where the members of the community are supplied of water for daily activities.

P1.47: Exploring the connections between outdoor recreation, nature, and human health in a northern British Columbia community

Carling Matthews, UNBC, Canada

Northern British Columbia offers diverse opportunities for outdoor recreation activities such as fishing, hunting, hiking, skiing, and snowshoeing. With a wilderness area twice the size of the United Kingdom, nature is often nearby in northern BC if not in one's backyard. In addition to facilitating recreation opportunities, exposure to natural spaces (both passive and active) has a positive influence on human health. A growing body of work has emerged that emphasizes the individual benefits arising from contact with nature including biological, mental, and social outcomes. In particular, evidence exists on decreased stress levels and improved levels of concentration. Connecting with local landscapes also has benefits for community well-being including increased levels of civic engagement and enabling people to relate to the natural world. Participating in nature-based recreation can increase people's connections to the environment thereby encouraging environmental stewardship. While a significant body of literature has identified the well-being benefits of human-nature

interactions, most research has focused on accessing nature from urban versus rural settings. To be relevant to the social-ecological setting of remote northern communities the research must be recontextualized. The orientation of this project will be towards the rural landscape of northern BC where outdoor landscapes define the settings of everyday life in the north within which well-being is created and lived. Grounded in naturalistic inquiry using qualitative methods, and with a case study approach, this thesis will explore perspectives of the connections among outdoor recreation, nature, and health. The project hopes to engage with three different community groups including decision-makers, community leaders, and the general public. This project will help researchers and communities understand the well-being/nature connection in the north and the role that nature-based recreation could, or already does, play in building and maintaining thriving communities.

P1.48: The Burden of Acute Gastrointestinal Disease (AGI) for Inuit in Iqaluit, Nunavut, Canada

Margaret Ellen McDonald, University of Guelph, Canada; Sherilee Harper, University of Guelph; Victoria L. Edge, Public Health Agency of Canada; M. Kate Thomas, Public Health Agency of Canada; James Ford, McGill University; IHACC Research Team, Indigenous Health Adaptation to Climate Change Project; Andrew Papadopoulos, University of Guelph

Background: Acute gastrointestinal illness (AGI) is an important global public health issue. The prevalence and risk factors related to AGI are unknown among Canadian Inuit and it is possible given their unique social, economic, and cultural conditions, these may differ compared with other Canadians. Objectives: This study (1) estimated the prevalence of AGI, and (2) identified risk factors for AGI for Inuit in Iqaluit, Nunavut, Canada. Methods: International burden of illness study methods were modified to reflect the Indigenous culture and Northern context of this study. Specifically, an EcoHealth framework was used to guide the research, which included principles of capacity development, transdisciplinarity, social equity, sustainability, and community participation. Two retrospective, cross-sectional surveys were conducted in Iqaluit in 2012 and 2013. Of the 1,055 individuals that participated in the surveys, 694 self-identified as Aboriginal, which formed the basis of analysis. The prevalence of self-reported AGI was estimated using a case definition of diarrhea and/or vomiting in the past 14-days not due to pregnancy, drug or alcohol use, or diagnosed chronic conditions. Multivariable exact logistic regression was used to identify risk factors associated with AGI cases. Results: The 14-day prevalence of AGI for Inuit in Iqaluit was 12.8% in 2012 and 11.6% in 2013. Several demographic, environmental, and socio-economic factors were significantly associated with increased odds of AGI. Conclusions: Estimating the prevalence of AGI and identifying Inuit-specific risk factors for AGI, with continued Northern stakeholders' collaboration was intended inform and strengthen evidence-based policy to reduce the impact of AGI in Inuit populations. These results will be used to co-develop and co-implement a knowledge translation project with Northern project stakeholders and community members toward enhancing AGI-related public health decision-making processes in Nunavut, Canada.

P1.49: Characterization Of Public Spaces With Community Participation: Rapid Epidemiological Assessment (RAE) Experience

Marcela Uribe, Universidad del Valle, Colombia; Carolina Mendoza, Grupo Epidemiología y Salud Poblacional - Universidad del Valle; Fabian Mendez, Universidad del Valle

In Colombia the reemergence of dengue produces high morbidity and mortality and decreased interepidemic periods. Cali territory hyperendemic for dengue requires interventions steadily, and continues to look beyond the services. In this context during 2013-2014, in the " Scaling intervention in dengue ECOSALUD approach " project, a RAE was conducted in order to characterize public spaces with community participation in priority areas for prevention and control interventions dengue to baseline for intervention. From a prioritized territory

and shortlisted by occurrence cases of dengue, commune 7 Cali was select to perform characterization. Community leaders were identified to participate for the characterization of public spaces was made, the selected individuals were distributed in groups made up of a professional team of Research & wizard fieldwork, these groups applied the instrument. The working groups were formed for 1 coordinator, 1 Assistant fieldwork and 2 community leaders. 81 sections of track and 59 homes were inspected. 322 sinks were reviewed, 56.2 % were clogged with solid waste, water 64.9 % had 48.1% of these larvae and 41% of all with mosquitoes. Other potential vector breeding sites, 78 % pots and tires, 10% water, larvae and / or mosquitoes were identified. In housing 67.8% tenial at least 1 bowl of water in some larvae were observed. Of the 67.1 % intradomiciliary containers were indoors, used for water storage, animal troughs and water retention of plants, all with potential breeding conditions. The methodology for the characterization of public spaces, included a component of social participation, which allowed community leaders make recognition their territories, expand the vision health-illness relationship between health and enviroment. Core elements for recognition and appropriation of ECOHEALTH approach.

P1.50: Cognitive assessment of riparian schoolchildren from the Western Brazilian Amazon

Sandra Hacon, Fundação Instituto Oswaldo Cruz, Brazil; Chrissie Cravalho, Uniseridade Federal da Bahia; David Hernández Bonilla, Instituto Nacional de Salud Pública (INSP); Ludmilla Viana Jacobson, Universidade Federal Fluminense; Marlon de Freitas Fonseca, Instituto Fernandes Figueira; Valéria Oliveira, Universidade Federal de Rondônia; Wanderley Bastos, Univesidade Federal de Rondônia

In recent years with the construction of several hydroelectric plants in the Amazon, there is a hypothesis that the burden of Hg in aquatic ecosystems is expected to increase, with direct consequences for the riverine population. The aim of this study was to evaluate the association between cognitive responses and hair mercury levels schoolchildren from the Western Brazilian Amazon. This study is part of a program of Health Impact Assessment of major development projects in Amazon. The study design is a cross-sectional study with a sample of 233 schoolchildren 7-14 years. The following tests were applied to the sample of schoolchildren. Raven Colored Matrices and Raven Scale General (MPR), the Rey Complex Figure (RCF) and three subtests of the Wechsler Intelligence Scales for Children - WISC - III (Looking symbols , digits and Mazes). Samples of hair were analyzed. An interview questionnaire was used to collect information on socio demographic characteristics, fish-eating habits, neurological symptoms, vaccination history, health problems, and others information. The descriptive analysis showed that 40% of children had mercury concentrations greater than 6mg/kg hair. The mean concentration of Hg in hair was 8.0mg/kg (95 CI 6.9 - 9.5). The mean age was 10.5±2.1 years, 55% are male. The tests of the WISC- III weighted average of scores was 8.0±2.9 Digits and Symbols Search was 7.9±2.9. Labyrinths in the average raw score was 7.7±4.2. The average percentile on Raven's Matrices was 27.4±26.2 classified as lower average performance . In Test FCR , 63% of the children had a percentile below 25 in print, and 43% were below 25 percentile on immediate recall , considered below average. These results suggest that chronic exposure to Hg is associated with performance on tests of attention and immediate recall.

P1.51: Intellectual coefficient and environmental exposure to air pollutants and in Mexican children from urban area

David Hernández Bonilla, Instituto Nacional de Salud Pública, Mexico; Ana Larissa Barbosa Sanchez, Instituto Nacional de Salud Pública; Consuelo Escamilla Nuñez, Instituto nacional de Salud Pública; Marco A. Sanchez Guerra, Toxicology Department, CINVESTAV-IPN. Harvard University, Faculty of medicine, Boston, MSC, EUA; Betzabeth Quintanilla Vega, 2Toxicology Department, CINVESTAV-IPN; Leticia Hernández Cadena, Instituto Nacional de Salud Pública

INTRODUCTION: Ecatepec County in Mexico City Metropolitan Area is highly industrialized with high traffic flow and considered as one of the most polluted regarding particulate matter (PM); however there are no reports about other air pollutants. **OBJECTIVE:** We evaluated the exposure to polycyclic aromatic hydrocarbons (PAHs), benzene, PM10 and PM2.5 and their association with the decrease in the Intellectual Coefficient (IQ) in school-aged children from Ecatepec County. **METHODS:** We conducted a cross sectional study in children aged 7 to 10 years from 3 different areas of the municipality of Ecatepec. PM10 and PM2.5 air concentrations were estimated by gravimetry by local monitoring in the schools; urinary concentrations of 1-hydroxypyrene (1-OHP) and t,t-muconic acid (t,t-MA) as indicators of PAH and benzene exposure, respectively were determined by HPLC. The IQ was evaluated with the Wechsler Scale for Children IV. **RESULTS:** A total of 244 schoolchildren participated. PM10 and PM2.5 concentrations were above national standards several days during the study. Fifteen percent of children had t,t-MA levels higher than the limit for workers (500 µg/g creatinine). The median value of 1-OHP was 0.018 µmol/mol creatinine, and preliminary results from multivariate analyses showed that PAH's exposure is associated with decrement IQ. **CONCLUSION:** We found a complex scenario of air contaminants in Ecatepec County, affecting the development intellectual of school-aged children (Supported by CONACYT-México Grant #106034).

P1.52: Evidence of Existing Seasonal and Agro-Ecological Differences in Vegetables Consumption: Implications on Blood Haemoglobin of Concentration of Rural School Age Children of Kilosa District, Tanzania

Julius Ntwenya, Sokoine University of Agriculture, Tanzania; Joyce Kinabo, Sokoine University of Agriculture; John Msuya, Sokoine University of Agriculture; Peter Mamiro, Sokoine University of Agriculture

Vegetables serve as a very important source of micronutrients and safeguards against nutritional deficiencies. This study aimed at identifying the types of vegetables available in Kilosa District, vegetable consumption pattern and establishes the link between vegetables consumption and blood haemoglobin concentration. The information was collected among 307 households during rainy season (February–March) and immediately after harvest (September–October) in 2010–2013. Households were randomly selected from three different agro-ecological zones: Mountainous and uplands, Plateau (cultivation steppe) and Flood plains. Dietary data were based on 24-h household dietary records and blood haemoglobin was assessed among school age children. About 21 vegetables were consumed during harvest season compared to 24 vegetables during rainy season. About 92% of the surveyed households included vegetables in their diets during rainy season compared to 24% during harvest season. Tomatoes, onions, African egg plant, pumpkin leaves, sweet potato leaves and amaranths were the dominant vegetables. Residents of the plateau zone which is characterized as drought prone area had adopted most of the processing techniques that ensured the supply of vegetables throughout the year. Sun drying and precooking of indigenous vegetables (fushe) were the most common practices. The mean haemoglobin concentration among children residing in the plateau zone was significantly higher compared to that of children residing in the other two agro-ecological zones during the rainy season (12.9g/dl, 12.71–13.22 95% CI) and harvest season (12.51, 12.24–12.77 95% CI). In the flood plain zone; mean haemoglobin was 12.0 g/dl (11.7– 12.4 95% CI) during rainy season and 11.8 g/dl (11.5 – 12.2 95% CI) during harvest season. Similarly; in the mountainous zone it was 12.2 g/dl (11.9-12.4 95% CI) during rainy season and 11.7 g/dl (11.4 – 12) during harvest season. Both vegetable consumption and blood haemoglobin concentration varies across agro-ecological zones and between agricultural seasons.

P1.53: The effects of anthropogenic mercury on indigenous and ecosystem health in Amazonian Peru and Ecuador: A scoping review and analysis

David Paterson, University of Toronto, Canada;

Mercury is a potent contaminant with a host of negative effects on both human and ecosystem health. Methyl-mercury can be particularly harmful to brain tissue, and cause severe birth defects. Its bio-accumulative properties also make it a potent environmental toxin, as it accumulates in animal tissues and environments, thereby disrupting ecosystems. This is exacerbated by methyl-mercury's penchant for biomagnification up trophic levels. Most environmental mercury is anthropogenic in origin; in particular it is released as a result of mining operations, including through deforestation and extraction. Despite extensive study and analysis of its effects in Brazil, much less is known in Peru and Ecuador. These countries are particularly important for several reasons: first they are the Amazonian nations with among the highest proportion of indigenous people. Indigenous groups are often marginalized by policies that impede access to healthcare, clean air or water, and so disproportionately bear the burden of mercury-related morbidity and mortality. Second, they are among the nations of greatest species biodiversity, as measured by number of endemic species, and thus considered biodiversity hotspots. Finally, these two countries have a prolonged history of mining operations, originating from Spanish colonial periods, increasing human and ecosystem exposure to mercury's toxic effects. This contamination is also intensified by poor environmental legislation and enforcement in Latin America. In consideration of the above, this paper uses an established scoping review methodology to examine what is known in the peer-reviewed literature of the effects of mercury from mining operations on indigenous and ecosystem health in Peru and Ecuador. The objectives are threefold: to map the relevant peer-reviewed literature; to report and synthesize the subsequent findings; and to critically analyze them, using thematic and socioecological analyses and through an ecohealth lens, to determine knowledge or policy gaps that would benefit from future studies or interventions.

P1.54: Air quality standards update in Mexico and Health Impact Assessment utility on the decision-making process

Horacio Riojas Rodriguez, National Institute of Public Health, Mexico; José Luis Texcalac-Sangrador, National Institute of Public Health; Karla Cervantes-Martínez, National Institute of Public Health; Magali Hurtado, National Institute of Public Health; Luz Angélica De La Sierra-Vega, National Institute of Public Health; Albino Barraza-Villarreal, National Institute of Public Health; Leticia Hernández Cadena, Instituto Nacional de Salud Pública

Background. Urban air quality represents a major public health burden and is a long-standing concern to Mexican citizens. Several health impact assessments (HIA) have already reported the major public health burden of PM10 and ozone around the world. HIA is a structured method for assessing and improving the health consequences of projects and policies in the health sector. It is a multidisciplinary and multistakeholder process combining qualitative and quantitative evidence in a decision-making framework. Aim. To achieve changes in policies by providing scientific support to the establishment of air quality standards in Mexican regulations in a multistakeholder participation context, using the HIA as a methodological tool. Methods. Using 2010 data, we provided two scenarios to reflect the stepwise improvements of air quality expected in Mexico. Both scenarios estimate the ultimate benefits for deaths attributable to air pollution, characterized by PM10 and ozone. The main scenario was in compliance with the WHO air quality guidelines, while the second scenario with EPA air quality guidelines. Mortality results were economically valued by using a Value of a Statistical Life approach. We participate in air quality multistakeholder discussion groups our preliminary results were discussed at government meetings with the participation of NGOs in order to support the best scenario to adjust to the new standards and the development of air quality management programs. Results. Mexican government adopted new standards based on the results and values proposed in this project. The adjustment will prevent more than 5,000

deaths in Mexico attributable to PM10 and over 4,000 in the case of ozone, meaning approximately 8 and 6.4 billion of USD, respectively by year. Conclusions. This study showed the potential benefits of reducing air pollution levels in Mexico if control policies were successfully implemented. This study shows the HIA impact on the decision-making process when stakeholders participate in the process.

P1.55: Denial of Deteriorating Health and Environment Issues through Social Hierarchy in Shanghai, China

Kaitlin Kishxu, University of Waterloo, Canada

Power of a government can be strengthened within a society through a strong social hierarchy. Social hierarchy is nested within rapidly changing ecosystems, creating complex relationships between the two systems. Research was conducted in Shanghai to uncover ways in which local social hierarchy has impacted health and well-being of elderly citizens alongside a rapidly changing environment. Approaching the problem with an EcoHealth perspective, while employing Soft Systems Methodologies (SSM), fostered a culturally sensitive approach that enabled a critical examination of the impacts of policy and governmental actions on opinions and experiences of participants. Participants were invited to engage with one another and researchers in an open interview format to express personal experiences about changes in Shanghai's environment and their own health and well-being. Rich pictures, human activity systems and content analysis were used to enhance and analyze the interviews. While literature suggests that participants should experience a decline in health and environmental conditions the results were conflicting. There were no reports of health issues associated with environmental degradation or reports of developing environmental issues. Particular subgroups demonstrated this discrepancy could be due to different interests and actions of the government and participants. For example, business oriented participants saw economic growth as a suitable trade-off for health and the environment. Retired participants were defensive of the government in its ability to keep the population and environment healthy. Analysis showed that the retired subgroup's opinion may be highly influenced by the nested social hierarchy via media. This indicates that government policy and action is leading, not only to issues of health but also, to systemic denial of health and environment issues in the population. The nested social hierarchy is negatively impacting the health and environment of participants with participant consent due to complacency and conditioning via media control.

P1.56: Sustainable development in practice at the Montreal University Mental Health Institute: «the least we can»

Edouard Kouassi, Université de Montréal/Institut universitaire en santé mentale de Montréal, Canada; Richard Pichette, Institut Universitaire en Santé Mentale de Montréal; Marie-Line Bénard Cyr, Institut Universitaire en Santé Mentale de Montréal

The Montreal University Mental Health Institute (MUMHI) formerly known as H pital Louis-H. Lafontaine (HLHL) is the largest mental health hospital in the Province of Qu bec, Canada. This hospital has established in 2009 a sustainable development committee including representative members of the different departments, whose role is to coordinate the application of the action plan of the hospital in the domain of sustainable development, and to sensitize the employees and the patients about the challenges, main targets and accomplishments. The mandate of the committee takes into account the principles of the Quebec law in the field of sustainable development at the environmental, social and economic levels. The progress made in implementing changes is monitored periodically, and various tools are used to inform people, including via the intranet and through diverse activities, such as organized visits of the green innovations inside the hospital, and public conferences. Among the most remarkable achievements of the last 2 or 3 years, the budget dedicated to office supplies has

been reduced by 20, the use of 10 oz and 6 oz styrofoam glasses has been reduced by 30 and 40 , respectively. Moreover, the composting of food waste has increased from 483 kg at the beginning in December 2012, to as much as 1,046 to 1,827 kg per month in the period of January-December 2013. These realizations illustrate the notion that relatively simple and realistic changes can lead to huge impact in favor of sustainable development at the local level of a health institution. Challenging issues remain including the need to reduce the use of paper by increasing the use of electronic devices whenever possible, the optimization of the paper used for printing or photocopying, and the use and management of medical/pharmaceutical products and waste.

P1.57: Estimated Costs of Diseases Related to Climate Change in Hospitals in Morelia, Michoacan, Mexico during 2011

Alejandro Molina-Garcia, Ministry of Health at Michoacan State, Mexico; Josefina Martinez-Ponce, Ministry of Health at Michoacan State; Angeles Fuentes-Chagolla, Carmen Elena Private Hospital Manager; Rafael Diaz-Rodriguez, Ministry of Health at Michoacan State

Background: Human actions and activities are changing the world's climate, and are set to do so an increasing rate in coming decades. It also poses threatens our biosphere, global economy and human health and survival. Urgent actions is now required to reduce emissions of carbon dioxide (the dominant long acting greenhouse gas). Aim: To evaluate an adaptative strategy like medical hospital attention to climate change related diseases and its costs in a year. Methods: Recently, medical literature data was reviewed about climate change and related diseases in web site, books and journals. Also, local epidemiological reports were analysed and included in the climate change state strategy. Besides, public and private medical costs of every disease were investigated with recent prices in both. Results: Twenty two diseases related with climate change were found in local studies and reported according international literature. The most frequent disease in Michoacan state were asphixia and direct injuries, diaorrhoea and respiratory infections. The cost of the diseases related with climate change in a day of internship is about \$5,615.00 USDollars in a public hospital and \$10,846.00 USDollars in a private hospital. The annual estimated cost in 25 public hospitals in Michoacan is almost \$51.2 Million Dollars to attend those 22 diseases. Conclusions: The health sector should play a central role: to communicate the health risks of global heating, to collaborate with other partners, and to promote, lead and evaluate a range of adaptative strategies like this to stablish a financial cost in a hospital to attend the most vulnerable and affected population with these diseases. Urgent action at local, national and international levels is required to aid with increased financial contributions by high income countries to middle and low income countries, and free flow of information and technologies between countries about climate change concerns.

P1.58: A follow up study after eight years of an efficient biomass stove intervention in Mexico

Astrid Schilmann, Instituto Nacional de Salud Pública, Mexico; Minerva Catalan-Vazquez, Instituto Nacional de Enfermedades Respiratorias; Horacio Riojas Rodriguez, National Institute of Public Health

Household use of solid fuels is globally the most widespread source of indoor air pollution; it is extensively used for cooking and home heating in developing countries. One approach to reduce the health burden related to biomass fuel has been the provision of improved wood-burning stoves. A randomized trial was conducted in the Purepecha region of Michoacán to evaluate the health impact of an efficient biomass stove Patsari program in rural women. Households were randomized to receive the stove at the beginning of the study (2005) or keep their traditional open fire until the end of that study (mid 2006). A follow-up study was performed during 2013 and the stove use and cooking practices assessed. One third (33%) of 187 women in three rural communities currently are using an efficient stove for cooking, either exclusively or combined with the traditional open fire. There is a significant larger prevalence of exclusive efficient stove users in the nonindigenous rural community

(32% in La Mojonera) compared to the other two, mainly Purepecha communities. In depth interviews show that there are important sociocultural determinants, such as traditional cooking practices, for the new technology adoption and sustained use.

P2A – Poster session, Aug 14, 12 :30-14 :00

P2.1: Investigating an association with household livestock keeping and acute diarrhoea in poor communities in Cambodia

Kerya Seng, Centre for Livestock and Agriculture Development, Cambodia; Silvia Alonso, International Livestock Research Institute; Borin Khieu, Centre for Livestock and Agriculture Development; Srey Teng, Ministry of Health; Phannara Tan, Ministry of Agriculture Forestry and Fisheries; Jeffrey Gilbert, International Livestock Research Institute

Diarrhoea is among the most common symptoms of illness affecting poor communities and it is associated with most deaths among children < 5 years of age in developing countries. In Cambodia it is the third most important disease in number of deaths and DALYs. Keeping livestock near the dwelling house is thought to contribute to the risk of human diarrhea and some of the most commonly pathogens isolated from diarrhea cases are potentially zoonotic. As part of a IDRC-supported EcoHealth project in the SE Asia region, a multidisciplinary team with expertise in human health, animal health and agriculture undertook a study to investigate factors associated with increased risk of zoonotic diarrhea in livestock keeping households. A survey was conducted in 400 households randomly selected in 8 villages, and repeated one year after in another set of randomly selected households (n=400). Questionnaires on diarrhoea episodes, farming and hygiene practices were compiled. Faecal samples from human diarrhoea cases and their livestock were collected during the second survey and tested for presence of a variety of pathogens. 17% and 8% of households reported diarrhea in the last 4 and 2 weeks prior to the first and second surveys, respectively. *Shigella* spp, and *E. coli* 0157 (zoonotic) were isolated from human diarrhea cases (15/31) in the second survey. The latter was also recovered from two animals. Hygiene practices and consumption of raw vegetables were found as most prominent risk factors but interestingly it seems that livestock do not pose a significant risk for the common bacterial causes of diarrhea. The study did not find any association between cases of acute diarrhoea in people and the consumption of meat or contact with livestock. However it uncovered a number of factors related to hygiene during preparation and consumption of food that contribute to diarrhoea.

P2.2: Increasing Incidence of Human Brucellosis in Pastoralist Communities of Southwest Uganda: a Ten-Year Trend Analysis

Benon Asiiimwe, Makerere University School of Public Health, Uganda; Catherine Kansiime, Makerere University; Innocent Rwego, Makerere University

Studies in Uganda have shown a significant incidence of zoonotic human brucellosis. A retrospective ten year study was undertaken to examine the trend of the disease at two health facilities in the major milk producing district of Mbarara, South West Uganda. The study included all suspects who had presented with symptoms suggestive of brucellosis at a University teaching hospital and a private diagnostic laboratory in the municipality, and had been subjected to serological testing by the plate agglutination test. A total of 1318 cases of brucellosis were identified, 560 (15.7 percent) were males and 758 (57.5 percent) were females. At the teaching hospital, the number of cases per year increased from five in 2003 to 39 in 2009, with corresponding rates of 1.3, and 8.8

per 100,000 populations respectively; while at the private clinic, a sharp increase in cases was observed from 2 in 2004 to 339 in 2012, with corresponding rates of 0.5 and 69.9 per 100,000 population respectively. The peak disease in almost all years was observed during April and June at both health facilities. Overall, at both facilities, the highest numbers of cases were observed with titres of 1 to 80 (56 percent) and 1 to 160 (27.4 percent). Of the 1318 cases, 207 (15.7 percent) were from the teaching hospital, while 1111 (84.3 percent) were seen at the private laboratory. The most noticeable increase was observed from 2010 to 2012, with rates of 2.8 to 13.5 per 100,000 population per year at the teaching hospital and 8.7 to 69.9 per 100,000 populations at the private clinic. This study showed that the incidence of human brucellosis is steadily increasing in greater Mbarara, hence the need for public health professionals to implement control measures and health education programs about the disease.

P2.3: Development of balanced diets using local feeds for smallholder Kenyan pigs: implications for livelihoods, human health, and gender

Natalie Carter, University of Guelph and ILRI, Uganda

Pig production can alleviate extreme poverty in the tropics. Resource-poor farmers, mainly women, in western Kenya raise pigs to pay for food, school, and healthcare. Pig-keeping is suitable for women with limited resources. Pig performance is low. Lack of feed contributes to pigs' low average daily gain (ADG). Human/pig food competition, feed shortages, and expensive commercial feed are constraints. Our objectives were to determine the nutrient value and seasonal availability of local pig-feedstuffs, describe the nutritional requirement of local pigs, and develop seasonal, least-cost balanced diets for local pigs on smallholder farms to reduce human/pig food competition and increase ADG; thereby promoting a sustainable pork industry through efficient use of local resources. Nutrient analyses conducted on 58 samples of 21 feedstuffs were complemented with data from a literature review of these and 8 additional feedstuffs. Seasonal availability was estimated by local crop experts. Energy and nutrient requirements were estimated by adjusting the model described in NRC (2012) to performance levels observed in the tropics. Pigs between 8-20 and 20-35kg bodyweight were assumed to consume 0.59 and 0.91kg/day (digestible energy content 3700 kcal/kg dry matter (DM)) and gain 0.20 and 0.31kg/day respectively, with body lipid deposition to body protein deposition ratio of 2.86. Standard ileal digestible lysine requirement was estimated at 0.72% of DM. From June to August the least-cost diet per 100kg batch as-fed is dayflower (*Commelina africana*) 48.0kg, avocado fruit (*Persea americana*) 23.7kg, slashed/wilted cassava leaf (*Manihot esculenta*) 20.0kg, sun-dried fish (*Rastrineobola argentea*) 7.8kg, common salt (sodium chloride) 0.3kg, and premix 0.15kg. The rest of the year the diet is maize flour (*Zea mays*) 71.8kg, slashed/wilted cassava leaf 19.8kg, cattle blood 5.2kg, sun-dried fish 2.7kg, common salt 0.3kg, and premix 0.15kg. Better diets can improve ADG and so increase farmers' income, food security, and access to medicine and education.

P2.4: Critical Factors influencing the economic feasibility of smallholder pig farming in Western Kenya

Cate Dewey, University of Guelph, Canada; Mike Levy, University of Guelph; Alfons Weersink, University of Guelph; Zvonimir Poljak, University of Guelph

Pigs are important livestock for many smallholder farmers in Sub-Saharan Africa because they form a source of financial savings, grow quickly, can be marketed at 8-10 months and provide income in times of need such as for school fees, medicine, social events (weddings) or when there are food shortages. Feed accounts for 80% of the cost of raising a pig therefore, traditionally, pigs run free to scavenge food. But this causes problems. Pigs dig and causing soil erosion and crop damage and acquire zoonotic diseases such as *Taenia solium* that causes tapeworm and epilepsy in people. Objective: to assess how season, average daily gain (ADG), opportunity costs of farm-

grown feeds, pig weight and butcher price variation impact the economic potential of semi-intensive pig rearing. Methods: using a unique algorithm to emulate least-cost pig feeding, we assessed the impact of factors on farmers' maximum revenue and profit potential when 30 kg pigs were sold to local butchers in western Kenya. Results: Feed cost to raise a pig to 30 kg were affected by ADG, opportunity cost of feed, and weaning season by 982 Ksh, 947 Ksh, and 379 Ksh respectively. If ADG is too low, feed is used for daily maintenance rather than growth. Variable butcher prices and seasonal differences in pig prices varied the 30 pig price by 744 Ksh and 225 Ksh respectively. Most common feed items in least-cost diets were small dried fish, cooked ground maize, whole maize, millet, cassava foliage, sweet potato vines, bone meal, avocado, and mango. Conclusion: Farmers have higher profits if they feed pigs to reach higher average daily gains, have lower opportunity costs of feeds, or effectively bargain with butchers. To make a profit, farmers must have access to some 'free' feed and/or access to feed at 50% of market price.

P2.5: Epidemiology of pig zoonoses in smallholder pig farms in Laos

Phouth Inthavong, Department Livestock and Fisheries, Lao People's Democratic Republic; Boualam Khamlone, Ministry of Health; Hannah Holt, Royal Veterinary College London; Silvia Alonso, International Livestock Research Institute; Delia Grace, International Livestock Research Institute; Jeffrey Gilbert, International Livestock Research Institute

Families in Laos are often in close proximity with their livestock, which represents a risk for zoonotic disease transmission. A study was conducted to investigate the epidemiology of two main pig zoonoses in two provinces in Laos: Northern upland (Luang Prabang) and Southern lowland (Savannakhet). Lowland Southern provinces tend to employ more intensive pig production systems and Savannakhet has an increasing number of commercial pig systems near the Thai border. Thirty villages were selected in each province (weighted according to human populations). From each village 15 pigs were sampled from 15 randomly selected households and one person per selected household was randomly sampled and interviewed. Risk factor analysis for pathogens with prevalence at village level greater than 10% was then performed. A high percentage of both pigs and pig farmers were seropositive for Hepatitis E, however, humans were more likely to be seropositive in the Northern Province, whilst pigs were more likely to be seropositive in the Southern Province. Pigs that were kept in free-range scavenger systems in Northern Province appear to have reduced odds of Hepatitis E. Pigs from households that dispose of manure in water sources were more likely to be seropositive for both *Trichinella* and Hepatitis E and this may present a further route of human exposure. Those that were involved in the slaughtering of pigs were more likely to have evidence of Hepatitis E exposure, whilst those which handled raw meat or offal were more likely to have been exposed to *Trichinella*; suggesting these are high risk activities for zoonoses. The study highlights the need for continued surveillance of pig zoonoses and communication between livestock owners and veterinary and public health authorities in order to control the disease.

P2.6: Application of Outcome Mapping to monitor and evaluate improvement of hygienic practices of small scale poultry slaughterhouses in Northern Thailand

Suwit Chotinan, Chiang Mai University, Thailand; Suvichai Rojanasthien, Chiang Mai University; Korapin Tohtubtiang, Independent M&E consultant; Fred Unger, International Livestock Research Institute

Even though Thailand is a major poultry export country of the world, poultry production system including poultry meat production especially for local consumption is still a challenge related to food safety policies. Poultry slaughterhouses are considered as the source of food-borne pathogens contamination on poultry meat. The objective of this study was to evaluate the perception and behavior change concerning food safety and hygienic practices of small scale poultry slaughterhouse owners in Northern Thailand by applying the outcome

mapping approach. Initial steps included development of objectives, identification of process markers and implementation. In-depth interviews and focus group discussions were used to monitor and evaluate changes of the targeted group, so called boundary partners. . For this five slaughterhouse owners were identified and participated in this study and followed up during June 2012 until June 2013 in repeated visits. Results of this study revealed that improper hygienic management is common practice and the slaughterhouse owners realized that this had affected also food safety for consumers. Four of the five owners agreed that they need to improve the slaughterhouse management. Feasible hygienic improvement guideline were jointly developed and presented to the owners. Among the five followed owners two implemented required changes in their slaughterhouses following the developed guidelines during our observations. Key challenges for owners towards improvement of their premises were identified such as return of investment. Those findings were presented to national level officers of the Department of Livestock Development (DLD). Based on a brainstorm meeting a policy brief was collaboratively developed. This study demonstrated that outcome mapping can be an effective tool to monitor perception and behavior change related to food safety of small scale poultry slaughterhouse owners and that those changes can be reflected in underlying policies.

P2.7: Factors influencing the transformation processes in rural poultry production in Hanam Province, Vietnam: Challenges, opportunities and implication for policy changes

Tung Dinh Xuan, National Institute of Animal Sciences, Vietnam; Pham Duc Phuc, Hanoi School of Public Health; Hong Le Thi Phuong, Hanoi School of Public Health; Huong Nguyen Mai, Center for Public Health and Ecosystem Research (CENPHER), Hanoi School of Public Health (HSPH), 138 Giang Vo; Tuyet-Hanh Tran Thi, Hanoi School of Public Health; Hang Tran Minh, Institute of Anthropology; Hung Nguyen-Viet, Hanoi School of Public Health

This study is one of the components of the Eco-health Field Building Leadership Initiative (FBLI) in Vietnam. Hanam province is located in the Red River Delta, North of Vietnam and dominated by flat land. Natural conditions favour diverse agricultural activities. Poultry raising farm is the common farming practice. The objective of this study was to determine the factors influencing the transformation process of poultry production in Hanam province. Multistage and random sampling procedures were employed to select 461 farmers. Both structured questionnaires and focus group discussions (FGD) were used to collect data on characteristics, dynamics, challenges and opportunities of poultry production systems. The collected information was analysed by applying descriptive statistics and Logit model. The findings revealed that poultry production is still a common activity, accounting for 66.8% of the studied farms. Of the poultry raising farms, 64% of them increased their flock size during the five-year period between 2008 and 2013, and the rest decreased their farm size. For the group of increased flock size, average flock size increased by 68%, while it was 105% for the decreased flock size group. Different challenges and opportunities of the two groups of farms were identified. At the household level, the choice of poultry flock size and decision of flock size changes were influenced by the size of household age, education, employment, access to service systems such as extension, credit, animal health and land area. These factors contribute to shape the poultry production pattern and their changes. Future changes of poultry process will also depend on dynamic relationships among these factors. We conclude that poultry farming will continue to change in the future. The trend of increasing poultry farm size brings the sources of risk, including disease and health problems that should be considered by both government and producers.

P2.9: Neglected zoonoses at the human and livestock interface in the department of Korhogo, northern Côte d'Ivoire

Youssef Baptiste Kanoute, Swiss Tropical And Public Health Institute, Switzerland; Bassirou Bonfoh, Centre Suisse de Recherches Scientifiques; Esther Schelling, Swiss TPH, affiliated with University of Basel

Background: Studies on brucellosis in Korhogo were last published in the 1990s when high seroprevalences were detected in people and ruminants. No control program has been in place for the last 20 years and almost no veterinary services operate since the political upheaval in 2002. A cross-sectional study in livestock was conducted from 2012 to 2013 as the first part of a study that will assess brucellosis, Q fever and Rift Valley fever in humans and livestock, including cross-border control options. Methods: A cluster sample of 309 cattle and 489 small ruminants from 45 random villages was enrolled. Sera were collected and tested with the Rose Bengal Test. A questionnaire on brucellosis herd management related risk factors was administered. Veterinary services and health facilities were consulted about zoonoses. Results: Two cattle were brucellosis seropositive. The true seroprevalences in sheep and goats were 10.5 (95 CI 7.06 - 13.97) and 8.93 (95 CI 4.83 - 13.03), respectively. Almost 4.7 (2 of 43 herds), 48.8 (20 of 41) and 27 (8 of 30) of cattle, sheep and goat herds, respectively, were brucellosis positive. In sheep, an average 22 increase in the odds of seropositivity was observed for each additional year of life (OR 1.22 95 CI 1.05-1.42). Animals of 4-8 years (OR 3.9 95 CI 1.07-14.15) and 8 years (OR 7.45 95 CI 1.42-39.14) were more likely to be seropositive than those of 1-4 years. Goats of 4-8 years were less likely to be seropositive than those 4 years (OR 0.59 95 CI 0.09, 0.77). Seropositivity in goats was associated with infertility (OR 3.9 95 CI 1.8-8.1). The presence of abortion/birth products at watering points exposed sheep herds (OR 3.4 95 CI 1.3-8.5). Interviews with health professionals and veterinarians showed that zoonoses were neglected in the study area.

P2.10: Bio-social determinants for the host-parasite interaction of emerging food-borne parasitic diseases

Xiao-Nong Zhou, National Institute of Parasitic Diseases, China CDC, China; Banchob Sripa, Khon Kaen University; Guojing Yang, Jiangsu Institute of Parasitic Diseases

With the globalization and economic development, the emerging food-borne parasitic diseases occurred much more frequent in Southeast Asia. For example, more than one tenth of liver fluke infections occurred in SE Asia, and it was found the increasing pattern is parallel with the output of fishery in the region. In addition, more food-borne parasitic diseases, including angiostrongyliasis, gnathostomiasis, paragonis, trichinosis, cryptosporidiosis, cyclosporiasis, anisakiasis, fascioliasis, etc were recorded to be occurred as outbreak which pay attentioned to the society as an important food safety issue. In order to understand the combat the food-borne parasitic diseases sustainably by using ecohealth concept and approaches, the following three aspects were reviewed. And two recommendations were put forward. A model of multi-country study on combating the food-borne parasitic diseases by ecohealth approach is introduced to present a demonstration of abovementioned theory. Finally, in order to reach the goal to design the implementable strategy, two recommendations were put forward. One is the design team has to be consisted of multi-disciplinary scientists in order to better translate the ecohealth concept into the national control program by multi-stakeholders. The another recommendation is that the ecohealth approach which is the evidence-based intervention need to take action by two-steps, or pilot study first, followed by scale up in larger areas in different zones.

P2.11: Environmental factors involved fecundity of *Opisthorchis viverrini* through enhancing propagation of its intermediate host: EcoHealth lesson from Lawa model

Sirikachorn Tangkawattana, Khon Kaen University, Thailand; Prasarn Tangkawattana, Faculty of Veterinary Medicine, Khon Kaen University; Apiporn Suwannatrai, Faculty of Medicine, WHO Collaborating Centre for Research and Control of Opisthorchiasis (Southeast Asian Liver Fluke Disease), Tropical Disease Research Laboratory, Khon Kaen University; Sasithorn Kaewkes, Faculty of Medicine, WHO Collaborating Centre for Research and Control of Opisthorchiasis (Southeast Asian Liver Fluke Disease), Tropical Disease Research Laboratory, Khon Kaen University; Christina Sunyoung Kim, WHO Collaborating Centre for Research and Control

of Opisthorchiasis (Southeast Asian Liver Fluke Disease), Tropical Disease Research Laboratory, Khon Kaen University; Banchob Sripa, Faculty of Medicine, WHO Collaborating Centre for Research and Control of Opisthorchiasis (Southeast Asian Liver Fluke Disease), Tropical Disease Research Laboratory, Khon Kaen University

Introduction: Opisthorchiasis is a major public health problem in Thailand. It is caused by *Opisthorchis viverrini*, group I carcinogen causing cholangiocarcinoma. The parasite needs two intermediate hosts for development; bithynia snail for cercariae and cyprinid fish for metacercariae. Infection occurs through ingesting raw infected fish. Lawa model is designed to control infection in Lawa Lake, an endemic area in Khon Kaen, Thailand. EcoHealth assessment is launched for a better understanding of parasite transmission. Relationship and supportive roles of several environmental factors on the parasitic fecundity and transmission are determined. **Methods:** The investigation was in 11 villages surrounding Lawa Lake. Feces of human, cats, and dogs were collected to determine the disease prevalence by formalin ether concentration technique. Cercariae in bithynia snail were investigated by cercarial shedding and metacercariae in cyprinid fish by pepsin digestion. Environmental conditions of the lake and wetland, e.g., shallowness of the bank, water quality (salinity, conductivity, and total dissolved solid (TDS)), and fecal coliform bacteria, were revealed. Relationship between these environmental factors, parasitic fecundity in the two intermediate hosts, and disease prevalence in human and animal hosts were determined. **Results and Discussion:** Nongnangkwan village had highest prevalence in human (74.3 in adult, 20 in school children), snail (0.18), fish (37.6) and cat (48.39), and highest scores on salinity (5.4ppt), conductivity (9,870 s/cm), TDS (9,490mg/l), and coliform (540MPN/100ml). Cat is the most important animal reservoir. The lake bank is shallow, thus allowing its bed to expose with sunlight necessary for the propagation of the snail. These environmental conditions would be a perfect support of the parasitic fecundity through the rich propagation of intermediate hosts, especially bithynia snail. **Conclusion:** Water quality and depth of the lake bank are crucial environment factors for the propagation of the two intermediate hosts, thus enhancing parasitic fecundity."

P2.12: Rapid anthropology and neglected tropical diseases: The promises and perils of engagement

Kevin Bardosh, The University of Edinburgh, United Kingdom

The neglected tropical diseases (NTDs) have become less neglected. Bold new elimination targets set by the World Health Organization for 2020 and the rapid scaling-up of donor programmes are currently helping to address these devastating illnesses. However, there is also a growing recognition that the social sciences (and social determinants) have been somewhat "relegated to the margins." A recent spat between anthropologists and NTD advocates in *The Lancet* is one example. While there is growing recognition of the need for more critically engaged social science research, the question is: How can the social sciences (particularly sociology and anthropology) become a more integral part of the NTD establishment and what are the promises and perils? This paper explores some longstanding issues in the challenges of joining disciplines for global health. Particularly, it explores the challenges anthropologists face as they conduct research with the explicit goal of influencing policy and practice. To keep pace with the rapid expansion of NTD programmes, it argues that a renewed focus on "rapid anthropology" is needed. While there are promises of improving programmes and adjusting strategies, methodological risks are many. This paper discusses these issues in reference to two research projects: an integrated One Health intervention to control cysticercosis in highland Laos and the control of cystic echinococcosis in central Morocco. I argue that, as anthropologists well know, data collection, analysis and presentation of results are intimately linked with individual subjectivities. While the need to quickly gather relevant information puts specific types of pressure on the researcher, prior experiences and grounding in theory can help navigate some, but not all, of these complexities. This paper ends with a reflection on the

inherent value of rapid assessments, not from an academic perspective, but from a political one - as researchers move from understanding to action.

P2.13: Participatory methods to explore rodents-related health risks perception among rural farmers of Cambodia

Ludovic Chiffot, CIRAD, Ur AGIRs, France; Nicolas Antoine-Moussiaux, Tropical Veterinary Institute, University of Liege; Sourn Butmao, CIRAD, Ur AGIRs; Serge Morand, CNRS-ISEM; Julien Cappelle, CIRAD, Ur AGIRs; Arnaud Tarantola, Institute Pasteur Cambodia; Flavie Luce Goutard, CIRAD, Ur AGIRs ; Michel de Garine-Wichatitsky, CIRAD, France

Previous research on wild rodents, in Mondulakiri and Sihanouk provinces in Cambodia showed a high seroprevalence of zoonotic pathogens in several wildlife species. In order to know if villagers of those provinces perceived rodents as a threat for their health, we returned to 16 villages, applying participatory methods (focus-groups, pair-wise ranking...) and the Q-methodology, to identify patterns in opinion and groups of individuals sharing the same "viewpoints". Twenty-five persons in Mondulakiri and twenty in Sihanouk Provinces were asked to score, from -3 to +3, a set of 35 statements depending on how strongly they agreed with them. Q-sorts produced by participants were analysed by Principal Components Analysis. Sixteen focus-groups with a total of 301 farmers were organised. During these meetings, 29 diseases were mentioned, two were identified as zoonoses (avian influenza and rabies), and none were associated with rodents by farmers. Semi-structured interviews underlined the fact that rodents were not identified as sources of diseases in any of the villages. Three common opinions were identified among the villagers: i) rodents are seen as pests because of their impact on rice cultivation but they are not identified as a source of disease, and they are less dangerous than other animals; ii) people should handle rodents carefully, clean their droppings and keep them away from food but rodents are not an important health risk; iii) rodents are identified as « dirty » animals who can affect the well-being of villagers and can be eliminated, whether or not they self-declared as being Buddhist. These results highlighted the fact that farmers in Cambodia underestimate rodents' importance in disease transmission and that they have almost no information about risks related to zoonotic diseases other than avian influenza and rabies. These data could be used by health services to design appropriate communication campaign about rodent-borne diseases.

P2.14: Social Participation and Micro-changes in vector-borne diseases control with Ecohealth's approach

Roberto Briceno-Leon, Laboratorio de Ciencias Sociales, LACSO, Venezuela

In the history of the prevention and control of vector-borne diseases, it has been considered the participation of people at risk of contracting the disease, however, the way it has been understood that participation has varied over time. The EcoHealth approach to control the vector-borne diseases has meant a significant transformation of the role of social participation, changing the focus of the orientation and the relationship between the actors. The study shows three distinct stages of executing the participation of persons : 1- The benevolent participation, 2 - Community participation and 3- Social participation. The latter corresponding to the EcoHealth approach and uses examples of programs on Chagas disease, Dengue and Malaria. In social participation in Ecosalud summon and integrate the different social actors and are formulated in a transdisciplinary and social equity and gender perspective, therefore must incorporate democratic mechanisms to overcome the difficulties that arise in the socio- environmental transformation and identified as : a- conflict of interest , b- conflicts in the allocation of resources and c- tensions for change or permanence of the distribution of power . The paper concludes with theorizing about the potentials and limitations of social and environmental microchanges and the role of social participation in the achievement and sustainability of vector borne-disease control.

P2.15: Developing an Ecohealth research program to improve public health related to agricultural intensification in Vietnam

Phuc Pham Duc, Hanoi School of Public Health, Vietnam; Hong Le Thi Phuong, Hanoi School of Public Health; Huong Nguyen Mai, Hanoi School of Public Health; Hung Nguyen Viet, Hanoi School of Public Health; Tuyet-Hanh Tran Thi, Hanoi School of Public Health; Hang Tran Minh, Institute of Anthropology; Tung Dinh Xuan, National Institute of Animal Sciences

Vietnam is undergoing rapid agricultural intensification that affects crop, livestock and fish productions. Using an Ecohealth approach to comprehensively tackle complex issues requires individual and institutional capacity development. The research component of the Ecohealth Field Building Leadership Initiative program has been developed by a research team in Vietnam with the purpose of addressing human health problems related to animal and human wastes management in Ha Nam Province. The research objectives identified by using some Ecohealth core principles such as participation, collaboration and interdisciplinary. Based on the results from our previous research program on the assessment of health risks associated with the use of waste-water and excreta in agriculture in the same study sites, the Ecohealth research team conducted a deeper exploration of the issues at the community level by re-visiting the study sites and spending more time with the community to identify their prioritized needs. An on-site stakeholder workshop was organized with the involvement of different stakeholders, who were local governmental authorities at provincial, district and communal levels experts working on different disciplines and community members. Afterwards, Community-Based Approach was used to explore community's needs and to get community's active involvement in this research-practice process. Three targeted communes were selected and 19 field visits have been made. Moreover, researchers had regular stays in the study sites for taking observations and 40 in-depth interviews with 40 stories to discover the agriculture intensification history and health issues at study sites. In addition, 461 households were interviewed by using a structured questionnaire. The information obtained including household socio-economic status, agricultural activities, human and animal wastes management, personal hygiene and health issues. Information and data obtained will be analyzed and discussed by researchers, and then relevant interventions will be proposed and implemented by researchers, local authorities and community members in the coming

P2.16: The Sicki Project: curating our knowledge of historic infectious disease events

Nicholas Preston, EcoHealth Alliance, United States; Carla Tilchin, EcoHealth Alliance; Alexa Frank, EcoHealth Alliance; Kris Murray, EcoHealth Alliance; Peter Daszak, EcoHealth Alliance

The goal of The Sicki Project is to unravel the origins of infectious disease events. Through Sicki, we aim to reduce uncertainty by curating, reviewing, and expanding the scope of the data used by the global health community to understand disease emergence. This initiative will ultimately generate improved inputs for analyzing disease threats and digital disease diagnosis. Our team has designed an innovative web platform to facilitate collaborative literature and peer review efforts. The application hosts an editable scientific wiki and a content repository of relevant resources (reports, statistics, maps, and media) related to historic events. Sicki employs mechanisms of collective intelligence to improve the accuracy of the data, and features a scalable cloud architecture, dynamic maps, an interface for analysts, and an integrated reference management system. The project has been developed through multiple initiatives at EcoHealth Alliance and, as we progress through the review process, is being incrementally released to the community.

P2.17: A situation analysis on the expansion of rubber plantation, human migration and linkage to vector-borne diseases in eastern Thailand

Pongsri Maskhao, Faculty of Humanities and Social Sciences, Rajabhat Rajanagarindra University, Thailand; Suwannapa Ninphanomchai, Center of Excellence for Vectors and Vector-Borne Diseases, Faculty of Science, Mahidol University; Supaluk Khaklang, Center of Excellence for Vectors and Vector-Borne Diseases, Faculty of Science, Mahidol University; Suporn Thongyuan, Department of Veterinary Public Health, Faculty of Veterinary Medicine, Kasetsart University; Luechai Sringernyuang, Department of Society and Health, Faculty of Social Science and Humanities, Mahidol University; Pattamaporn Kittayapong, Center of Excellence for Vector and Vector-Borne Diseases, Faculty of Science, Mahidol University

An increasing number of agricultural developments have changed the country's land use patterns and greatly affected ecosystems and entire natural resources. In 1988, the occurrence of deforestation in Chachoengsao caused the reduction of forestry from 280,500 hectares to 128,000 hectares. To maintain naturally balanced, the Chachoengsao Local Forestry Department Policy was to increase the area of forestry to 40% and one of the launched projects was to give private sectors a concession of reforestation which allowed the plantation of eucalyptus, teaks, rubber trees and other cash crops in the areas (Pratumkwea, 1989). Among others, rubber plantation and human movement have been outgrown in numbers due to higher consumption, fast industrial development and inspiring economy especially in Sanamchaiket District. The rapid expansion of rubber plantation and migrant resettlement highly increase a range of vector-borne infectious disease outbreaks in the country. Our situation analysis addressed the following issues: (1) migrant movement in the rubber plantations of Sanamchaiket District with the linkage to vector-borne diseases; (2) needs and awareness of shareholders on land use change and its effects on vector-borne disease infections; and (3) facilitation of participatory research to rubber plantation stakeholders for benefit of health and environments. Our research findings should facilitate policy makers a better approach to rubber plantation development and health improvement at national level.

P2.18: Remote sensing and spatial analysis of dengue in different areas of rubber plantations in eastern Thailand

Chitti Chansang, National Institute of Health, Department of Medical Science, Ministry of Public Health, Thailand; Uruyakorn Chansang, National Institute of Health, Dept. of Medical Science, Ministry of Public Health; Somchai Sangkitporn, National Institute of Health, Department of Medical Science, Ministry of Public Health; Pattamaporn Kittayapong, Center of Excellence for Vector and Vector-Borne Diseases, Faculty of Science, Mahidol University

Dengue remains a public health problem in Thailand. In recent years, there has been an increase in rubber plantations in Thailand. *Aedes albopictus*, one of the vectors of dengue, were found abundantly in rubber plantations. However, no study had been conducted on the spatial relationship between dengue and rubber plantations at the local scale over time. This spatial relationship is important for planning and implementing disease prevention and control. Thaichote Satellite images were used for characterizing rubber plantations in four selected districts in Chachoengsao Province, eastern Thailand. Plaeng Yao and Phanom Sarakham were the districts that had low numbers of rubber plantations while those with high numbers of rubber plantations were Sanam Chai Khet and Tha Takiap. The dengue patients admitted to four selected district hospitals were included in this study. Global Positioning System (GPS) units were used to record the locations of dengue patients between 2009-2012. Spatial maps of dengue were created using Kernel estimation. Spatial maps created by using the Geographic Information System (GIS) and overlaid with characterized rubber plantations from Thaichote Satellite images showed that dengue was highly concentrated in the northeast areas of the two districts that had low numbers of rubber plantations while dengue was scattered in the areas of the two districts that rubber plantations were abundant. The average number of dengue per 1,000 people of the two districts that

had low numbers of rubber plantations and the two districts that had high numbers of rubber plantations were 1.13 ± 0.60 and 0.22 ± 0.18 respectively and were significantly different ($p < 0.001$). Results obtained could be used for planning effective dengue prevention and control programs.

P2.19: Seasonal abundance of Anopheles mosquitoes and their association with meteorological factors and malaria incidence in Bangladesh

Kabirul Bashar, Jahangirnagar University, Bangladesh; Nobuko Tuno, Kanazawa University

The malaria situation in Bangladesh is complicated due to suitable environment, high species diversity and species complexes with many sibling species. The relationship between climatic factors and mosquito abundance is very important to determine parasite activity levels and disease risk. Therefore, this study was conducted to investigate the seasonal abundance of anophelines and their association with meteorological variables and disease transmission in two malaria endemic areas of Bangladesh during January, 2011 to January, 2012. Pearson correlation and canonical correspondence analyses (CCA) were computed to investigate the associations with species abundance and rainfall, temperature, humidity and malaria cases. A total of 2,443 female anophelines, representing 22 species were captured. Every female *Anopheles* were tested for *P. falciparum*, *P. vivax* 210 and *P. vivax* 247 CSP, of which 10 species were found positive. The CSP positive species were *An. annularis*, *An. baimaii*, *An. barbirostris*, *An. jeyporiensis*, *An. karwari*, *An. minimus* s.l., *An. philippinensis*, *An. umbrosus*, *An. vagus* and *An. willmori*. *Anopheles vagus* and *An. philippinensis* were the dominant species present almost throughout the year with highest peaks in March and smallest peaks in September but *An. baimaii* and *An. willmori* were found during monsoon (July -September) only. Lag rainfall and relative humidity were the most significant variables influencing *An. baimaii*, *An. willmori*, *An. vagus*, and *An. subpictus* density in study area. Abundance of these four species positively related to malaria cases. The density of other *Anopheles* species negatively associated with rainfall, humidity. The effects of temperature were not found as a significant variable on the abundance of anophelines mosquitoes in Bangladesh. Our study demonstrates that the nature of relationship between malaria vector and climatic variables were multifaceted. Detailed studies of vector bionomics, continuous monitoring and malaria transmission dynamics is essential for predicting disease outbreaks and vector control in the region.

P2.20: Malaria burden in relation to ecosystems and livelihoods among farming communities in Kilosa District, Central Tanzania

Leonard Mboera, National Institute for Medical Research, Tanzania; Susan Rumisha, National Institute For Medical Research; Veneranda Bwana, Amani Medical Research Centre; Malongo Mlozi, Sokoine University Of Agriculture

Malaria is a public health problem that illustrates the interactions between livelihood, ecosystems and health systems. The objective of this study was to investigate the relationships between malaria, ecosystems, and livelihoods and compare the burden between rice farming and pastoral communities. This study was carried out in 5 villages of Kilosa district in central Tanzania. The villages were Tindiga and Malui (rice farming community), Twatwatwa and Mbwade (pastoral community) and Kimamba (mixed livelihood activities). Malaria prevalence among schoolchildren was determined using microscopy and rapid diagnostic test (mRDT) techniques. A total of 1318 school children aged 9 years (range=4–16 years) were involved. The overall prevalence of *Plasmodium falciparum* malaria infection was 8.5% by mRDT and 3.5% by microscopy. A significant high risk of malaria was observed among children in rice farming communities. Children living in areas with health care facilities had a low odd of malaria infection by 45% (OR: 0.55; 95% CI. 0.35, 0.86). Children over 8 years old were at a higher risk of acquiring malaria infection than younger children. The average prevalence of anaemia was 22.7%, with

the highest rate (mean=26.9%) observed among children in the pastoral communities. There were significant variations in the risk of acquiring malaria infection between children from different ecosystems and livelihoods and between those from villages with and without health care facilities. Crop farmers experienced few number of fever episodes than pastoral communities. The study has clearly shown that water and land resource management are important drivers of rural community livelihood systems and malaria burden. These findings suggest that malaria control programmes must account for the livelihoods and ecosystems contexts in which they are implemented. It is also critical to strengthen community capacity in water and land resource management strategies to prevent negative impact on health and ecosystem.

P2.21: An Agro-eco-health platform for sustainable agricultural production and malaria control in Irrigated Rice Cultivation areas of Selingue, Mali

Seydou Doumbia, University of Bamako, USTTB, Mali; Rousseau Djouaka, IITA; Oumar Sangho, University of Bamako USTTB; Dade BSB Haidara, Health District of Selingue; Mohamed Soumare, Ministry of Agriculture; Maimouna Halidou Doudou, Ministry of Health; Samba Diop, University of Bamako USTTB

Malaria transmission is influenced by poor water management and double cropping of rice, the main livelihood activities in irrigated rice cultivation areas. Through the integrated partnership for malaria control (IPMA) project, we developed a community based integrated malaria control interventions combining the promotion of best agricultural and malaria control practices through Farmer Field School (FFS) approaches and community based organizations (named as “health for all in the community” and composed of women and men). The interventions included the “intermittent watering of plots” instead of the existing permanent flooding which rather increases the development of mosquito breeding sites. The training also introduced minimal tillage and good soil leveling for reducing soil aggression and minimizing standing of water pockets for decreased development of mosquitoes breeding sites. FFS approaches were also used for sensitizing farmers on health and environmental risks associated with the use of synthetic pesticides and to introduce the utilization of botanicals for pests control and treatment of breeding sites in the community. The developed Agro-eco-health knowledge and exchange platform brought health care providers, agricultural and environmental workers and the community representatives for discussing issues on sustainable agricultural production, and environmental protection for improved community’s livelihood. The platform is currently well functional and discussions/trainings organized in the platform have strengthened population knowledge and practices on local approaches for community based control of malaria. As agro-ecosystems are growing in Africa, the FFS approach provides a great opportunity for reducing malaria transmission risk as control is evolving toward elimination. The established “health for all groups” will serve in the long run as a portal of entry to series of planed agro-eco-health program in this community/village.

P2.22: The Burden and Determinants of Self-Reported Acute Gastrointestinal Illness among an Indigenous Batwa-Pygmy Population in Southwestern Uganda

Sierra Clark, McGill University, Canada; Lea Berrang-Ford, McGill University; Shuaib Lwasa, Makerere University; Didas Namanya, Uganda Ministry of health; Sherilee Harper, University of Guelph

Acute gastrointestinal illness (AGI) is an important public-health priority worldwide. Few studies have captured the burden of AGI in developing countries, and even less for Indigenous populations. The aim of this study is to estimate the incidence and identify determinants of AGI within a Batwa-Pygmy Indigenous population in southwestern Uganda. This study is a part of a larger international initiative, called the Indigenous Health Adaptation to Climate Change (IHACC) project, with parallel field sites in the Canadian Arctic and the Peruvian Amazon. A two-week retrospective cross-sectional face-to-face survey was conducted in January 2013 via a

census of ten Batwa communities (n=583 participants). The case definition for AGI included self-reported diarrhea (three or more loose stools) and/or vomiting in the past two weeks. The 14-day prevalence of AGI was 6.1% [95% CI 4.0-8.0], corresponding to an annual incidence rate of 1.66 episodes of AGI per person-year. The prevalence of AGI was greatest among children below the age of three (11%). The mean duration of vomiting episodes lasted for 2.8 days with an average of 2.8 maximum episodes, while the mean duration of diarrhea symptoms lasted 4.5 days with an average of 4.3 maximum loose stools. A multivariable mixed effects logistic regression model controlling for clustering at the community level indicated that exposure to goats or sheep [OR= 2.64, 95% CI 1.04-6.76], being a child below the age of three [OR=4.8, 95% CI 2.4-13.2], and being a wealthy non adult as opposed to a non-wealthy non-adult [OR=7, 95% CI 3.95-9.20] were significantly associated with being a case of AGI. This is the first AGI community-census level study in Uganda, and highlights the significant burden of AGI among the Batwa in Southwestern Uganda.

P2.23: Success and challenge in moving from research to action to reduce disease risk on Chang Island, a global outreach tourist hotspot in Thailand

Pattamaporn Kittayapong, Center of Excellence for Vector and Vector-Borne Diseases, Faculty of Science, Mahidol University, Thailand; Rungrith Kittayapong, Center of Excellence for Vectors and Vector-Borne Diseases, Faculty of Science, Mahidol University; Suwannapa Ninphanomchai, Center of Excellence for Vectors and Vector-Borne Diseases, Faculty of Science, Mahidol University; Supaluk Khaklang, Center of Excellence for Vectors and Vector-Borne Diseases, Faculty of Science, Mahidol University; Suporn Thongyuan, Department of Veterinary Public Health, Faculty of Veterinary Medicine, Kasetsart University; Luechai Sringernyuang, Department of Society and Health, Faculty of Social Science and Humanities, Mahidol University

Although tourist destinations are vulnerable hotspots for disease emergence and global spread, there has been no systematic study of the vulnerability of communities that have been affected by the rapid and unplanned tourism development and there are no existing comprehensive strategies to respond to the needs related to improved health and wellbeing within these vulnerable communities. Koh Chang, the second largest island and one of the most beautiful natural attractions in the Gulf of Thailand, was selected to apply an integrative eco-bio-social approach to reduce disease risk. Our situation analysis revealed that traditional life style had been distinctively changing. Local people changed their professions from agriculture into investors of business related to tourist activities. Increased development had created new vulnerabilities that had been exacerbated by inadequate health system and poor sanitation. Migrant workers moved in and out for seasonal work and tended to continue working after being infected enhancing spread of diseases to their work places, i.e., hotels/resorts. Baseline information related to disease emergence was gathered. Our findings indicated that land use change had influenced disease incidence and risk for viral infections from monkeys was higher in tourist settings with national parks due to the evidence of mixed human-monkey blood meals of vectors. Analysis by time-lag series showed that dengue incidence was high in rainy season while malaria was high in summer and this finding was used to develop health education materials to increase awareness among local residents and tourists visiting the island via eco-house and eco-hotel networking. One of the environmental-related problems that enhanced disease risk on Koh Chang was an increase in garbage due to rapid tourism development. Stakeholder meetings organized to report research findings led to further collaboration to improve waste management on the island through the distribution of garbage houses for garbage disposal and recycling.

P2.24: Description of aquatic bugs in buruli ulcer endemic and non-endemic areas in cameroon based on both morphological and molecular approaches

Solange Meyin A Ebong, Centre Pasteur Du Cameroun, Cameroon ; Elsa Petit, Laurent Marsollier, Jean-François Guegan, Philippe Le Gall, Sara Eyangoh, Myriam Harry

Buruli ulcer is a skin infection caused by *Mycobacterium ulcerans*. For long time neglected, Buruli ulcer is currently a real problem of public health in Africa. In Cameroon, an increase in the number of cases, have resulted in a strong involvement of public health stakeholders in the fight against Buruli ulcer. Thus, since 2002 the Mycobacteriology Service of Centre Pasteur du Cameroon, the National Reference Laboratory for Diagnosis of Buruli ulcer, has undertaken an extensive program to better understand the transmission modes. Several studies have linked water bugs with transmission of the mycobacteria. But detailed knowledge of the biodiversity and ecology of these potential hosts/vectors required for understanding the transmission dynamics of this mycobacteria remains poorly documented. The objective of this study is to describe taxa of water bugs in Buruli ulcer endemic and non-endemic areas in Cameroon using morphological and molecular approaches. Sampling was carried out in ten collection points in two endemic areas (Akonolinga and Bankim) five in each and twenty seven collection points in eight non- endemic areas (Mbalmayo, Abong Mbang, Garoua, Tibati , Ngaoundere , Bamenda , Buea and Santchou) three in each. We have identified nine families of water bugs and fifty four (54) morphotypes on the basis of their morphological characteristics. Belostomatidae (8), Corixidae (3), Gerridae (10), Hydrometridae (4), Mesoveliidae (3), Naucoridae (4), Nepidae (5), Notonectidae (9), Veliidae (8). We confirmed this classification using molecular barcoding which involved sequencing the mitochondrial genome (COI, COII, 866pb, 102 sequences). There is a good congruence between identified morphotypes and sequences; delimitation of species is based on the calculation of intra-and inter-specific distances. The concatenation of two mitochondrial genes gives us several species candidates as well as morphotypes identified in families. This work is the first molecular database for aquatic bugs in West Africa.

P2.25: An ecosystemic framework to address rabies in the Canadian Arctic: the role of arctic foxes and dogs

Audrey Simon, Université de Montréal, Canada; Denise Bélanger, Université de Montréal; Christine Fehlner-Gardiner, Canadian Food Inspection Agency; Taya Forde, University of Calgary; Leighton Patrick A., Université de Montréal; Jean-François Proulx, Nunavik Regional Board of Health and Social Services; Andre Ravel, Université de Montréal

Animal rabies occurs across the Canadian Arctic and infection from Arctic foxes (*Vulpes lagopus*) poses an ongoing threat to the health of Inuit people. Rabid foxes may attack and infect domestic dogs, which in turn may expose and infect people mainly through bites. With significant changes to the Inuit way of life, the economic role of dogs has decreased, but their socio-cultural role remains significant in the Inuit culture, highlighting the importance of taking into account the relationship between Inuit and their dogs in public health interventions. This presentation provides a framework to study the transmission dynamics of rabies in the Canadian Arctic for the purpose of planning sustainable, effective, and culturally appropriate preventive programs in communities. We review the current knowledge of fox rabies epidemiology and we examine the role of dogs in the transmission of rabies at the interface between wildlife and humans in the North. There is a clear need for further data on rabies in the Canadian Arctic, especially on the transmission dynamics in Arctic foxes and the risk of exposure of dogs from wildlife which could increase in a changing North. Moreover, we need to understand the effectiveness and acceptability of existing and possible rabies control interventions in wild and domestic animals to support the self-determination and empowerment of Inuit communities and their public organizations to mitigate the threat of rabies to the health of Inuit people.

P2.26: Use of participatory rural appraisal tools for eco-health research: A case study on agricultural and human waste management in Hanam province, Vietnam

Hang Tran Minh, Institute of Anthropology, Vietnam

Hanam is an agriculture province in the Red River Delta of Vietnam with remarkable changes in the agricultural intensification recent years. If agricultural and human waste managements are not managed properly then they could affect human health and environment. This research is one of components of the Eco-health Field Building Leadership Initiative (FBLI) program has been developed by a research team in Vietnam with the purpose is to address human health problems related to agricultural and human wastes management in Hanam province that involve multi-stakeholders, multi-institutions, and policy makers. In this research, we have applied Participatory Rural Appraisal (PRA) tools with eco-health perspectives in order to identify emerging needs of local communities, feasible solutions, and reasonable plans in the comprehensive aspects of agricultural intensification. During the year of 2013, PRA qualitative research component including focus group discussions (FGDs) in relation to various tools such as Participatory Problem Analysis, Venn Diagram, Spider Diagram, and Seasonal Calendar were used for ten FGDs (2 local authority and 8 resident groups) of 69 local participants (26 men and 43 women) at 4 villages of Hoang Tay and Le Ho communes in Kim Bang district. Each group of 6-10 local people with diversity in gender, age, and farming activities discussed their concerns with the research team. The two main concerns of the local people were poor livestock waste management and pesticide control. In both communes, the increase in using of plant protection chemicals in cultivation, plus the ignorance of safety regulation among farmers together with the needs of on-field dustbins for pesticide packaging was pinpointed. The issues of bad smell and poor hygiene of livestock waste water were the two prioritized issues that need to be improved. By applying eco-health approaches and PRA tools, the research team together with local people identified priority issues and

P2.27: Knowledge, Attitudes and Practice of the Community, El Chaparral, Matagalpa in the Management of Drinking Water November 2013, Nicaragua

Tamara Ismene Alonso Valenzuela, Esteli, Nicaragua; Larry Lopez, CIES-UNAN

In the Community El Chaparral, Matagalpa, the rural population is facing difficulties in the access to drinking water. Besides the limited access, it should be added the threat of Drinking Water Quality, due to the contamination with Arsenic and the inadequate system of excreta Disposal. This research allowed to identify the lack of education of the people about the effects of the Arsenic in the health, lack of education reflected in the poor management of the solid waste. These results will help to design Plan of Water Safe with the support of the WHO/PAHO and the technical assistance of CIES-UNAN and the participation of the organized community. Study Objectives General : To determine the problems of Drinking Water facing in the Community El Chaparral. Specific : 1. To contribute to the recognition of measures to improve the quality of drinking water. 2. Help develop control strategies in water stop protection of public health Methodology This is a descriptive study, type (CAP) that identifies the Knowledge, Attitudes and Practice of the community to manage the quality of drinking water. The sample in this study consisted of 57 houses randomly selected households to be surveyed. Results •In 2010, 37 houses of this community received filters for arsenic removal, in where it was found evidence of the filter in only 19 houses, and 5 houses are currently using it. •80% of the houses which received the filter, reported not received training on the use and maintenance of the filter. •The disposal of excreta is inappropriate because of the poor conditions of the latrines in the community and 10% practice open defecation. •65% of the waste is burned and 17% is disposed in the areas

P2.28: Microbial Risk Assessment Associated With Treated Wastewater Reused For Irrigation

Ana C Espinosa-Garcia, Universidad Nacional Autonoma De Mexico, Mexico; Miguel A Silva-Magaña, Instituto de Ecologia, Universidad Nacional Autonoma de Mexico; Alejandra Fonseca-Salazar, Instituto de Ecologia, Universidad Nacional Autonoma de Mexico; Fernando Gonzalez-Villarreal, Instituto de Ingenieria, Universidad Nacional Autonoma de Mexico; Marisa Mazari-Hiriart, Instituto de Ecologia, Universidad Nacional Autonoma de Mexico

Wastewater treatment is the fundamental requirement for water reuse because contaminants can become an important source of hazards for exposed persons. The quality of water for reuse must comply with the limits stipulated in regulations in order to protect public health. Therefore, quality as well as microbial contaminants as related with the potential health risk is a key management issue in the assessment and monitoring of treated wastewater. Our aim was to assess the health risk associated with the presence of Fecal Coliforms (FC), Enteroviruses (EV), and Adenoviruses (AdV) in reused irrigation water. Microbial detection from wastewater and treated wastewater samples was performed with methods such as membrane filtration, double agar layer, and quantitative Polymerase Chain Reaction (qPCR). The risk matrices show that bacterial and viral presence in water reused for irrigation, as well as in grass, must be monitored and resolved because the counts found were above doses that can cause infection in exposed users. At present, a renovated residual Wastewater Treatment Plant (WWTP) is working and initial analyses show improvements in the WWTP regarding the ability of bacteria and virus removal.

P2.29: Exploring the Relationship between Micro-ecosystems in Drinking Water and Human Health in an Urban Environment in Cameroon

Jessica Healy Profitós, The Ohio State University, College of Public Health, United States; Arabi Mouhaman, The University of Maroua; Seungjun Lee, Department of Food Science and Technology, The Ohio State University; Rebecca Garabed, Department of Veterinary Preventive Medicine, The Ohio State University; Mark Moritz, Department of Anthropology, The Ohio State University; Barbara Piperata, Department of Anthropology, The Ohio State University; Jiyoun Lee, Division of Environmental Health Sciences, The Ohio State University

This study was conducted in the city of Maroua in the Far North Region of Cameroon, home to over 300,000 people. The aims of this study were 1) to investigate microbial contamination of drinking water along the water delivery chain within the city 2) to identify the potential sources of the microbial contamination using microbial source tracking and 3) to examine the relationship between water quality and gastrointestinal illnesses. We used interviews and observations to document the water delivery chain; surveys to collect demographic data and human health history in 120 households (785 people); and assessed human fecal contamination by measuring E.coli levels. The degree of human fecal contamination was measured through microbial source tracking. Antibiotic resistance was also examined. Paired source and home drinking water storage samples (canaries) were collected from 25 surveyed households. In the prior month, 12.5% of individuals experienced diarrhea. Sampling results from canaries had higher levels of contamination with average E.coli concentrations of 383 CFU/100ml versus an average of 71 CFU/100ml in source samples. Human genetic fecal marker (HF183), and the tetracycline-resistant gene (tetQ) were detected in source and home samples. Statistical analysis found an inverse relationship between tetQ and E.coli, and tetQ was the parameter with the highest correlation coefficient with diarrhea (0.15, $p=0.003$). Combined survey and water quality analysis demonstrated that samples from the canaries of diarrhea cases were more likely to have tetQ and E.coli levels below the 1st quartile compared to non-cases (OR 5.05). Our study indicates that most deterioration of drinking water quality occurs within the home. We are planning further studies of water handling and storage practices to examine how contamination occurs and understand the complex interactions between pathogens and antibiotic usage.

P2.30: Quality of drinking water and diarrheal diseases in Benin

Marius Kedoté, ISBA, Benin

Introduction According WHO (2006), diarrhoea ranks high among the causes of death and disease, annually making 1.8 million deaths and resulting in about 4 billion of morbid episodes. In Benin, water-borne diseases remain the leading causes of morbidity especially in children under 5 years and the incidence of diarrhoeal diseases is estimated at 32, 9% in 2010. The consumption of poor quality water is one of the important causes of diarrheal diseases such as cholera, gastroenteritis, diarrhoea, dysentery, typhoid fever. This study focuses on the determinants of the quality of the drinking water and the perception of two communities on the link between diarrhoeal disease and drinking water. Methodology We conducted an assessment of the microbiological quality of different consumed sources (42) in two communities (rural and urban), a descriptive cross-sectional survey based on questionnaire with 356 households selected by simple random draw in the target communities and interviews with households (30) selected by purposive. Results A vast majority, over 90% the samples of water carried from outside or stored in households including urban were contaminated. Found germs were total coliforms, fecal coliforms and the Escherichiacoli. However, the vast majority of participants in urban areas are the link between the occurrence of diarrhoeal diseases and consumption of poor quality water. The determinants of this bad water quality are lack or inadequate cleaning and maintenance of transport containers and storage of water, lack of hygiene and sanitation in the vicinity of water sources, access to water by the children, non protection of transport containers containing water, poor management of household waste, defecation in nature could be sources of water contamination. Conclusion It is therefore important to provide drinking water supply equipment to the populations and help promote health education to prevent water pollution.

P2B – Poster session, Aug 14, 12 :30-14 :00

P2.31: Health Risk Assessment Of Water Sold In Plastic Bags In The City Of Abidjan (Cote D'Ivoire, West Africa)

Kouame Kouadio, Institut Pasteur of Côte d'Ivoire, Côte d'Ivoire

Justification: Water is important because of the role that it plays in our daily life. Since 2000, Water sold in plastic bags has increased in Côte d'Ivoire particularly in Abidjan. Objectives: For the important role that it plays, we decided to assess the risk that water sold in plastic bags may cause in the health of the consumers. Methods: A cross sectional study was conducted at the Pasteur Institute of Abidjan in Cote d'Ivoire from October 2003 to May 2004. 900 bags were involved in the study in which, 450 home made bags and 450 semi-industrial bags. Results: The result showed that 89.6% of the sellers were doing these activities for more than six months. 69.8% of them were women. 79.3% of those women have a primary education level. Also, concerning the mode of conditioning the plastic bags, the individuals and environmental hygiene were some of the risk factors associated in this study. The pH of the 900 samples showed an average of 7.20; which was acceptable. The non conformity of the semi-industrial bags was 21.3% and 26% for the home made bags. 5.4% of the home made bags contained bacteria, whereas 3.3% of semi-industrial bags contained them. Enterococcus faecalis represented 91.6% (76 cases), Escherichia coli 7.2% (06 cases), and Salmonella spp 1.2% (01 case). We can conclude that the water whether it is semi industrial or homemade should not be consumed in Abidjan because of the high presence of bacteria (79.4%).

P2.32: Spatial Analysis Of Topography And River Watershed Factors For Leptospirosis Cases In Kulon Progo, Yogyakarta Province, Indonesia

Dyah Ayu Widiasih, Gadjah Mada University, Indonesia; Wayan T Artama, Gadjah Mada University; Adi Heru Sutomo, Gadjah Mada University; Tjut Sugandawaty Djohan, Gadjah Mada University; Fred Unger, International Livestock Research Institute

This study, which was part of the ILRI/IDRC EcoHealth project, was conducted to reveal epidemiological analysis of the spatial and temporal distribution of Leptospirosis in Kulon Progo District, Yogyakarta Province based on the topography and river watershed in those areas to explore the geographical influences in the dissemination of zoonotic diseases and support disease modeling. The study was carried out by tracing back to 54 positive results of MAT from cattle sera collected in a previous survey which focused on risk factors. The distribution of *Leptospira* serovars were plotted using ArcGIS 9.3 map software. This tool analyzed dissemination of leptospira serovars among the land altitude and river watershed. Result showed that *Leptospira* sp. was disseminated in 12 subdistricts in Kulon Progo district with eight serovars finally identified. This bacterium was spread almost overall the low land altitude with stream tributary branches across the regions from the high land altitude. *Leptospira* serovar Hardjo and L. ser. Icterohaemorrhagiae were widely identified in high to low land altitude of the sub villages in Kulon Progo District. Meanwhile, other serovars such as L. ser. Pomona and Rahmadie were mainly identified in high land altitude areas. Conversely L. ser. Tarassovi was only identified in the low land altitude area. The remaining identified serovars, Celledoni, Bataviae and Javanicae varied less in their distribution, reported only for some areas. From the findings, the use of a geographic information system provided a visual presentation when synthesized with the results of previous studies. This resulted in a more beneficial mapping and modeling of the diseases. Therefore spatial analysis based on topography and rivers watershed contributed to a better integrated understanding of disease emergence and is the basis for a more effective control and efficient addressing of public health concerns.

P2.33: Flood and food as potential carriers of health risk agents between urban and rural lives: A case in central Vietnam

Toru Watanabe, Yamagata University, Japan; Yuki Takada, Yamagata University; Kazuya Watanabe, Yamagata University; Duong Van Hieu, Hue University; Pham Khac Lieu, Hue University

Urban flooding poses risk of communicable and non-communicable diseases to dwellers because they frequently expose to floodwater which is easily contaminated with a variety of contaminants originated from urban drainage. The floodwater finally flow out from the urban area and reach to the downstream, bringing various contaminants. The priority in the flood management is usually put on the protection of dwellers and treasures in the urban area and therefore the floodwater is discharged or pumped out to the surrounding rural area as quickly as possible. Usually a large part of the rural area is used as agricultural field to produce fresh foods for urban dwellers. If such an agricultural field is covered by floodwater from the urban area, the field must be contaminated and the foods cultivated there may threaten human health in the urban area. In this sense, flood and food are potential carriers of contaminants, or health risk agents, between urban and rural areas. The present study is a case-study conducted in Hue, central Vietnam, to evaluate the potential of risk transfer between Hue city and surrounding rural area. We performed the field surveys on contaminations of soil and leaf vegetable (lettuce) at 33 farms of four rural villages in August (before flood season) and December (after flood season) 2013. It revealed that the seasonal flood from the city was a key factor of soil contamination with fecal indicator bacteria, although such a flood-induced contamination was not observed in vegetable samples. The relationship between agricultural soil and vegetable contaminations is still unknown and of our interest. We also found a channel of distribution of the vegetable from the flood-affected farms to consumers in the urban area and finally assessed their risk of infection due to contaminated fresh vegetables.

P2.34: Climate Change, Ecohealth and Watersheds

Nathalie Abrahams, Grupo Epidemiología y Salud Poblacional-Universidad del Valle, Colombia; Daniel Cuartas, Universidad del Valle; Diana caicedo, Universidad del Valle; Camilo Salcedo Jiménez, Epidemiology and Population Health Group - GESP; Fabian Mendez, Universidad del Valle

Ecohealth approach requires a systemic view of problems, but sometimes these view are not possible in pre established territories like municipalities or departments (administrative division similar to state), due to boundaries that divides natural systems in which humans and other species participate and interact. Despite climate change is a global issue, its impact needs to be assessed at local level to design particular adaptation strategies. We assess different levels of territories (study area) to select the best option for evaluating climate change impact in two health effects (dengue and acute diarrheal diseases). Three geographical/political areas were selected for assessment: municipal, departmental, and watershed. a matrix were designed for characterization of information source and its geographical level. Data required for exposure and health effects was: meteorological, hydrological, land use or coverage, aedic indexes, microbiological indicators in water. Three department, 41 municipalities and the 1 watershed were included in the assessment. Exposure data was available at watershed, departmental and municipal levels, but health effects was only available at departmental and in some municipalities. Changes in water cycle are evident in the watershed: intensity of precipitation, distribution of seasons and temperature, and although there are other factors than climate change affecting water cycle, such as land use changes, all these elements configure a spiral cycle of causes-effects-causes that not happens in the boundaries of a municipality or a department or even at watershed but it can be assessed much better at the later level. Use of watershed as a spatial analysis unit and ecohealth as research approach contribute to a better understanding of climate change impacts in the territory.

P2.35: Using heat stress maps to predict increased emergency room visits in rural Southern Ontario (2010-2012)

Katherine Bishop-Williams, University of Guelph, Canada; Olaf Berke, University of Guelph; David Pearl, University of Guelph; David Kelton, University of Guelph

In Southern Ontario, climate change gave rise to an increasing occurrence of heat waves, causing heat stress to the general public, with potentially fatal consequences. Heat waves are defined as three consecutive days with temperatures of 32°C and above. Heat stress is the level of discomfort. Heat stress indices measure heat stress, e.g. the heat stress index (HSI) is based on temperature and humidity, indicating serious health impacts above a level of 70 units. Maps visualizing the distribution of heat stress can provide information about related health risks and insight for control strategies. Information to inform heat wave preparedness models in Ontario was previously only available for major metropolitan areas. Hospitals in communities of fewer than 100,000 individuals were recruited for a pilot study by telephone. The number of people visiting the emergency room or 24-hour urgent care service was collected for 27 days, including three heat waves and six 3 day control periods from 2010-2012. The heat stress index was estimated using data from 37 weather stations, and subsequently interpolated across Southern Ontario by geostatistical kriging. Ordinary logistic regression modeling was applied to determine the odds of increased emergency room visits in a rural hospital with respect to the HSI. When the HSI exceeded a threshold value of 70 units, the odds of emergency room visits doubled (OR = 2.08, CI95%= 1.03-4.20, p = 0.04). This finding will aid hospitals and rural local public health units in preparing for emergencies during heat waves. Future research is needed to assess the relation between heat stress and individual characteristics and demographics of rural communities in Ontario.

P2.36: Examining Health Impact of cold weather using remotely sensed data: A case study of Dhaka, Bangladesh

Shinya Yasumoto, University of Tokyo, Japan; Ayesha Kabir, University of Tokyo; Kei Oyoshi, Japan Aerospace Exploration Agency (JAXA); Chiho Watanabe, University of Tokyo

Asthma is widely recognised as a major chronic respiratory disease and the prevalence of asthma is associated with cold weather. To observe the effect of cold weather, air temperature data provided by meteorological stations is often used, but limitation is that meteorological stations tend to be only situated in sparsely inhabited locations. It may provide discrete and partial representation of temperature, and thus biases to evaluate the public health risks. More recently land surface temperature (LST) data derived from satellite images became publically available. The LST data covers larger spatial coverage and its geographical resolution is smaller than the station data. Nevertheless, limited research has employed this data to test the relationship between exposure to cold weather and asthma prevalence. Although Bangladesh is located in sub-tropical area, cold weather is concerned as a trigger of asthma prevalence due to the poor qualities of heating systems and health cares in the country. By conducting a case study on Dhaka, the capital city of Bangladesh, this research examined the relationship between the two indicators of exposure to cold weather (i.e. air temperature data from stations and LST data) and number of asthma visits (as health outcome). The data on the number of out-patient visits due to asthma was collected in the National Asthma Centre in Dhaka through questionnaire survey. We also examine which indicator better predict asthma prevalence in the sample area. As a result, we found that air temperature was negatively associated with asthma visits. It was found that 1 degree decrease in minimum air temperature was associated with 2% increase in the visits of asthma patient. The health effect of LST will be also reported.

P2.37: Direct evidence of chemical contamination of *Anopheles gambiae* s.l. breeding sites underlying the selection of pyrethroid resistance in cotton growing areas revealed by HPLC: potential impact on the efficacy of vector control tools in Burkina Faso

Roch Dabiré, IRSS/Centre Muraz, Burkina Faso

Since the detection of the first case of *Anopheles gambiae* resistance to pyrethroid recorded in Ivory Coast in 1993, several studies had reported the role of agriculture in the selection and the spread of pyrethroid resistance in natural populations of *An. gambiae* s.l. Unfortunately no direct evidence was reported enhancing the presence of chemicals in anopheline breeding sites. It is what we addressed in the current study performed in Dano, a cotton growing area located in the South West of Burkina Faso by monitoring the insecticide content both in water and sediments sampled from randomly selected breeding sites using GC analysis from August to October 2013. The resistance status of local populations of *An. gambiae* s.l. was estimated using standard WHO tube assays. Early in August some herbicides as Diuron were detected from the soil residue in concentrations ranged from 22,63 to 105,5 mg/Kg of soil without any insecticide in the water. In October two pyrethroids namely lambda-cyhalothrin and deltamethrin were found in the breeding water at concentrations ranging from 0,0147 µg/l to 1,49 µg/l together with other chemicals occurring in very low concentration from the soil residue (benzoypropenyl, dioxacarb, chloroneb). A reduced mortality rate was observed both with deltamethrin 0,05% and bendiocarb 0,1% reaching 52,04% and 66,67% respectively. High kdr allele frequencies reaching 0,95 and 0,4 respectively for 1014F and 1014S alleles and 0,12 for the ace-1 allele accompanied this strength resistance phenotype. Data on the efficacy of long lasting insecticide treated bednets (LLINs) in use in the region obtained by WHO cone test, showed mortality rates ranged from 10% to 83% depending to the type of LLIN. The significance and the impact of such resistance on the efficacy of malaria vector control strategy in short and long terms were discussed.

P2.40: Biomarkers in environment health impacts assessment. Applying the Ecohealth approach in Uruguay

Nelly Manay, Faculty of Chemistry, Uruguay; Adriana Cousillas, University of the Republic; Cristina Alvarez, Faculty of Chemistry - Universidad de la Republica; Teresa Heller, Faculty of Chemistry - Universidad de la Republica

The Ecohealth emerging study field requires the contributions of Public Health sectors in order to address regional transdisciplinary actions with a global perspective. However, capabilities and resources are not always sufficiently developed for national implementation of global strategies. Human biomonitoring data in public health risk assessment play an important role in establishing relationships between a specific human health effect and a given chemical exposure. Animals can also suffer from diseases owing to element deficiency or toxicity, and may even develop early serious health problems before they occur in humans. This study highlights the importance of developing locally available analytical tools for appropriate biomarkers to assess human environmental exposure to trace elements and toxic chemical pollutants. It also applies to sensitive living species in the ecosystems. The focus is on the integration of multidisciplinary knowledge and transdisciplinary thinking towards the benefit of community health, ecosystems and the Uruguayan society. Lead is an example of a well known environmental toxic chemical pollutant that can be absorbed and cause adverse health effects on susceptible living organisms. Children's neurodevelopment can be affected by lead contribution even at low levels of exposure. In Uruguay, this environmental problem became of public concern in 2001. Lead in whole blood (B-Pb, BLL) is the internationally recommended biomarker for lead screening, biomonitoring and diagnostic purposes. Uruguayan human populations (infants, children, adults, workers) lead studies were conducted to show the incidence of different variables on B-Pb. Then, health benefits of medical intervention, nutrition, regulations and environmental education were demonstrated by a statistically significant decrease of their B-Pb. Biomarkers for other metals (arsenic, zinc, mercury, chromium, cadmium) used in health impacts assessment studies, and in ongoing projects in Uruguay, are also described to show the relevance of this practice for the consolidation of the Ecohealth approach at a local level.

P2.41: Assessing saliva as a biomarker of manganese exposure in children exposed through well-water

Ruth Ntihakose, Université de Moncton, Canada; Céline Surette, Université de Moncton; Delphine Foucher, Université de Moncton; Maryse Bouchard, Université de Montréal

Several regions in Canada and elsewhere around the world have naturally high concentrations of manganese (Mn) in groundwater. Recent studies have shown an association between Mn in drinking water and neurotoxic effects on children at levels much lower than the World Health Organization's guideline (0.4 mg/L) suggesting that the latter might not be sufficiently protective. However, currently available scientific data are insufficient to develop a health-based guideline for Mn in drinking water. One of the main goals of our study is to assess saliva as a biomarker of Mn exposure from well-water for children 6 to 12 years old. With the collaboration of local schools and municipalities, we have assembled a group of 280 voluntary children living in New Brunswick where more than 60% of the population are drinking well-water. Information about water intake was collected by administering questionnaires. In parallel, saliva and sources of drinking water were sampled and analysed for Mn concentration. Water samples collected in the households showed a gradient of Mn levels ranging up to 0.7 mg/L. Approximately 23% of the children studied were exposed to drinking water exceeding the recommended organoleptic standard of 0.05 mg/L established in New Brunswick. Four percent among them were exposed to water with Mn levels above the WHO guideline. In this work, the potential for saliva as a Mn exposure biomarker was assessed by evaluating the relationship between Mn concentration in drinking water, Mn intake, and Mn concentrations in saliva. Based on our results, we will work with the New Brunswick government to improve health and well-being of children relative to their exposure to Mn through drinking water, and consequently

bring risk assessors a step forward to establish a health-based standard guideline for Mn in drinking water in Canada.

P2.42: Using Blood Spots to Assess Heavy Metal Exposure in Humans and Wildlife

Marie Perkins, McGill University, Canada; Niladri Basu, McGill University

Evaluating heavy metal contaminant exposure can be an important metric for assessing human, wildlife, and ecosystem health. Blood samples can provide a good measure of recent dietary exposure to heavy metals. However, current blood collection and storage methods can be difficult and costly, particularly at resource-limited locations. Collecting blood on specialized filter paper (blood spots) is an innovative method for sampling human and wildlife blood to evaluate contaminant exposure. The development of a common sampling method for humans and wildlife provides a broad application for assessing ecosystem health. The use of blood spots may reduce many of the current challenges faced by environmental contaminant researchers. They offer an easy, widely accessible, and cost-effective method for blood collection and storage allowing researchers to examine contaminant exposure at remote, resource-limited locations that have been unstudied. The use of blood spots requires minimal training therefore sample collection can be undertaken by researchers with varying skill sets, from community members to highly trained biologists. While previous studies have used blood spots to evaluate heavy metal exposure in newborns and more recently in birds, no standardized method of analysis has been determined. This research tests a variety of analysis methods to determine the ease and accuracy of using blood spots to assess heavy metal exposure in humans and wildlife. Analysis methods include multiple extraction techniques coupled with inductively coupled plasma mass spectrometry (ICP-MS), laser ablation ICP-MS, solid sample-graphic furnace atomic absorption spectrometry, and direct mercury analyzer (DMA). Method development will use human and chicken blood spots, the most accurate methods will then be applied to other species. Preliminary results for chicken blood spots indicate that analyzing entire blood spots using a DMA provides an accurate measure of blood mercury concentrations, 100+/-11.0% recovery. Analyzing blood spot subsamples resulted in a lower recovery rate of 72+/-7.8%.

P2.43: Risk of mercury exposure and benefits of selenium intake among inhabitants of a whaling town in Japan

Mineshi Sakamoto, National Institute for Minamata Disease, Japan; Masumi Marumoto, National Institute for Minamata Disease; Toshihide Iwasaki, National Research Institute of Fisheries Science; Genta Yasunaga, The Institute of Cetacean Research; Yoshihiro Fujise, The Institute of Cetacean Research; Masaaki Nakamura, National Institute for Minamata Disease; Laurie H.M. Chan, University of Ottawa

Mercury (Hg) in whales has been analyzed as total mercury (T-Hg), methylmercury (MeHg) and inorganic mercury (I-Hg). However, most of the Hg in tooth-whale can exist as mercury selenide (HgSe) which is inert and hardly absorbed from the intestine. In this study, we conduct an analysis of mercury speciation and selenium (Se), paying special attention to the molar ratio of I-Hg and Se, in 4 species of tooth-whales, such as striped dolphin (n 29), short-finned pilot whale (n 31), risso's dolphin (n 31), and bottlenose dolphin (n 30), which were caught in the sea near a whaling town in Japan. Hg and Se in the bottlenose dolphin were also analyzed by electron probe micro-analyzer (EPMA) to assess their distributions. Nakamura et al. reported that the negative effect of mercury was not observed in this population. Selenium is known to prevent the toxicity of MeHg in animal experiments. Therefore, we also analyzed the Hg and Se concentrations in the blood of the inhabitants (n 149) of a whaling town in Japan, to determine their associations in their blood. In 4 species of tooth-whales, MeHg concentrations were positively associated with T-Hg concentrations. However, the MeHg concentrations appeared to reach a plateau beyond which the percentage of MeHg dramatically decreased with further increase

in T-Hg concentrations. In all species of tooth-whales, Se/I-Hg molar ratio decreased with the increase in T-Hg concentrations, and eventually reached a constant ratio of 1 (Se I-Hg 1 1). EPMA showed that Hg and Se in the bottlenose dolphin existed in the same place as particles in the muscle cells close to the endomysium. These results indicate that tooth whales, especially bottlenose dolphin, accumulate a high Hg concentration in the red meat. However, they may have high demethylation ability, and the demethylated inorganic Hg may persist as an

P2.44: Hydroelectric development in vulnerable ecosystems and biomonitoring of human exposure to toxic risks: the case of mercury exposure in the JIRAU Reservoir, Brazilian Amazon

Carlos José Sousa Passos, University of Brasilia, Brazil; Luiz Fabricio Zara, University of Brasilia; Clarisse Vasconcelos Serra, VENTURO Environmental Consultancy; Valeria Vasconcelos Serra, VENTURO Environmental Consultancy; Vera Lucia Damasio Simoes, VENTURO Environmental Consultancy; Tania Machado da Silva, VENTURO Environmental Consultancy

Following different strategies to natural resources use according to diverse economic cycles over the last decades, the Brazilian Amazon currently faces the construction of huge hydroelectric dams on its vulnerable ecosystems, in order to support the Brazilian socioeconomic growth as an emergent global economy. In this context, not only the issue of its vulnerable ecosystems but also the vulnerability of its traditional populations (e.g., indigenous and riparian fish-eating communities) become a central matter, and challenges both the educational, environmental and health sectors to protect such ecosystems and their populations against major damages. Based on interdisciplinary and participatory approaches, researchers from three Brazilian universities teamed up in order to plan and conduct a huge monitoring program involving both biogeochemical and human aspects of mercury (Hg) environmental contamination, and exposure of riparian populations living in the area of the JIRAU Dam, Madeira River Basin (Western Brazilian Amazon). So far, results obtained for Hg concentrations in several fish species consumed by riparian communities indicate values within averages recorded in the Amazon as a whole, where Hg levels in carnivorous species are around 5-fold higher than non-carnivorous ones. With the exception of 1 species - *Hoplias malabaricus* – all the others are within allowed limits by Brazilian regulatory agencies. Human exposure has remained low, although such exposure degree is possibly due to a progressive decrease of fish consumption, mostly by those villagers who have been resettled in a small town so that the dam can be built. This biomonitoring program illustrates recent important advances in Brazilian development policies, to include ecosystem and human health aspects while establishing huge infrastructure projects in the Amazon and elsewhere.

P2.45: Socio-environmental characterization of “La Perseverancia” landfill in Cuautla, Morelos, Mexico

Horacio Riojas Rodriguez, National Institute of Public Health, Mexico; Margarita Sánchez Arias, Instituto Nacional de Salud Pública (INSP); Maria Alejandra Terrazas-Meraz, Universidad Autónoma del Estado de Morelos; Minerva Catalán-Vázquez, National Institute of Respiratory Diseases; Irma Aurora Rosas Pérez, Universidad Nacional Autónoma de México; Cristina Siebe-Grabach, Universidad Nacional Autónoma de México; Ana Cecilia Espinosa-García, Universidad Nacional Autónoma de México

Background. Inadequate management of solid waste in La Perseverancia landfill has caused great concern in the surrounding communities. Objective. To characterize biological, chemical and physicochemical agents from the landfill, as well as the socio-historic factors that allow us to understand the socio-environmental problem. Methods. This study was conducted with an ecosystem approach. The historical and social characterization was performed by interviews with different social actors and review of secondary sources. A meteorological station was installed to verify the wind patterns. We assessed viable (bacteria, fungi) and no viable (PM2.5, PM10, beta-glucan, endotoxin) particles in air physicochemical parameters in soil and water microbiological indicators in

leachate and heavy metals in all matrices. Results. The social mobilization of the affected social actors, the publication of the NOM-083-SEMARNAT-2003 and the management transfer of the solid waste to a private company were key factors to be more attached to regulations. The average daily concentrations of PM2.5 and PM10 were 31.68 mcg/m³ (14.25-46.49) and 58.34 mcg/m³ (8.47-297.84), respectively; the concentrations of beta-glucan (n=17) and endotoxin (n=34) were 0.61ng/m³ (0.09-1.43) and 3.37EU/m³ (0.27-32.01), respectively. We found Mn and Ni levels over the recommended limit values, gram negative bacteria *Pseudomona stutzeri* and *Proteus sp.* in air. We detected in 62% of the samples of leachate gram negative bacteria and in 38% gram positive, identifying primarily *Pseudomonas sp.*, *Proteus sp.*, and *Escherichia coli*. The mean of electric conductivity in leachate was 21.81mS/cm two sampling points in water and ground had high values. Conclusions. We found Mn and Ni above the recommended inhalation reference dose PM10 and endotoxins suggested a risk for the landfill workers and possible risk for people living around the site. The socio-environmental history of the site is an example of an unsolved problem of management and disposal of municipal solid waste in Mexico.

P2.46: Environmental Risk from the Perspective of Workers in a Landfill, in Cuautla, Morelos, Mexico

Minerva Catalan-Vazquez, Instituto Nacional de Enfermedades Respiratorias, Mexico; Horacio Riojas-Rodríguez, Instituto Nacional de Salud Pública; Margarita Sánchez-Arias, Instituto Nacional de Salud Pública;

Background: Solid waste management in La Perseverancia landfill has been a cause for social concern. Therefore, the National Institute of Public Health initiated a study using an ecosystemic approach to evaluate the risks to workers at the site, including their perceptions, which play a significant role in the public response to risk.

Objective: To identify the health risk perception among landfill workers associated with their work environment.

Materials and Methods. A qualitative design was used which included in-depth interviews of eight workers at the site, a review of secondary sources and non-participant observation. A thematic analysis was performed with the help of the Atlas-ti 5.2 program. Results. Six of the workers were migrants from other states. They referred to their reasons for entering this work as: lack of employment, not requiring official documentation, schooling and an age limit. The workers indicated different risks. Those they feared most were lethal accidents that can be caused by trucks, trailers and/or compactors, considering the experiences they have had at the site. They also mention lesser risks such as being pricked by needles, cut by glass, dust and contact with leachate used by the company to dampen the garbage during the compacting process. Most workers no longer perceived the strong and penetrating odors from the garbage. The benefits that they perceived include economic income from selling the remains and collecting food, clothes and shoes. They indicated that the consumption of the food they find there has enabled them to develop a state of immunity. Conclusions. The landfill workers report great risks involved in their work activity and behaviors that may have a negative impact on their health aspects that should be considered in future management strategies and the risk communication. very imp

P2.47: Lung function decline in rural women using fuel wood for cooking

Astrid Schilmann, Instituto Nacional de Salud Pública, Mexico; Horacio Riojas Rodriguez, National Institute of Public Health; Rogelio Perez Padilla, Instituto Nacional de Enfermedades Respiratorias; Isabelle Romieu, International Agency for Cancer Research

Biomass smoke exposure has been recognized as a risk factor for the development of chronic obstructive pulmonary disease (COPD) in women in developing countries. The rate (mL/year) of forced expiratory volume in 1 second (FEV1) decline is a marker of COPD risk. We performed a longitudinal assessment of the lung function decline in women after eight years of the introduction of efficient biomass stoves Patsari in highland Michoacán, Mexico. Following the same standardized procedure as in the previous study, spirometry was conducted using

portable battery-operated ultrasonic spirometer in accordance with the ATS/ERS recommendations. The group slope for a sample of 84 women from two rural communities was -30 mL/year (reference decline). Women mainly using an open fire show a trend to excessive lung function decline (-41 mL/year) compared to those women mainly using the efficient stove, adjusted for age, height, BMI. These results suggest the mid-term positive effect of the intervention reducing the COPD risk when the exposure is lowered by using the efficient stoves and displacing the polluting open fires.

P2.48: Assessing the public health impacts of urban air pollution in Mexico

José Luis Texcalac-Sangrador, National Institute of Public Health, Mexico; Horacio Riojas Rodriguez, National Institute of Public Health; Karla Cervantes-Martínez, National Institute of Public Health; Magali Hurtado, National Institute of Public Health; Luz Angélica De La Sierra-Vega, National Institute of Public Health

Background. Urban air quality represents a major public health burden and is a long-standing concern to Mexican citizens. Several health impact assessments (HIA) have already reported the major public health burden of particulate matter (PM10) and ozone around the world. HIA aims to assess the potential impacts of a proposal and make recommendations to improve the potential health outcomes and minimize inequalities. Current Mexican air quality standards for PM10 and ozone are still above the World Health Organization Air Quality Guidelines (WHO-AQG) that aim to protect public health. **Aim.** Provide a first national estimate of the potential health and monetary benefits of reducing air quality standards (PM10 and ozone) in Mexico. **Methods.** The health benefits of changes in air pollution are expressed as avoidable mortality using 2010 data. We considered three scenarios for PM10: a decrease of the air pollutant levels by a short term fixed amount, intermediate decrease and finally adjust according to the WHO-AQG. For ozone, only two scenarios were considered. Monetary benefits were estimated using a Value of a Statistical Life approach. **Results.** Considering the three scenarios of reduction of current annual levels of PM10, about 3,732 (3,356-3,826), 4,968 (4,468-5,092) and 5,582 (5,021-5,721) deaths per year could have been avoided, which means approximately 6, 8 and 9 billion of USD, respectively. In case of ozone, considering both scenarios, about 3,049 (2,500-3,595) and 4,398 (3,609-5,182) deaths per year could have been avoided, which means approximately 5 and 7 billion of USD, respectively. **Conclusions:** Our study provided useful information to policy makers and confirms that reducing urban air pollution would result in significant health and monetary gains to Mexico. Our results are particularly relevant now when the current Mexican legislation is being revised for an update in 2013 and 2014.

P2.49: The Japanese Society for Ecology and Health: J-EcoHealth

Moji Kazuhiko, Nagasaki University School of International Health Development, Japan

No healthy population exists without healthy environment - this is the heart of the "Ecohealth". As both population and environment have been and will be changing, Ecohealth is a dynamic state. Therefore, we are interested in elucidating the impact of the incessant changes brought by both nature and human activities on population health. In December 2013, the Japanese Society for Ecology and Health (J-Ecohealth) was established to provide a platform for discussion about these issues. This poster introduces J-Ecohealth, the thinking that led to its establishment, its membership and plans for the near future.

P2.50: Bridging the divide: novel One Health solutions to faunal introductions?

Charles Rupprecht, Ross University School of Veterinary Medicine, St. Kitts and Nevis; Sean Callanan, Ross University School of Veterinary Medicine; Arve Lee Willingham, Ross University School of Veterinary Medicine

Diverse eco-health topics span the gamut from climate change to emerging infectious diseases. Seemingly small, historical effects of globalization may be overlooked compared to more recent developments. Two illustrations from the Caribbean elucidate classical underpinnings to modern societal challenges, due to the introduction of non-native fauna. In the lesser Antilles, vervet monkeys were brought as pets from West Africa during the 17th century. Several escaped, establishing founder colonies. Today, numbers are estimated in the tens of thousands. Bites, crop damage, depredation upon avian populations, and disease persistence are cited as concerns by residents. Others view monkeys as beneficial. With the reduction in cotton and sugar cane production, many Caribbean islands are dependent upon the service sector, touting the draw of non-human primates for tourism. Additionally, monkeys are used for biomedical research, much to the concern of those opposed to such utilization. In contrast, the small Indian mongoose was introduced not for companionship or accidentally, but intentionally, for rodent control in sugar cane fields. Not only was this well-intentioned plan a failure, but these carnivores had a major impact upon native fauna, such as ground-nesting parrots and marine turtles. Moreover, on at least 4 islands, rabies virus was introduced, and mongoose serve as major reservoirs. Mongoose distribution throughout the region acts as a threat for disease introduction to otherwise rabies-free localities. Both cases demonstrate the unpredictable consequences of faunal exchanges to new communities, particularly among insular ecosystems. As elimination may not prove feasible, novel management may be preferable. In place of population reduction, other strategies are required to resolve such effects of centuries-old anthropogenic action. In addition to bio-technological considerations such as immuno-contraception or oral vaccination, greater public engagement and education are necessary for environmentally sound, cost effective, trans-disciplinary, and sustainable solutions to both challenges.

P2.51: Macrohabitat factors influencing the prevalence of three tick-borne pathogens

Christine Zolnik, Fordham University, United States; Richard C. Falco, New York State Department of Health; Thomas J. Daniels, Fordham University

Distribution and prevalence of vector-borne pathogens are dependent on the complex interactions between pathogens, vectors, reservoirs, and environmental conditions. Studies have investigated habitat suitability for the blacklegged tick (*Ixodes scapularis*), an important disease vector in the United States. However, studies are limited on macrohabitat factors (often determined by reservoir distribution) that influence pathogen prevalence within this tick vector. In the northeastern United States, where the highest densities of the blacklegged tick occur, the prevalence of each of three tick-borne pathogens (*Borrelia burgdorferi*, *Babesia microti*, and *Anaplasma phagocytophilum*) varies considerably. This suggests that different drivers may be responsible for transmission and maintenance of these pathogens within tick populations. The purpose of this study is to identify macrohabitat features that influence the prevalence of each of three pathogens vectored by the blacklegged tick. In June 2011, we collected 50-200 nymphal blacklegged ticks from fourteen forested sites along a 170 km urban-to-rural gradient of the northeastern United States. This region is endemic for blacklegged ticks and has varying prevalences of each pathogen. Environmental variables (e.g., climatic, geological, anthropogenic, and biological) likely to influence macrohabitat suitability for each pathogen are being overlaid in ArcGIS. Infection prevalence with *B. burgdorferi* ranged from 3-32% (mean=13.4, s.d.=8.8) across sites and testing for *B. microti* and *A. phagocytophilum* is currently being completed. Results will clarify macrohabitat features correlated with prevalence of each of three tick-borne pathogens. This will allow us to better understand factors that influence the distribution of each pathogen within tick populations and, ultimately, disease risk to humans.

P2.52: Understanding factors that contribute to resilience and sustainability within communities of practice: a conceptual framework

Kaileah McKellar, University of Toronto, Canada; Rhonda Cockerill, Institute of Health Policy Management and Evaluation, University of Toronto; Donald C Cole, DLSPH, EkoSanté

Communities of Practice (CoPs) have been developed in multiple sectors including health, education, and business. Communities of practice in ecosystem approaches to health (CoPEHs) grew from a desire for researchers and practitioners to share knowledge and experience. CoPEHs provide opportunities to define and advance the field of EcoHealth through knowledge creation, enhanced learning, identity building, and professional development. However, there is a lack of empirical evidence on how they work or the factors that drive their resilience and sustainability, important for most CoPs. In a systematic scoping review of CoPs in health, environmental, education, business, and interdisciplinary fields, we documented a range of ways of understanding resilience and sustainability of CoPs in different contexts. From these we developed a conceptual framework to illustrate how member, community and external factors can lead to resilience and sustainability of CoPEHs. Further, as resilience and sustainability are action areas of CoPEH, their potential relationships to long-term outcomes, such as social and environmental change, are also set out. The framework can be used to guide questions such as ‘do member level outcomes have a greater influence on the sustainability of a network than community level outcomes or vice versa?’. Our presentation will outline the state of the literature and highlight key gaps in evidence that can be addressed or guided by the conceptual framework. It will conclude with an approach to applying the framework in an evaluation of CoPEHs as part of the author’s dissertation work.

P2.53: ‘My Word:’ Storytelling and Digital Media Lab: The Evolution of an Inuit-Owned Digital Media and Research Organization

Inez Shiwak, Rigolet Inuit Community Government, Canada

Canada’s polar regions are already experiencing rapid biophysical and socio-cultural transformations from climatic and environmental change. These alterations in weather, temperature, snow and ice patterns, and wildlife and vegetation are impacting Canada’s Inuit populations, and negatively impacting their abilities to hunt, fish, forage, trap, and travel on the land. These climatic and environmental changes are also negatively affecting physical, mental, and emotional health and well-being, as land-based lifestyles and socio-cultural structures are also being disrupted. Inuit communities have been subject to much climate-related research in the past decade, and there is wide recognition that this research needs to be community-driven, community-directed, and participatory, ensuring that Inuit are leading the process and enhancing and expanding community research capacities. Recognizing this dual need for locally-appropriate and culturally-relevant adaptation strategies and the development of research capacities in the community, in 2009 the Rigolet Inuit Government in Rigolet, Nunatsiavut, Labrador undertook an innovative plan to develop the first Inuit-run centre dedicated to digital media and research. Since its inception, the ‘My Word’: Storytelling and Digital Media Lab has developed expertise in numerous areas: facilitating digital storytelling, PhotoVoice, and participatory video workshops; designing and developing research plans; conducting interviews and surveys; filming, editing, and producing videos; consulting with multiple stakeholders for research and adaptation goals and strategies; disseminating information through print and digital media; and presenting at national and international conferences. The ‘My Word’ Lab has also developed particular research capacities for climate-health research and health adaptation strategies. This poster will explain the evolution of the ‘My Word’: Storytelling and Digital Media Lab, and discuss the opportunities and challenges in setting up a research and capacity-development organization such as this. Details will also be shared about the specific services offered by the ‘My Word’ Lab, and the future directions and visions for the organization.

P2.55: Drivers and outcomes of change in urban environments: A case study of disjunction between theory, evidence and practice

Mardie Townsend, Deakin University, Australia; Catherin Bull, University of Melbourne; Ian Shears, City of Melbourne

Theories about the value of healthy environments abound and are supported by a growing body of research (e.g. Bedimo-Rung, Mowen & Cohen 2005; Chivian & Bernstein 2008; de Vries et al. 2013; Maas et al. 2006; Matsuoka & Kaplan 2008; Sugiyama et al. 2010; Ward-Thompson & Aspinall 2011). At the same time, there is a growing recognition of the urban planning implications of this evidence (e.g. Barton 2005; Crawford 2010; Northridge & Freeman 2011). But how well do these theories and this growing knowledge base stand up to the real-world challenges of decision-making in our urban environments? This paper considers the current case of Royal Park, an expansive historic park in inner urban Melbourne (a rapidly expanding city), in an area where the focus at a policy level is on urban intensification and renewal. At Royal Park the possibilities for broader efficiencies in the urban system -- in this case the completion of a ring-road system where the final connector route most logically passes through the Park -- are pitted against its value as a source of recreational, social, cultural and environmental benefit for the immediate locale and the city. As a lesson for contemporary city-making internationally, this case tracks the process by which such competing values were articulated and prioritised and how they fared in the real-world situation.

P2.56: Environmental Sensitivities: Education on an emerging disability

Lise Parent, Télé-université, Cinbiose, Réseau des femmes en environnement, Canada; Rachel Cox, UQAM; Marie Eve Brodeur, UQAM; Rohini Peris, ASEQ-EHAQ; Michel Gaudet, ASEQ-EHAQ; Claire Vanier, UQAM

Environmental sensitivities are an emerging illness, little known to the general public and even to health professionals. People suffering from this disease are poorly equipped to identify the source of their symptoms and subsequently it is very difficult to get the support they need to manage their health. On a social level, people often face a lack of understanding and compassion in workplace, with family, friends and their community. This non-recognition adds to the suffering of these people and contributes to their isolation and exclusion. At present, the only way to improve the health of people with environmental sensitivities is avoidance of agents that trigger symptoms, and having a healthy lifestyle. This means that these people must be able to identify the triggers of their illness in order to avoid being exposed and to make the best possible choices relative to every aspect of their daily lives. This is an environmentally linked disease that affects more than 3% of the Canadian population. Therefore products, services and resources should be made available to the general public to help reduce the exposure of individuals who suffer from environmental sensitivities. In addition, for prevention and best management, it is important to disseminate information on this illness. In the fall of 2010, the Environmental Health Association of Quebec (AEHQ-EHAQ), a charitable non-profit organization that assists people afflicted by this illness, approached the Service aux collectivités (Community services) at the University of Quebec at Montreal (UQAM), in order to access the Faculty resources necessary to develop training sessions on environmental sensitivities. We will examine the impact of this new network of trainers on recognition of the illness.

P2.57: Connecting the Health, Economic and Ecological Dots: Effects of Community Based Natural Resource Management on Household Welfare in Namibia

Brianne Riehl, University of British Columbia, Canada; Hisham Zerriffi, Liu Institute for Global Issues; Robin Naidoo, World Wildlife Fund

Biodiversity conservation, as an environmental goal, is increasingly understood to be intricately connected to the socioeconomic wellbeing of local communities. Namibia is an African country rich in biodiversity and endemism, with a largely rural population dependent on natural resources for their livelihood. The development of a widespread community-based natural resource management (CBNRM) program makes it an ideal location to analyze the connection between conservation and socioeconomic wellbeing of local communities. Namibia's CBNRM program involves the formation of communal conservancies within rural communities and is considered to be a success on both ecological and economic fronts. In order to broaden the understanding of the program's impact to include social factors, we have conducted a comparative analysis to determine the effects of this program on household health outcomes. Data from two rounds of the Namibia Demographic and Health Surveys (2000 and 2006/07) and quasi-experimental statistical methods were used to evaluate changes in various health outcomes of those living in conservancies, relative to non-conservancy comparison groups. Preliminary results indicate differences between the groups along a variety of socio-economic indicators but with evidence of convergence between the groups over time. Further results of a regression analysis will be presented, depicting relationships between various health outcomes and participation in conservancy programs.