Communauté de pratique canadienne en approches écosystémiques de la santé

CoPEH - Canada

Canadian community of practice in ecosystem approaches to health

ECOSYSTEM APPROACHES TO HEALTH TEACHING MANUAL

Edited by:

McCullagh S, Hunter B, Houle K, Massey C, Waltner-Toews D, Lemire M, Saint-Charles J, Surette C, Webb J, Beck L, Parkes M, Woollard R, Berbés-Blázquez M, Feagan M, Halpenny C, Harper S, Oestreicher S, Morrison, K

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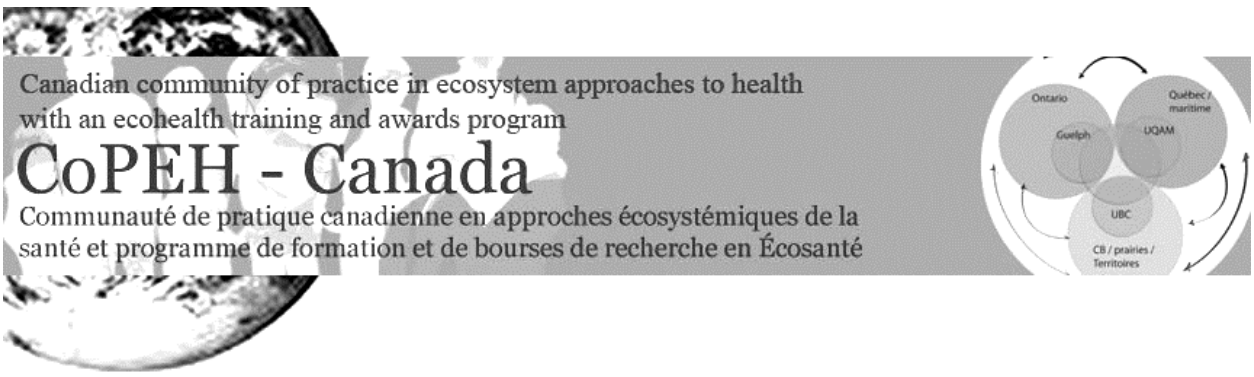

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BRUCE HUNTER, AUGUST 3, 1950 – OCTOBER 19, 2011

For more than two decades Bruce Hunter championed a vision of the world that brought together the health of wildlife, farm animals, people, and the ecosystems on which we depend. It was not surprising, then, that Bruce was one of the pivotal founders of the Community of Practice for Ecosystem Approaches to Health in Canada (www.Copeh-Canada.org). While involved in all aspects of the community, his great passion was teaching. Without Bruce's humane, intelligent, easy-going, practical, humorous, visionary, stubborn, dogged badgering, this training manual would not have come into being. We are all grateful, and miss him dearly.

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The development of the teaching manual was a collaborative effort amongst several members of CoPEH-Canada in conversation with individuals from other CoPEHs and knowledge networks. The overall design of the manual was significantly influenced by a series of workshops held between January 2011 and November 2012. During these workshops participants generated ideas, troubleshot approaches, provided feedback on the general aims and goals of the teaching manual, as well as worked together to contribute to the development of content for specific modules, and/or provide feedback on existing content. Since so many people have contributed to the development of this work in many different kinds of ways, below we describe some of the roles.

Editors – The manual editors are those people who directly influenced decision-making about the structure and content of modules, as well as content inclusion and exclusion by participating in teaching manual workshops, conference calls, and providing feedback and advice to the project facilitator.

Lead Author – This is the first name listed at the beginning of each module. The lead author is the person who coordinated the development of the module, wrote most of the draft, made decisions about key sections and components, and incorporated feedback and suggestions.

Authors – These are listed at the beginning of each module, following the lead author. Authors worked as part of the module working group, wrote sections, developed activities and provided substantial contributions to the development of the draft.

Reviewers – These are listed at the beginning of each module, and are people who provided detailed feedback to the module leads on how to improve the module.

Contributors – These are listed below and are people who were part of conversations surrounding the teaching manual during some stage of its development. They reviewed modules and/or were part of a working group during one of the workshops to develop content and/or provide feedback and suggestions on the development of the module.

- Silvia Alonso (CoPEH-Canda Alumni 2010), Complexity Module Review

- Martin Bunch (CoPEH-Canada, NESH), June 2011 Workshop, Contributor to the Complexity Module
- Ben Brisbois (CoPEH-Canada Alumni 2008), June 2011 Workshop and Contributor to the Participation and Research Module and provided feedback on the Gender Module
- Tim Gray (CoPEH-Canda Alumni 2010), June 2011 Workshop and Contributor to the Participation and Research Module
- Renee Jackson (CoPEH-Canada Alumni 2010), June 2011 Workshop
- Donna Mergler (CoPEH-Canada, CoPEH-LAC), November 2011 Workshop and Contributions to the Health Module
- Vi Nguyen (CoPEH-Canada Alumni 2009), June 2011 Workshop, Reviewed, Using and Developing a Case Study Review
- Carlos Passos (CoPEH-LAC), June 2011 and November 2011 Workshop
- Emily Root (CoPEH-Canada Alumni 2010), June 2011 Workshop, Contributed to the Participation and Research Module
- Evan Schneider (Ecohealth Club, University of Guelph), January 2011 Workshop
- Maude St-Cyr Bouchard (CoPEH-Canada), core organizer of the November 2011 Workshop and participant in the January 2011 and May 2011 Workshops
- Cathy Vaillancourt (CoPEH-Canada), Contributed to the Gender Module
- Michelle Villeneuve (CoPEH-Canada Alumni 2009), June 2011 Workshop and Contributor to the Complexity Module

The Guelph Node of CoPEH-Canada (Hunter, Houle, Massey, McCullagh, Morrison, and Waltner-Toews) initially proposed the project and applied for and administered the grants that enabled the teaching manual to be developed.

The content and materials in this teaching manual grew out of four years of collaborative teaching of a graduate short course in ecosystem approaches to health by the CoPEH-Canada team from 2008 – 2011 as part of an IDRC funded project to inaugurate the Canadian Community of Practice in Ecosystem Approaches to Health. The initial teaching development team was:

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HEALTH - FROM MULTIPLE PERSPECTIVES TO AN ECOSYSTEM APPROACH

Authors: Dr. Jena Webb, Dr. Céline Surette, Dr. Mélanie Lemire

Reviewed by: Carli Halpenny

Contributions: Dr. Bruce Hunter, Suzanne McCullagh and Marta Berbés-Blázquez developed the negotiating health activity during the May 2011 Teaching Manual Workshop.

CONNECTS WITH:
Complexity – Gender – Participation and Research

The authors would like to thank Donna Mergler for the development of Figures 1-6 and Figure 9. Jena Webb would like to thank Enrique Cifuentes for insights that he provided which helped to develop the use of a conceptual framework in indentifying types of information and modes of inquiry.

MODULE INTRODUCTION

DESCRIPTION:

In the context of ecosystem approaches to health, stepping back and thinking critically about health is a part of the process. Health can be defined in various and contrasting ways depending on one's standpoint, perspective or values. For example, public health authorities might define health differently than ecologists working in aquatic ecosystems or Indigenous communities in Northern Canada or representatives of petroleum companies. When differing worldviews come together, the process of negotiating health is complex. Nonetheless, it is also essential for understanding the issues and proposing actions and policies that are equitable, inclusive and sustainable. The process of negotiating and defining health helps frame health issues within current

cultural, economic and political contexts, and within our own research or practice. It also enables us to choose the methodology and tools best suited to measure and/or define health in that context. It is also necessary to understand the structures that exist and look at them from a critical perspective to see how they hinder or promote health.

DIRECTIONS:

This module contains two sections, which can be modified as necessary. The first session should be presented early in the course, as it introduces key concepts that are revisited in the other modules. Further, the "defining health" activity in section one is a good exercise to build a sense of community among participants of the course. If this will not be the first session, sessions on scale, complexity, or uncertainty could precede it foreshadowing towards health. The concepts presented in this module can also be integrated into other learning modules as strategic 'Ah-ha!' moments throughout.

AIMS/GOALS:

- Think critically about multiple perspectives of health
- Experience health and the process of negotiation
- Learn how to frame health within an ecosystem perspective
- Explore ways of building and using a conceptual framework
- Think critically about the choice of appropriate indicators and methodologies to measure and/or describe health, and the limits of different tools

GUIDING QUESTIONS:

- What is health?
- How is health defined and negotiated?
- What is the overall picture of the individuals whose health is of concern?
- What are the best indicators to address the health issue?
- What is unique to measuring health using an ecosystem perspective?

WORKING TERMS:

Health, negotiation, multiple perspectives, spatial and temporal scales, health continuum, the pyramid of populations at risk, multiple health determinants, conceptual frameworks

SECTION 1 – EXPERIENCING AND NEGOTIATING HEALTH

DESCRIPTION:

Health is a concept that can be intensely personal. It makes reference to one's own worldview and life context. To get past the differences a common vision of the health problem and the ideal state of health, is needed. In this section, common definitions of human, animal and ecosystem health are provided. There is, however, no consensus on health definitions and a working definition must be negotiated by each research project or intervention in its particular context. Following the definitions, some strategies and tactics for negotiating visions and definitions of health are presented. Creative tension is purposely generated to help students understand how health is integrated into real world situations.

LEARNING OBJECTIVES:

- Deepen our understanding of what it means "to experience" in general and of experiencing health in particular, through a reflection on health and experiencing it.
- Develop an appreciation of humility, through the sharing of experiences.
- Explore the definitions of health by negotiating from different perspectives
- Practice the process of negotiating a definition of health.

KEY QUESTIONS:

- What is experience, and how does one experience health?
- Is it possible to arrive at one common definition of health?
- How do you negotiate a health? (biomedical, socio-economic, etc.)
- In what ways is health a negotiable term?
- What are some of the processes by which we can negotiate health in our ecohealth work?

DISCUSSION QUESTIONS:

- Does how we define health make a difference to how we treat health? How we develop our research or intervention? How we approach our practice?
- Can the same definition of health lead to multiple approaches to dealing with health?
- Can certain definitions of health lead to erroneous choices in methodology with respect to health?
- How can we make links between the individual experience and equity and gender issues (socially defined identities)?
- Why are these valuable? Why is it important to foster sharing of one's values?
- What are you experiencing? What are you not experiencing?
- What are you capable of being aware or conscious of? What are you incapable of being aware of or conscious of?
- If the definition of health is always open to negotiation, how do we use it to inform our practice?

- How does the process of negotiating health affect the way YOU experience your own health?
- Is it necessary to reach a consensus on the definition of health?
- Does the definition of health change depending on the perspectives involved?
- How does the way we deal with or define human health issues affect animal and environmental health?

Reflective Prompts:

- What do you do when you are healthy?
- What is it like to be healthy?
- What do you do when you are sick?
- What is it like to be sick?
- How can illness be prevented?
- Does what makes you healthy also make others healthy? What about animal health or ecosystem health?

Key Content:

Defining Health

Health has a number of different definitions, and the concept of health challenges organizations that take up its cause. Classic definitions of health include those of the World Health Organization's (WHO) Consitution: "...complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1967) and the Alma Ata Declaration: "The extent to which an individual or group is able, on the one hand, to realize aspirations and satisfy needs; and, on the other hand, to change or cope with the environment" (WHO, 1978). The latter definition makes reference to an individual's relationship with the environment. It does not, however, draw out the interdependence of the ecosystem's health, human health and animal health. Some groups have attempted to rewrite the standard WHO definition of health; others go into more detail in mission statements or other documentation. One Health, for example, is dedicated to fostering collaborations between physicians, veterinarians and environmental scientists. The American Veterinary Medical Association defines it as "the collaborative effort of multiple disciplines – working locally, nationally, and globally – to attain

> *"Health offers an approach to assessing the multi-faceted well-being of organisms, populations, communities and ecosystems. The combination of health with sustainability brings together the notion of a currently desirable state with that of longevity. In this, the less focused notions of what has been called sustainable development are made clear" (NESH, 2011).*

optimal health for people, animals and our environment". James Kay's Diamond Diagram highlights how the needs of ecosystems are linked to the needs and wants of society in the presence of policy makers and other stakeholders (Kay et al. 1999).

Less attention has been paid to defining and refining the definition of "animal health". Indeed, a study looking at how animal health is defined in veterinary texts found that most did not present a definition of health (Gunnarsson, 2006). While it was rare that an author referred solely to animal productivity, this would never be considered a pertinent category when referring to human health. Furthermore, the environment was rarely taken into consideration in these texts. When it was, it was often in reference to disease (not health) or a "failure to produce."

> *"Since the ecological system may be fundamentally altered by the time that scientists attempt to describe and quantify pathology, the etiology of the disease is lost and analysis is primarily forensic or retrospective diagnosis."*
> *(Schaeffer et al. 1988, p. 447)*

Attempts to define ecosystem health in modern science are much more recent. An early definition is the following: "an ecological system is healthy…if it is stable and sustainable— that is, if it is active and maintains its organization and autonomy over time and is resilient to stress" (Costanza et al. 1992, p. 9). Ecosystem health is routinely defined with regard to a few parameters (such as diversity or productivity) and assessment relates to populations rather than individuals. A true evaluation, however, would also examine the interrelationships between populations (Schaeffer et al. 1988). Further, the original state of many ecosystems is not known to science, although traditional ecological knowledge can sometimes be used to reconstruct how the ecosystem might have looked before perturbation (Houde, 2007). In addition, our tools are not sophisticated enough to allow us to accurately establish how healthy an ecosystem is (Vogt, 1997). These complications lead some scholars to wonder whether it is even useful to speak of ecosystem health (Vogt, 1997). Definitions of ecosystem health also make frequent reference to human health and policy making. Viewing ecosystems in terms of human health provides important opportunities for the integration of social and health sciences into environmental management (Rapport et al. 1998). Ecosystem health can be linked to the services that ecosystems provide human communities to sustain them (Rapport et al. 1998), resulting in the Millennium Ecosystem Assessment definition of ecosystem health as "the ability of an ecosystem within its surrounding landscape to continue to provide a particular set of services." (MA, 2003, p.69)

Health is Multiperspectival:

When a problem is being defined, multiple perspectives are brought to the table. Each individual, species, or ecosystem will have its own definition or requirements for health. In order to fully understand the health problem, all of these perspectives need to be acknowledged and explored. Module 6: Participation and Research elaborates on this theme. This exploration often highlights the need to look at health in terms of complex systems [See Module 3: Complexity]. Further, bringing in different perspectives on health can often highlight issues of gender [See Module 5: Gender], power and equity.

Two particular perspectives, "Western" and "traditional" views of health, often clash. On the one hand, Western science is rooted in a worldview which grew out of the dualism of Descartes. In this system there is mind and body, humans and nature; elements which as antitheses to one another. Humans can understand nature because they are separate from it. Following Descartes, Hume and Berkeley introduced the inductive method and modern science as we know it was born (Russell, 1961). The methods presuppose a reductionist view of nature – by reducing nature to its constituent parts, scientists could understand its internal workings (Suzuki and Knudston, 1992). The health sciences, particularly with respect to quantitative methods (see Appendix), have largely adhered to these principals.

Traditional views, on the other hand, often recognize the complexity of nature. They engage with local dynamics of an ecosystem to try to understand it as fully as possible, while retaining a certain awe of the enigmatic mysteries that nature offers us. Traditional Ecological Knowledge (TEK) is intrinsically ecosystemic and interdisciplinary. Both the scientific information and the methods used bear a striking resemblance to the ecosystem approaches to health. See the *Appendix* for an example of where differing definitions and a disregard for traditional knowledge led to a backlash.

There is, however, some convergence between "Western" science and "traditional" views. Einstein's Theory of Relativity shows that one can never know both the velocity and the position of an object at the same time, Heisenberg discredited Newtonian physics by showing that pausing nature to study it gives a false representation since nature is inherently dynamic, and Bohr demonstrated that the behaviour of subatomic particles can only ever be expressed in terms of probabilities. Further, systems thinking has revealed cases of synergy, where the properties of systems do not seem to equal the sum of their parts. Traditional science has been criticized as a "disconnected, inadequate description of the whole" (Suzuki and Knudston, 1992). Ecosystem approaches to health attempt to retain a holistic focus.

Negotiating Health:

Ecohealth research and practice focuses on process. There can be as many different definitions of health as there are stakeholders. Different perspectives shed light on divergent worldviews and positions that are likely to come to the fore later on. Going through the process of acknowledging different perspectives can also help determine the positions and perspectives that are absent from the discussion. As the number of stakeholders and the complexity of the issue increases, the process of negotiating a common vision of health and of the issue at hand also becomes more complex. Yet, at the same time, the process of negotiating health can help foster a sense of community and better frame health issues. It highlights areas of convergence that can be used to develop a common vision. The focus is on the process instead of the outcomes, allowing us to understand where people are coming from and why they have a particular worldview. It then becomes part of the process of deciding how to go forward with the limitations expressed.

Box 1.

Sample perspectives for negotiating health activity

- *Pregnant waitress from small community*
- *International forestry company CEO*
- *Master tradesperson from a small riverside community who works for the forestry company*
- *Retired public health nurse*
- *Female salmon and her offspring 7 generations from now*
- *Boreal forest in the Springtime*
- *Unborn moose*
- *Provincial Ministry of Health*
- *Birch tree seeds*
- *Child who plays in a creek*

ACTIVITIES:

Activity 1: Define and negotiate health

TOTAL TIME: at least 60 minutes
OBJECTIVE: To facilitate participant's experience of the multiple perspectives of health and live the process of negotiation through a role playing game. This is a good activity to have in the beginning of the course as it creates a sense of community and builds relationships between the participants. To foster this sense of community, all participants – students and instructors – should be actively engaged in this activity.

STEP 1: *Specific definitions of health* (15 minutes)

- Divide the participants into small groups (3 or 4 max).
- Give each group a different perspective or standpoint (which has been decided upon beforehand by the team; see Box 2 for some ideas).
- Ask each group to develop a working definition of health that considers the imposed perspective.

Note:

- the diversity of perspective is important for the negotiation process in step 2;
- it is important to include standpoints from the non-human world;
- include time and scale dimensions.

STEP 2: *Negotiating health* (at least 20 minutes – give more time if you can. This round takes more time than the first step as this is where the real process of negotiation begins)

- Reorganize the groups to make up to 5 groups where the individuals from each group in step one are spread out.
- Ask the participants to present the definition that emerged in step 1 to their new group.
- Negotiate a new definition of health that takes into account the different perspectives at the table.

Note: *Each of the new groups doesn't necessarily have a representative of all the imposed perspectives of step 1. It may happen that some groups don't arrive at a consensus or a common definition in the time frame allowed.*

STEP 3: *Wrap-up discussion (30 minutes)*

- Bring the participants into plenary.
- Ask each group to state its definition of health. NOTE: *If a group hasn't arrived at a definition explore with them why and how this makes them* feel*. Probe into whether* words *were the hindrance and whether some other representation (image, sound, etc.) could better synthesize perspectives and experiences.*
- Extract commonalities and differences from the different definitions.
- See if the group can get the 5 definitions down to 3.
- Debrief the negotiation process. Some discussion questions could be:
    - How is "health" a negotiable term?
    - How did the negotiating process occur?
    - Are any of these definitions transdisciplinary?
    - What role does willingness play in negotiating a definition?

Note: *Be aware that there might be some frustrations at this point and be prepared to discuss and debrief this by looking at the process*

Note: *Definitions can be kept for other activities in the course. If they are put in a visible place, participants can go back to them as the course evolves. They can be a dynamic teaching tool. It is also a good idea to synthesize the process. Ask each group to bring up their hand written initial definition from step 1 and save the definitions produced in step 2. Create a document which shows the evolution of definitions through the three steps and provide this document to the group.*

- *This activity is designed as a good icebreaker and should be done at the beginning of the course.*

Activity 2: Reflection on our own definition of health

OBJECTIVE**:** To reflect on one's own way of experiencing and defining health.

DIRECTIONS: This activity can be part of a "reflective passport" and can be used as a transversal activity prompting reflections on the different fundamental concepts of ecohealth. The reflective passport is a journal where students can write their thoughts on the different concepts presented during the course and revisit them as they evolve during the course (See Module 5: Gender for an example of a reflective passport).

PRIOR TO THE COURSE: Ask students to write their own definition of health.

DURING THE COURSE: periodically (maybe 3 times during a 10 days course) ask students to go back to their definition of health and write their reflections/rewrite/adapt their definition. During sessions, field trips, and when debriefing health definitions, you can ask students how the definitions presented by groups, papers, or presentations resemble their own.

Note:

As an ecohealth researcher or practitioner, including one who is preparing a course on ecosystem approaches, it is important to reflect on our own worldviews, motivations and definitions of health and their limits. These essential reflections help to create the openness needed to deal with and appreciate the divergent worldviews that will be expressed by the different stakeholders involved in an issue or a course.

Activity 3: Mindfulness Meditation

10 minute presentation on the benefits of meditation (optional), 10 minutes of meditation and at least 30 minutes of discussion: The course itself can be a trying experience, with full schedules and constant contact with a new group of people. Ask students to reflect on how their health changes in these new circumstances, how they are "experiencing" health in the present. A mindfulness exercise can be carried out during class. Yale University has a research programme studying the impacts of mindfulness meditation and provides resources for carrying out meditation exercises. The first of the three audio exercises on their "resources" site (http://medicine.yale.edu/psychiatry/ytnc/care/resources.aspx) entitled "Body Scan Meditation" is an interesting exercise to bring peoples focus onto their own body and how it feels. Have people stay in their seats and close their eyes while you play the audio clip for them. Hold a discussion following the meditation, linking back to the concepts seen in the course and tying this personal "experience" of health into theory. Is it important to dedicate time to reflecting on health? To what extent is health an embodied experience? A theoretical concept? Does their own experience fit with the

definition of health that they wrote down before the course? Does it fit better with any of the definitions presented during the course? This exercise can be tied into a discussion about qualitative methods (see following section) as it is essentially a phenomenological approach to inquiry.

Note:

- *The mindfulness exercise should not be held at the beginning of a course.*
- *Meditation is a powerful experience. Be aware that some people may not be feeling themselves (or rather might be feeling much more themselves) after the practice and may need time to reflect privately before speaking. Allow people to not participate in the discussion and record their reflections in their passport instead. Do not ask people who have not volunteered to share their thoughts.*
- *If you are wary about introducing meditation in a course due to fear that sceptical students will find it esoteric, you can present the findings from new research about the health benefits of meditating (Brewer et al. 2011) before the meditation, bringing the exercise full circle.*

Activity 4: Analyzing the concept of health

TOTAL TIME: 60-75 minutes

OBJECTIVE: To reflect on common definitions of health and how much importance is given to critically thinking about defining health in science, policy and the media.

STEP 1: *Pre-readings*
Provide students with a variety of materials (research articles, government reports, newspaper clippings, organizational pamphlets, etc.) in which the word "HEALTH" is used. This material can be provided as course readings and the students can be asked to have read the material before arriving to save time for the following steps.

STEP 2: *Analysis (20-30 minutes)*
Ask the students (in groups or individually) to try to pull out the working definitions of health in each of these works (make sure they know that there may be more than one definition employed in each piece or that a definition might be difficult to tease out). They can highlight the definitions directly in the text or, if none can be found in the text, the assumptions behind the work can be turned into a definition and written on a separate piece of paper.

STEP 3: *Categorization (20-30 minutes)*
Have the students develop some categories to compare and contrast the various definitions.

STEP 4: *Wrap Up Discussion (15-20 minutes)*

What conclusions can they draw about the concept of health from this exercise? If the "negotiating health" activity was done, how are the definitions different from the ones developed by the group? Why? The categories developed in step 3 can be compared with the categories identified by Gunnarsson (2006) and described in the section on animal health above. Did different types of documents (scientific, media, governmental) define health differently? Did they treat the process of defining health the same?

SPECIFIC READING:

Brewer JA, Worhunsky PD, Gray JR, Tang YY, Weber J, Kober H (2011) Meditation experience is associated with differences in default mode network activity and connectivity. Proceedings of the National Academy of Sciences of the United States of America 108: 20254-20259

Costanza R, Norton BG, Haskell BD (1992) Ecosystem health: new goals for environmental management. Island Press. 269 pgs.

Gunnarsson S (2006) The conceptualisation of health and disease in veterinary medicine. Acta Vet Scand 48: 20

Houde N (2007) The six faces of traditional ecological knowledge: challenges and opportunities for Canadian co-management arrangements. Ecology and Society 12: 34

Kay JJ, Regier HA, Boyle M, Francis G (1999) An ecosystem approach for sustainability: addressing the challenge of complexity. Futures 31: 721-742

Millennium Ecosystem Assessment (MA) (2003) Ecosystems and Human Well-Being: A Framework for Assessment. Island Press.

NESH (2011) NESH Approach. Available: http://www.nesh.ca/index_files/Page488.htm [accessed December, 13, 2011]

O'Neil JD, Elias B, Yassi A (1997) Poisoned food: cultural resistance to the contaminants discourse in Nunavik. Arctic Anthropology 34: 29-40

Rapport DJ, Costanza R, and McMichael AJ (1998) Assessing ecosystem health. Trends in Ecology & Evolution 13: 397-402

Russell B (1961) History of Western Philosophy. London: Routledge.

Suzuki D and Knudston P (1992) Wisdom of the Elders: Honouring sacred native visions of nature. Toronto: Bantam Books

Vogt K (1997) Ecosystems: balancing science with management. New York: Springer, 470 p.

WHO (1967) The Constitution of the World Health Organisation. Geneva: WHO

WHO (1978) Declaration of Alma--Ata. International Conference on Primary Health Care, Alma--Ata, USSR, 6-- 12 September, 1978

SECTION 2 - FRAMING AND MEASURING HEALTH

DESCRIPTION:

This section explores some ideas about framing, measuring and describing health. The process of framing health in time, scale and along the health continuum will help students identify measurable variables that are indicative of the central processes influencing health within a negotiated definition. This ensures that identified variables address pertinent questions and take into account differences in temporal and spatial scales. Finally, we show how to use a conceptual framework to identify the types of information required and modes of inquiry for accessing this information.

LEARNING OBJECTIVES:

- To frame inquiry within a negotiated, multi-perspective definition of health.
- To create a conceptual framework to frame and identify key questions.
- To recognize how health determinants act at different temporal and spatial scales.
- To identify indicator variables which address the questions and consider temporal and spatial scales.
- To critically discuss how the choice of conceptual framework and indicators influence the measured or described Health of a system.

KEY QUESTIONS:

Framing health

- What factors influence the health context?
- How are the chosen concepts/populations/landscapes related or connected?
  - Directly, indirectly, feedbacks?
  - Do they operate on the same temporal and/or spatial scales?

Developing a conceptual framework

- What is a conceptual framework?
- What should be included in a conceptual framework and how is this based on the chosen definition of health?
- What are the areas/connections of the concept map [See Complexity Module] or conceptual framework that are of particular interest in your system?
- What populations (human and animal) and ecosystems are involved?
- How are animal health and ecosystem health related to human health?
- How does your specific system map onto the conceptual framework?
- How can you use a conceptual framework throughout the process of studying or addressing health problems?

Measuring and describing health

- What different types of information and modes of inquiry are needed in order to address each of the spheres involved in the problem? How are they interconnected? Can you develop your intervention or research question so that your results will be complementary to the results of your colleagues from a different field?
- What kinds of variables are indicators of health states or processes? At what temporal and spatial scales are they acting?
- What tools can be used to measure these variables?
- What kind of conclusions can be drawn from these measurements? Do they address key questions?
- How does a project evolve during the different steps of the process? What could you have done differently?

Discussion Questions

- Is there one "correct" conceptual framework?
- How does a conceptual framework change if:
    - You use a different definition of health?
    - Different people are involved in creating it?
- What cannot be included/captured in a conceptual framework?
- Is it possible to measure/describe everything of interest? What cannot be measured or described? How might this influence the interpretation of the results? How might this influence the generalizability or validity of your results?

KEY CONTENT:

Framing Health:

How to frame inquiry within a negotiated definition of health?

Human and ecosystem health, including animal and "vegetal health," are embedded in multiple scales of ecosystems acting both in space and in time. In order to frame our health questions, it is important to understand this context. The health of the ecosystems and living beings can be affected by a multitude of factors or health determinants acting at different spatial or temporal scales, including both biogeophysical (air, earth, water) and built (houses, public infrastructures, road, etc.) ecosystems. We need to begin by understanding the physical, social and temporal contexts. Figure 1, referred to as an "onion skin diagram," and developed by Donna Megler (unpublished) helps us to visualize the different contexts – all of which act on health – within which the health of an individual, animal or ecosystem rests.

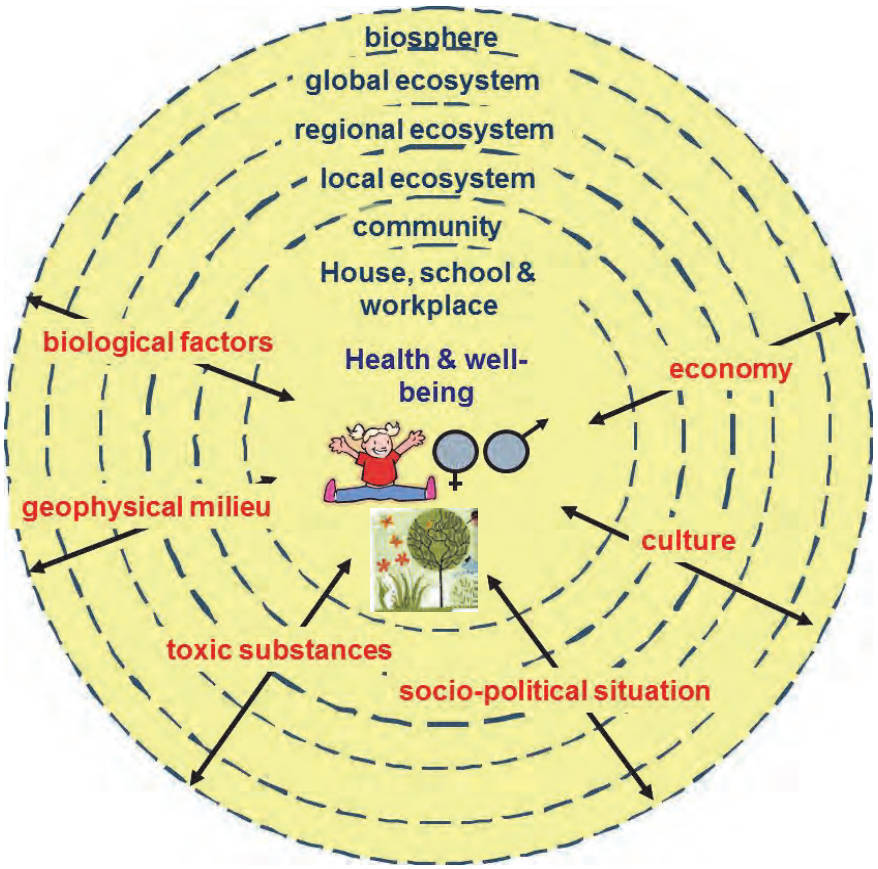


Figure 1: Health in a nested set of ecosystems

Further, health is a continuum acting over time and its deterioration is influenced by the severity of the exposure to one or several factors acting simultaneously or not (ex. contaminants, pathogens, socio-economic context, loss of culture, etc.). How one defines health and frames the health context can have important implications on which part of this continuum one is able to detect or improve on (see Figure 2).

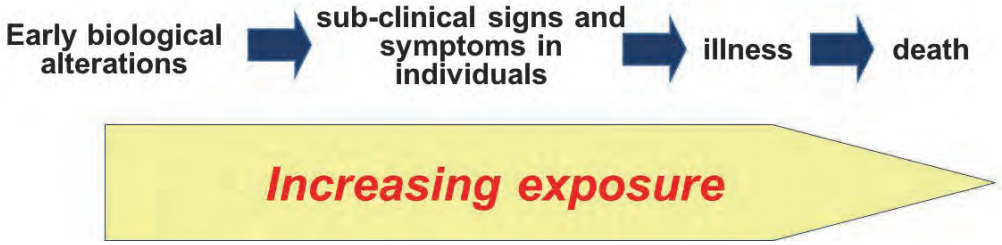


Figure 2: A continuum of deterioration

The size of a population at risk of being impacted by a factor (Figure 3) will depend on the health outcome of interest and the health focus (Figure 4). So, how health is defined and how the context is framed has important implications on the target population.

Figure 3: Pyramid of risk

The choices made in defining and framing health, leading to decisions about the size of the target population, in turn has implications on the type of study or intervention that will be carried out. The issue here is whether the focus is on the population as a whole or the individuals in the population. This will have impacts on which scale and moment in time intervention occurs. With a focus on individual health, therapeutic interventions become paramount; but, with a focus on community health, awareness raising and prevention are crucial.

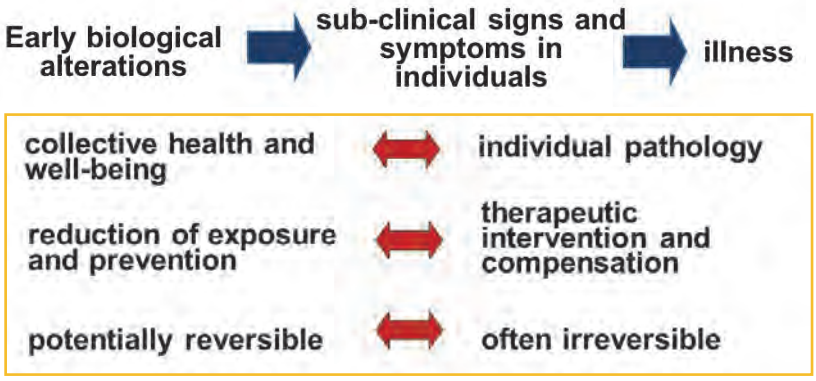


Figure 4: Health focus: individual vs. collective, remediation vs. prevention

In addition to issues of scale and time, there are a multitude of determinants of health, or factors that influence health outcomes (Figure 5). Increasingly, health practitioners and researchers recognize the social determinants of health, such as lifestyle, nutrition, education, etc. (Lalonde, 1974; CSDH, 2008). The ecosystem approaches to health seek to integrate these social determinants of health with environmental determinants of health, such as climate, housing, exposure to contaminants, etc. This approach leads to a vision of health which requires inquiry using natural, social and health sciences making it inherently interdisciplinary (Figure 6).

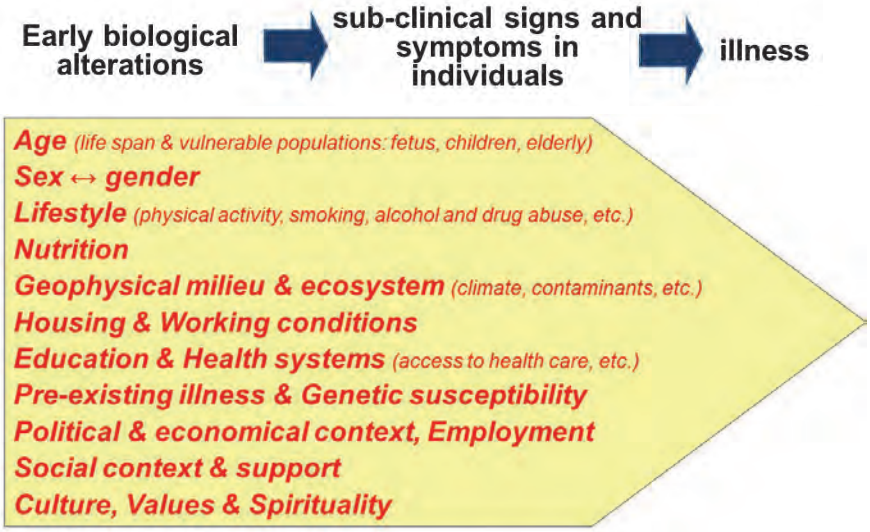


Figure 5: Multiple determinants

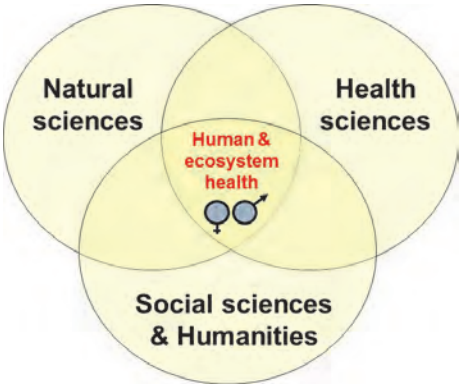


Figure 6: Multiple perspectives and interdisciplinarity

What is a conceptual framework?

A conceptual framework is a visual constructed to outline some of the principal relationships between human health, animal health and/or ecosystem health, and other relevant contexts such as economics, policy, culture, etc. The transdicisplinary nature of the ecosystem approaches to health means that most probably a great many factors will be deemed pertinent to the study of a particular health issue. On the other hand, including too many factors paints an unwieldy portrait. Creating a conceptual framework is an art and a balancing act. Conceptual frameworks are constructed to help focus one's efforts. The process of constructing a conceptual framework leads the scholar or practitioner to ask themselves many questions about their underlying definitions and the current context for the work. It may highlight areas that were neglected or assumptions that were made, which is in and of itself useful. However, the conceptual framework is also intended to be a road map used to guide the process of studying or improving a health issue, and should be continually consulted and re-constructed.

Note: *Social science students may be very familiar with conceptual frameworks, whereas students from the natural sciences may not. This can be turned into a learning point if the reasons for this are discussed. This also means that when creating groups for activities, such as the one suggested at the end of this section, attention should be paid to getting a balance between the social sciences and natural sciences.*

How to develop a conceptual framework

Several guiding questions can be used to develop a conceptual framework for addressing ecosystem, animal and human health based on the theory of complex systems and taking into account a negotiated definition of health:

a. How can the issue be framed in ecosystem terms?
b. What are the issues related to human, wildlife and ecosystem (natural and built)health?
c. What are the links between health and the ecosystem? Are they direct or indirect? Is there retro-action or feedback loops? Do they operate on the same temporal and/or spatial scales?
d. Where does the issue situate itself in the health continuum?
e. What are the health determinants?
f. Who are the populations involved? Among these populations, are any groups (human, animal or flora) more vulnerable? Are there specific gender and equity issues?
g. Who are the important stakeholders and actors involved in the issue?

From these guiding questions can emerge a wide diversity of conceptual frameworks. Figure 7, 8 and Box 3a present three different examples of frameworks, among many others. The Multiple Exposure Multiple Effects (MEME) model is a framework developed for the World Health Organization by Biggs (2003) to provide the conceptual and theoretical basis for the development, collection and use of children's environmental health indicators. This model emphasizes the complex relationships between environmental exposures and child health outcomes. Figure 8 is an example of a conceptual framework of an agroecosystem's health management (Neilsen, 2001). Neilsen (2001) notes of the process of constructing a conceptual framework; "to simplify and identify key relationships within and between ecosystems is helpful in understanding ecosystem functional relationships in pursuing management goals."

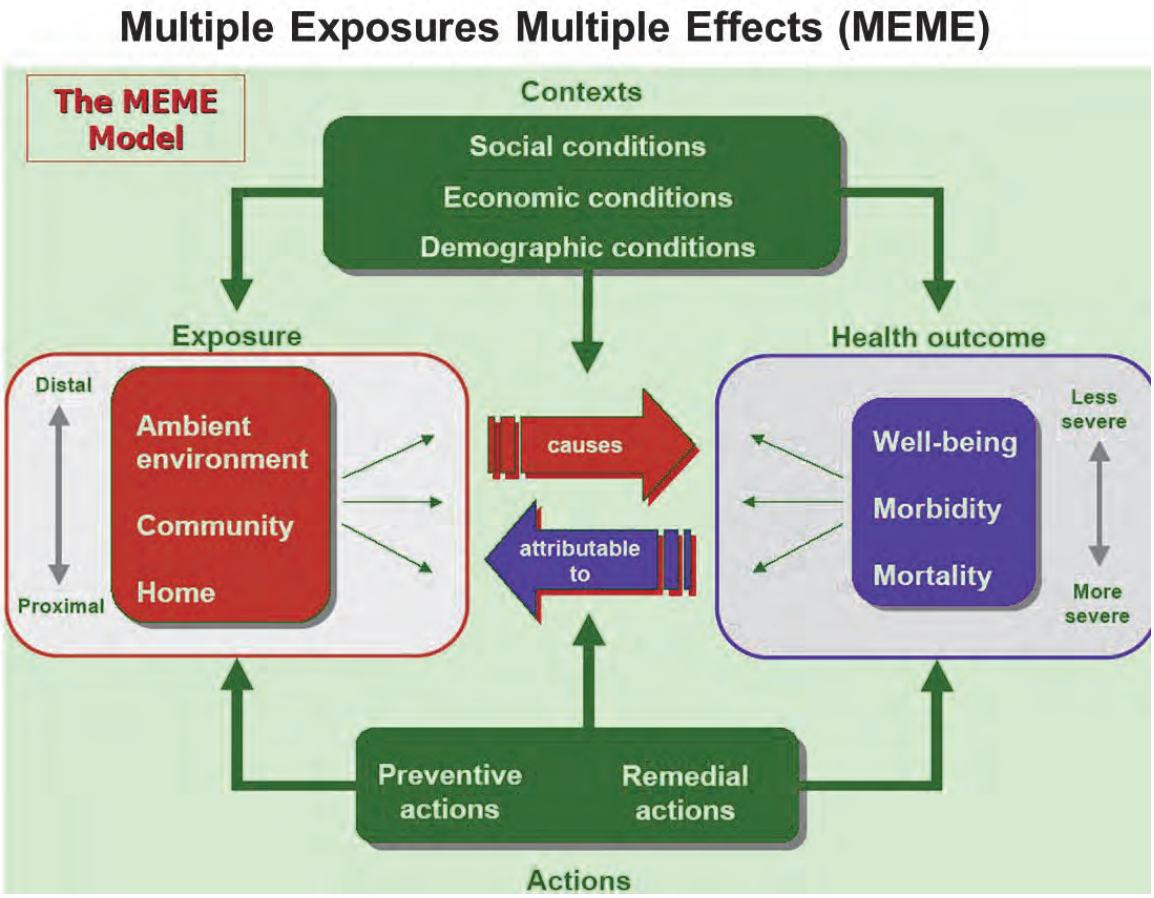
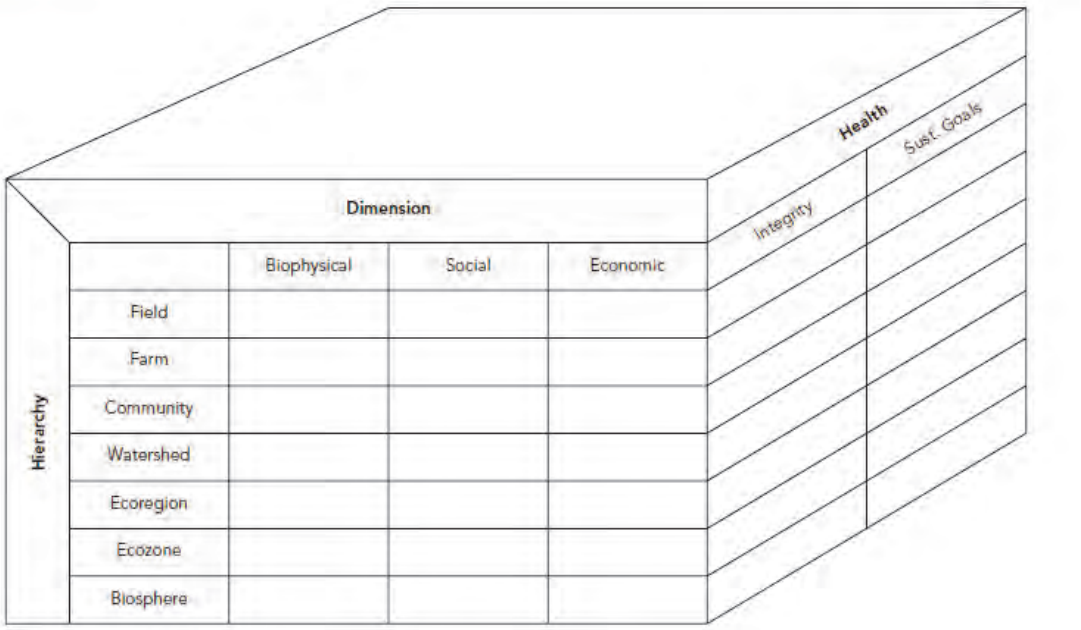


Figure 7: Briggs, 2003. Making a Difference: Indicators to Improve Children's Environmental Health. World Health Organization. pg 14. Available at: http://www.who.int/phe/children/en/cehindic.pdf. Accessed on March 16, 2012. This material is reproduced with permission of World Health Organization.

A conceptual framework, in this case an agroecosystem, illustrating a typical ecosystem hierarchy, its biophysical, social, and economic dimensions, and the essential parameters of health, namely, integrity and sustainable goal achievement.



* Observe that the temporal dimension can be imagined by replicating the diagram in time. Such a framework serves to simplify the complex relationships that must be considered in ecosystem health management (VanLeeuwen et al., 1998).

Figure 8: Nielsen, N.O. 2001. Ecosystem approaches to human health. Cad. Saúde Pública, Rio de Janeiro, 17 (Suplemento): 72.

Measuring and describing health

The process of defining, framing health and constructing a conceptual framework has identified different determinants, scales, populations, and contexts. Some aspects also need to be fleshed out or measured. Decisions made in the previous phases will have important consequences for the description or measurement of health. The measurements that will be taken or the medium used for describing health will be different according to the organism, population, scale or time frame chosen (e.g. individuals, herds, communities). Defining health in terms of early biological alterations vs. illness or death will mean that more sensitive tests will be required, ones that are on a continuous scale and which can be conducted on smaller populations, as shown in Figure 9. Further, the ultimate use of the information flows directly from choices made in framing health. For example, focusing on early biological or psycho-social alterations could eventually lead to preventive actions for a larger population. Ultimately, the process carried out in each project will lead to a unique methodology which is dependant on both technical, disciplinary knowledge and some of the broader considerations described in this module.

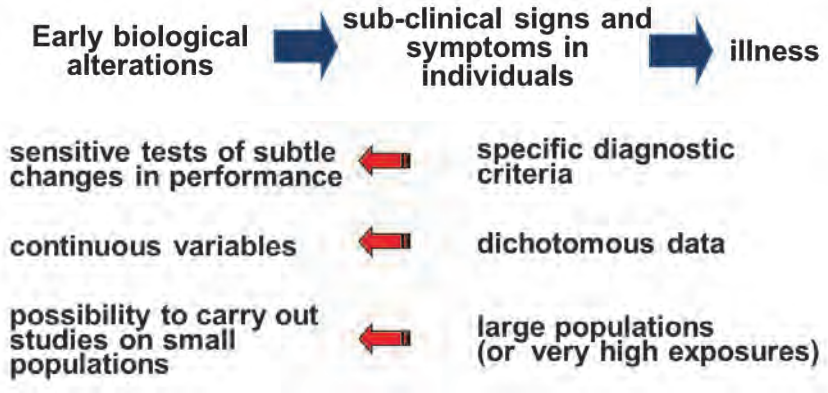


Figure 9: Methodological considerations

The conceptual framework can be broken down into its constituent parts to help identify which types of information are missing and how to go about collecting this information. *Appendix Box 2a* presents a conceptual framework of the interconnecting spheres of influence of a particular health problem in three separate natural ecosystems. The different components of this conceptual framework were then used in turn to help clarify the different types of information and modes of inquiry needed in order to address each of the spheres involved in the problem. This is a tangible example of how the methods for describing or measuring the different determinants or contexts surrounding a health issue differ between scales/perspectives.

Two basic types of inquiry are used in studying health: qualitative and quantitative. Both seek to describe and explain phenomena. One of the distinguishing characteristics between the two is the focus on measurement and numeric data in quantitative methods as well as a strong intent to be "unbiased" and founded on the "objective" observation of facts, events and phenomenon. Quantitative approaches use controlled experiments, representative samples, standardized instruments, empiricism, generalization, positivism, and deduction. Results tend to be generated as numbers, percentages, and generalisations (see Appendix). Qualitative methods, on the other hand, recognize that the observer has an inherent bias and that research is conducted to describe and understand certain groups' experiences, perspectives, etc. Qualitative methods aim to gain an "in-depth" view based on personal experiences, rather than glean generalizations out of means. Five qualitative approaches are commonly used in the social, behavioural and health sciences: narrative research, phenomenology, grounded theory, ethnography, and the case study (Creswell, 2007). For a description of the modes of inquiry of each, similar to that presented for quantitative methods in Box 4, see chapter 4 in Creswell (2007). Mixed methods are becoming increasingly popular (Creswell and Clark, 2011; Hesse-Biber, 2010) and are particularly well suited to issues being examined with an ecohealth lens, as ecohealth projects often integrate several disciplines. The use of a conceptual framework should help in identifying the overall

methodological approach (qualitative, quantitative or mixed methods) the appropriate tools and disciplinary knowledge needed to understand health in a particular system. It is important to recognize the limits of these methods and that the very same health issue can be studied from different angles. Examples of Ecohealth case studies using a combination of methodological approaches can be found in Charron et al. (2012).

Both applied research and targeted interventions – either of which can be carried out using an ecosystem approach to health – require a process, beginning with the conceptual phase (described in the defining, negotiating and framing health sections) and leading through to methodological choices, the empirical and analytical stages, and ending in a concerted effort to render the results of the inquiry or intervention available to interested parties. It is important to note that between all these different steps there should be a back and forth process as the comprehension of the health issue evolves in time. A self-investigation of the process of defining, negotiating, framing and measuring health should be carried out in order to ensure that the best practices have been used in the move from theory to practice (Nguyen, 2011).

Notes:

- *Students might feel uncomfortable with the scope of what is presented here. You can introduce the idea that there is a dilemma between what a student can do and true transdisciplinarity. While it is important to produce good disciplinary research to feed into the overall comprehension of the interdisciplinary framework, this information needs to be somehow integrated at all the different steps of the process.*
- T*o include a section on how to synthesize the breadth of information collected [See Module 3: Complexity].*

ACTIVITIES

Framing and measuring and/or describing health

TOTAL TIME: 90 minutes

DIRECTIONS: If posters [see Transversal Activities] are being used in the workshop or course, this exercise can be followed closely by a poster session as it gives the students experience in refining definitions and constructing conceptual frameworks. It would be best placed somewhere mid-course, when the students have already had time to become comfortable with their posters, but will still have sufficient time to integrate what they have learned into subsequent drafts.

OBJECTIVES: Participants will gain experience:

- Creating conceptual frameworks from working definitions of health.
- Developing a project plan based on these definitions and conceptual frameworks.
- Collaborating with other participants to develop and communicate a project plan.
- Identifying differences in proposals based on the choice of a definition of health.
- Negotiating which *one* proposal they will select to move forward.

STEP 1: Creation of a conceptual framework *(20 minutes)*

- Break participants into groups of 4-5 and provide each group with a different definition of health that the facilitator has collected ahead of time.
- *NOTE:* Definitions of health should provide a breadth of perspectives/priorities (*possible sources: research reports, government reports, organizational pamphlets, the activities in Section 1*).
- Have participants create a conceptual framework that represents "their" definition of health.

STEP 2: Construction of a project plan *(40 minutes)*

Present all groups with the same Ecohealth issue and ask them to come up with a project proposal that is based upon "their" definition of health and includes:

- Working questions
- Expected outcomes
- Selection of modes of inquiry, tools and methodologies for measuring or defining health.
- A list of potential collaborators and rationale for including each.

Note:

- *To emphasize the process of using the conceptual schematic, participants could be prompted to demonstrate how their research questions relate to the conceptual framework and why these particular questions were chosen.*
- *This exercise can be adapted to research by constraining projects to mean "research projects."*

STEP 3: Wrap-up discussion *(30 minutes)*

- Have groups briefly (2 minutes each) present their conceptual framework and project proposal to the larger group
- Debrief discussion as a large group with an emphasis on:
    - Identifying the differences between project proposals developed for the SAME Ecohealth issue but *informed by different definitions of health.*
        - How might the expected outcomes for the different proposals result in different action plans?
        - What biases are inherent in the different health definitions? Is it possible to create a project proposal without these biases? Which ones are you willing to accept?
    - If you had to move forward with one project proposal tomorrow, how would you choose? *(This could be done as STEP 4 if time allows, where participants actually have to negotiate a single project proposal).*

Note: *Core questions and discussion questions (from above) can be used to inform steps 2 and 3.*

SPECIFIC READING:

Briggs D (2003) Indicators: Making a difference: Indicators to Improve Children's Environmental Health, Geneva: WHO

Charron D (2012) Ecohealth: Origin and approach, Chapter 1. In: Ecohealth Research in Practice. Innovative Applications of an Ecosystem Approach to Health, Charron, D (editor). Ottawa: IDRC, pp. 1-30. Available online: http://idl-bnc.idrc.ca/dspace/bitstream/10625/47809/1/IDL-47809.pdf

Creswell JW (2007) Qualitative inquiry & research design: Choosing among five approaches, second edition. Thousand Oaks, California: Sage Publications Ltd.

Creswell, JW and V.L.P. Clark. 2010. Designing and conducting mixed methods research. 2nd edition. Thousand Oaks: SAGE Publications.

CSDH (2008) Closing the gap in a generation: Health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. Geneva: World Health Organization

Fortin M-F (2010) Fondements et étapes du processus de recherches: Méthodes quantitatives et qualitatives, 2e édition. Montréal: Chenelière Éducation, 632 pages

Guerin M, Gosselin P, Cordier S, Viau C, Quénel P, Dewailly E (2003) Environnement et santé publique – fondements et pratiques. Paris : Éditions Tec&Doc. http://www.dsest.umontreal.ca/recherche_rayonnement/environnement_sante_publique.html

Hesse-Biber, S.N. 2010. Mixed methods research: Merging theory with practice. New York: Guilford Press.

Lalonde M (1974) A new perspective on the health of Canadians. A working document. Ottawa: Government of Canada

Nielsen NO (2001) Ecosystem approaches to human health. Cad. Saúde Pública 17:S69-S75

Nguyen V (2011) Understanding the Concept and Practice of Ecosystem Approaches to Health in the Context of Public Health. Master's thesis. Guelph: University of Guelph, p. 185

Webb J (2010) Environmental Contamination of Fish and Humans through Deforestation and Oil Extraction in Andean Amazonia. Doctoral thesis, Montreal: Department of Geography, McGill University

REFERENCES

Charron D (2012) Ecohealth: Origin and approach, Chapter 1. In: Ecohealth Research in Practice: Innovative Applications of an Ecosystem Approach to Health, Charron, C (editor), Ottawa: IDRC, pp. 1-30. Available online: http://idl-bnc.idrc.ca/dspace/bitstream/10625/47809/1/IDL-47809.pdf

Forget G, Lebel J (2001) An Ecosystem Approach to Human Health. International Journal of Occupational and Environmental Health 7:S3–38

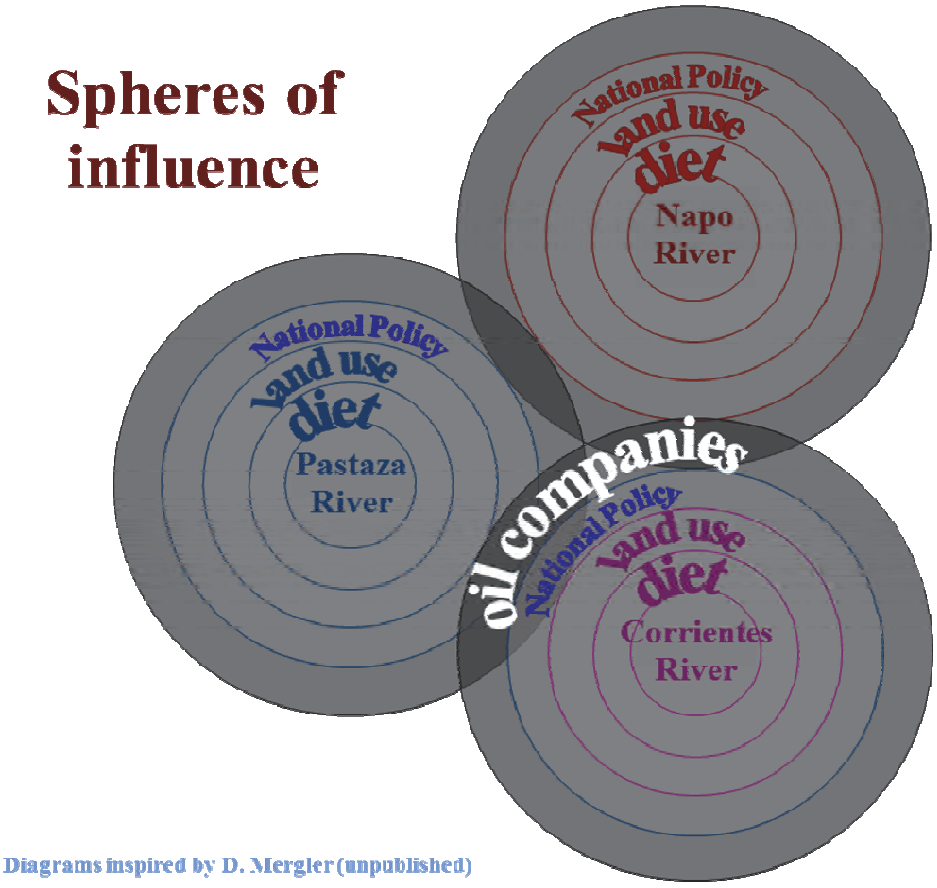
Nielsen NO (2001) Ecosystem approaches to human health. Cad. Saúde Pública 17, suppl:S69–S75

Waltner-Toews D, Kay JJ, Lister NM (2008) The Ecosystem Approach: Complexity, Uncertainty and Managing for Sustainability. New York: Columbia University Press, 383p.

APPENDIX

Box 2a: Use of a conceptual framework to integrate diverse types of information and modes of inquiry

Research on mercury and PAH levels in Amazonian populations used a schematic tool to help organize the spheres of influences affecting contaminant levels and to facilitate the integration of different types of information and methods of accessing this information (Webb, 2010). Variability in the patterns and pace of deforestation within the Upper Amazon provided an opportunity to make comparisons and this research employed an ecosystem approach to analyze the forces that drive decisions on land use and policies that encourage unsustainable land-use practices in three river systems of the Upper Amazon.



Diagrams inspired by D. Mergler (unpublished)

Box 2b: **Types of Information and Modes of Inquiry**

Types of information: Quality of life, incidence of disease, levels of contaminants, mortality

Modes of Inquiry: Questionnaire, national survey data, levels of contaminants in hair and urine samples

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Types of information: Types of fish consumed, frequency of consumption, location of fishing, levels of contaminants in fish

Modes of Inquiry: Questionnaires, mapping, levels of contaminants in fish samples

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Types of information: Types of land use, methods used, spatial distribution of land use, socio-economic profile of land owners

Modes of Inquiry: Questionnaires, surveys, satellite data, GPS points, GIS, contaminant levels in soil of different land use types

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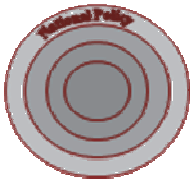

Types of information: Policies, decision making processes, lobbying power, public opinion

Modes of Inquiry: Review of policies, interviews, media reports, citizen blogs

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Types of information: Company policies, decision making processes, lobbying power, public opinion, macroeconomic push and pull factors

Modes of Inquiry: Review of policies, interviews, media reports, citizen blogs, economic data

The different components of this conceptual framework were used to help clarify the different types of information (Box 2a) and modes of inquiry (Box 2b) needed in order to address each of the spheres involved in the problem. This is a tangible example of how the methods for describing or measuring the different determinants or contexts surrounding a health issue differ between scales/perspectives.

Box 3: Quantitative Research

Types of quantitative research and information of interest

• **Fundamental research**: Aims at providing new knowledge, independent of the potential application of the knowledge to particular situations.
    - Example: Development of theories and models

• **Applied research**: Aims at finding solutions to practical problems, focused on action and decision making
    - Example: Evaluation of a community intervention

Mode of inquiry

1. Choose the study subject and the preliminary research question
2. Conduct a literature review
3. Elaborate the theoretical and conceptual framework
4. Refine the research goals, research questions (incorporating issues of scale, determinants and context), hypothesis and objectives (explicitly detailed to answer the research question)
5. Methodology
    a. Indentify the underlying principles of the chosen measures
    b. Define the population and the sample size
    c. Write a research plan
    d. Choose sampling strategy and analytical methodology

Box 4: Multiple perspectives on health and food in Inuit communities

O'Neil et al. published a paper in 1997 on the scientific and local discourse of poisoned food in several Inuit communities in Nunavik. Their findings indicate that health policies which exclude traditional knowledge lead to "counter-knowledge as a form of resistance." In other words, Inuit knowledge on what is healthy to eat was turned into a kind of "bio-power" which rejected external warnings and extolled the curative agents in traditional, albeit potentially poisoned, food. Part of the traditional knowledge of the Inuit is knowing which foods to eat and which animals are healthy. The scientist's claim that country meat, in general, might be unfit for consumption was regarded simply as false because it ran contrary to what the Inuit had been taught by their Elders. In conclusion, the authors state:

> Risk communication discussions are based primarily on the problem of providing simplified scientific information to supposedly uninformed recipients. Risk communication strategies continue to ignore both the essential content of Inuit traditional knowledge about the risks and benefits of country food as well as the political act of resistance that is engendered when "contaminant bio-power" is grounded solely in Western scientific knowledge…Communicating about contaminants in Nunavik communities must be seen as the engagement of two discursive formations, each grounded in alternative normative understandings of human-animal-environment relationships.

ECOSYSTEM APPROACHES TO HEALTH PRINCIPLES AND HISTORIES

Authors: Dr. Karen Morrison, Mathieu Feagan and Ben Brisbois

Reviewed by: Lindsay Beck

CONNECTS WITH:
Gender - Using and Developing an Ecohealth Case Study

Table of Contents:

MODULE INTRODUCTION

DESCRIPTION:

This module presents ecosystem approaches to health as a process of inquiry into health and ecosystems. Through activities which encourage the exploration and discussion of key principles, a critical, open-ended model of ecohealth is presented.

DIRECTIONS:

The introductory activities outlined in this module can be modified, as necessary, to meet the needs of the instructor.

- The two case study focused activities could be combined for a short ecohealth workshop, or different cases can be assigned for courses where there is more time for discussion.
- The conversation about what attracted the instructors and students to the field could be a discrete event or incorporated into other activities (e.g. in the introduction to a new talk).

- The introduction to the field ecohealth is an optional exercise that could be a didactic lecture or developed by the students independently as a self-study assignment.

Preparation for Instructors: Select one of the suggested case studies or develop your own case [See Using and Developing a Case Study]. Read or review a few of the seminal texts in the field, in order to develop your sense of what ecohealth is, and where it came from.

Aims/Goals

- Involve students in exercises related to ecohealth.
- Have the ecohealth principles emerge from practical work.
- Be open ended and interpretive.

Guiding Questions

- Eco + Health + Process: Why is this integration necessary?
- Where did ecohealth come from? How is history also contextual/interpreted?
- Who, what, why, when, where, and how of ecohealth, such as:
  - How is human health linked to environmental systems?
  - Where have you encountered ecosystems and health?
  - How has the field of ecohealth developed?
  - When is an ecohealth approach needed?
  - What are the key components of an ecohealth approach?
  - What types of questions are best-suited to an ecohealth approach?

Working Terms

- Ecosystem approaches to health
- Scale
- Simple, complicated, complex problems
- Social-ecological system
- Principles of ecohealth research and practice (Charron, 2011): transdisciplinarity, systems thinking, and multi-stakeholder participation, sustainability, equity, and knowledge to action.
- Three pillars of ecohealth (Forget & Lebel, 2001): transdisciplinarity, participation, equity.

SECTION 1- ECO + HEALTH + PROCESS

DESCRIPTION:

Through case study and group discussion, this section explores student experiences and conceptions of "health" and "environment". Questions, discussions and activities are constructed in a way which will prompt the emergence of the 6 principles (transdisciplinarity, systems thinking, multi-stakeholder participation, sustainability, equity, and knowledge to action).

LEARNING OBJECTIVES:

- To learn about ecohealth principles, practices and questions through the examination of case studies
- To develop an understanding of the literature from which ecohealth thinking has emerged

KEY QUESTIONS:

- Why are health and ecology converging now?
- What questions are missing from the scenario/case study?
    - What perspectives are not included?
    - What scales are missing?
- How do gender [Module 5: Gender], power, equity and sustainability factor in?

PREPARATION:

1. **Choose a case study with ecology and health components**
   A good approach is to choose a case which you are already familiar, or one that you have some connection with through your community and social networks. If would like to develop a new case, have a look at the processes outlined in Module 8: Using and Developing a Case Study.

   The main criteria for selecting a case is that it pertains to both environmental and health concerns. The challenge of linking environmental change to human health is the main focus of the field of ecohealth, but many papers and cases focus on one or the other.

   Examples of possible case studies to use for this section:
   - Case Study of Kathmandu, Nepal.
       - Neudoerffer CR, Waltner-Toews D, Kay J, Joshi DD, Tamang MS. (2005). A diagrammatic approach to understanding complex eco-social interactions in Kathmandu, Nepal. Ecology and Society 10: 12.

- International Development Research Centre (IDRC) case studies: http://web.idrc.ca/en/ev-27268-201-1-DO_TOPIC.html
- Pull out a case description from a journal article (remove the scholar's interpretation).

2. **Develop perspectives**
   Each case will have a variety of stakeholders associated with it – either explicitly, or implicitly. Instructors may want to develop a list of stakeholders from the text and add additional ones where necessary. Different perspectives may include those of members of the community (men, women, children, elderly; male, female; different socio-economic classes), as well as policy-makers (bureaucrats from the local, state or national government; elected or un-elected officials); and researchers with different backgrounds (engineering, environmental science, ecology, political science, anthropology, etc.).

3. **Prepare prompts**
   Develop a series of questions that you can use to prompt students to critically examine the case from a specific perspective. Prompts should be designed in a way that bring out issues around power, representation and participation.

   In developing prompts, consider both the spatio-temporal scale and the socio-cultural context of the issues in question. Try to develop some prompts which will probe these elements of the case.
   - Whose health is of interest?
   - Who speaks for the trees? Fish?

ACTIVITIES:

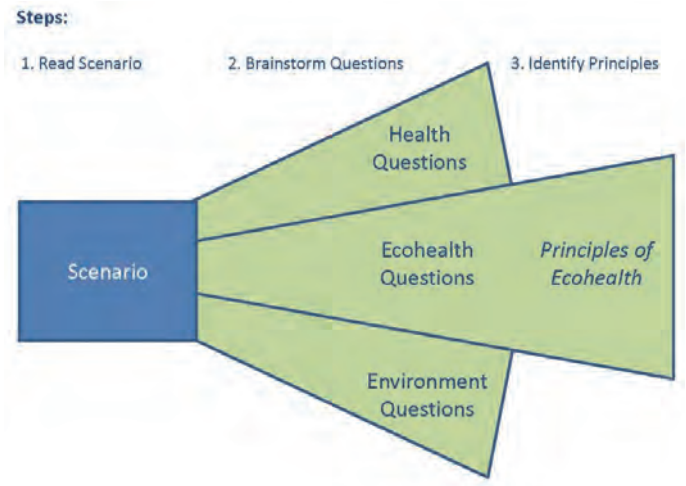

Figure 1. Summary of Steps in Eco+Health+Process Activity

STEP 1: Read Scenario

- Small group work (3 – 5 people)
- Distribute one copy of the case description
- Ask students to read the case and to highlight the questions that relate to environment and the questions that relate to health.

STEP 2: Brainstorm Questions

- Are the health questions also environmental questions (and vice-versa)?
- Are there specific questions that combine environment and health?
- Whose health? How do you define the environment?
- From reading the case, what other questions could be considered?
- What concept of health is at work in this case?
- What concept of the environment is at work in the case?

STEP 3: Identify Principles

- *Plenary Discussion*: Use the prompts you developed to facilitate a plenary discussion which connects the concepts of health and environment which students found in their examination of the cases. Draw attention to ideas which reflect the principles of ecohealth as the discussion progresses.

SPECIFIC READING:

Select one reading which relates to the case that you have chosen to use.

Webb, J., D. Mergler, M. W. Parkes, J. Saint-Charles, J. Spiegel, D. Waltner-Toews, et al. (2010). "Tools for Thoughtful Action: the role of ecosystem approaches to health in enhancing public health." Canadian Journal of Public Health 101(6): 439-441.
http://www.copeh-canada.org/documents/Volume_101-6_439-41.pdf

SECTION 2: INTERESTS AND EXPERIENCES IN ECOHEALTH

DESCRIPTION:

This session provides an opportunity for students and instructors to talk about how and why they first got involved with ecohealth.

LEARNING OBJECTIVES:

- Recognize that people have been attracted to the field from very different backgrounds and experiences.
- Share experience and develop insight into how ecohealth approaches research.

FORMAT:

- This entire session can be done as a plenary discussion, or participants can begin their discussions in smaller groups and then come together as a plenary after they have had the opportunity to share their experiences.
- Another approach could to break people into groups of 2 and ask them each to spend 5 – 10 minutes interviewing each other, then facilitate a plenary discussion.

KEY QUESTIONS:

- How did you become involved in ecohealth?
- Why are you interested in the field?

DISCUSSION QUESTIONS:

- What is ecohealth a response to?
- What conditions call for an ecohealth approach to health?
    - Emergence of complex problems and the incapacity of traditional medical model of health to deal with them
- How is ecohealth situated in relation to other approaches to health?
- What does it mean to take an ecosystem approach to health?
- What institutional and infrastructural supports seem to be necessary to facilitate this approach?
- What attitudes and dispositions are related to this approach?

SECTION 3: ECOHEALTH HISTORIES

DESCRIPTION:

This session develops the intellectual and institutional history of ecohealth through a combination of instruction (information transfer) and interpretation (student recontextualization of information) employing collaborative, group work processes.

LEARNING OBJECTIVES:

- Identify key moments in the history of health.
- Think about the significance of key events.
- Experientially explore the idea of multiple perspectives and languages related to the same "facts".
- Demonstrate the evolution of thinking on environment and health over time.
- Represent the idea of ecohealth as a collective and situated way of thinking and acting.

KEY QUESTIONS:

- How have people understood health, environment, and the interaction between the two over time?
- What institutional structures, events and paradigms (or paradigm shifts) are relevant to understanding the origins of ecohealth?
- What are the inter-relationships between the concepts described as ecohealth and the places and people who have been involved with them over time?
- What are the histories of ecohealth? (link to contemporary post-colonial historiography)

PREPARATION:

- The teaching team should develop a 'History of Ecohealth Milestones' document.
    - Circulate Table 1
    - Each member will contribute from their disciplinary, professional, organizational, personal, cultural perspectives.
    - Create cards for each event using the information developed in Table 1.
        - Cards can be created based on the table that contain these milestones in Ecohealth (dates, places, names, dollar figures, languages, etc.) – see Figure 2.
- Milestones will begin with Aristotle (and other early integrative thinkers) who theorized the relationship between health and larger systems. Include more recent theories, including Schwab's One Medicine, conservation biology, ecosystem health and others.
    - Include descriptions of milestone significance (interpretations). This may be done by the instructors or researched by students.

- Students will be asked to connect the events into a narrative that demonstrates how thinking in the field has evolved over time, so **consider this when selecting and describing the milestones.**

Date	Event/Title	Organizers and Participants	Place	Significance to Ecohealth	Alternative Significance
300 BC	Early Philosophy	Aristotle and students	Ancient Greece	Early expression of integration of environment and health	
1986	Ottawa Charter for Health Promotion	Canadian Department of Health	Ottawa	Mention of environment (but underdeveloped …)	
2003	Health: An ecosystem approach	IDRC	Ottawa	First attempt to define ecohealth pillars	
2004	Ecohealth Forum	IDRC + international	Montreal/ Merida, et.	Field Building	

Table 1. Example content for History of Ecohealth Milestones

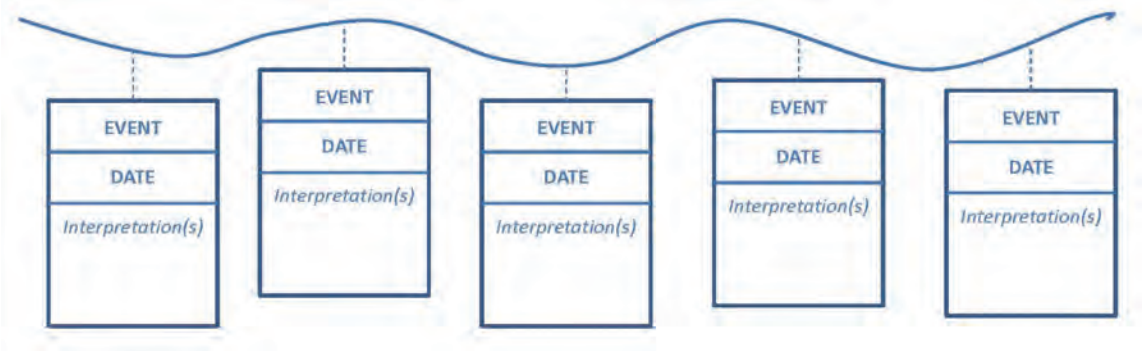

Figure 2. Ecohealth milestone cards arranged on a timeline.

ACTIVITIES:

Many activities can use the cards and timeline as a basis for discussion, for example:

1. 'Creation myth':
   - Participants are provided with milestone cards containing dates, names, locations, etc., but with the 'Significance to Ecohealth history' (Interpretations) section left blank.
   - Working in groups of three or four, participants are asked to select milestones they feel are important to telling the history of Ecohealth, then fill in the 'Interpretation' section of those cards.
   - One group member should be selected to tell the story of Ecohealth to the group as a whole.
   - After each group has told their story to the group, there should be time for debrief/discussion. At this point, the facilitator can fill in any gaps they think participants missed and guide a discussion about how the way in which we order facts can affect interpretation. How would a different order lead different interpretations?

   Additional options:
   a. Divide the groups based on age, gender, disciplinary background, or other;
   b. As students will be expected to have read at least one of the 'story of Ecohealth' assigned readings, they can also be separated based on which reading participants did. There should be a respectful but potentially provocative discussion about the different stories that emerged.

2. Facilitator tells 'the' story of Ecohealth using milestone cards – points to key events being more relevant to certain disciplines than others.

3. Students are given individual cards and asked to research the event and think of how it might be significant to ecohealth – they then present their card to the group and place it on the shared timeline (see Figure 2). The cards will be more and less relevant to the history of ecohealth from different disciplinary, geographical and cultural perspectives. The cards used and developed in Latin America or China will be different than those developed in a North American context. Blank cards will also be provided so that students can include events they deem to be significant, and that better reflect their context.

SPECIFIC READING:

Students should be asked to read at least one of the following (preferably the one they think looks most interesting at first glance):

- Cole D. (2006). Canada's International Development Research Center's Eco-Health projects with Latin Americans: origins, development and challenges. Canadian Journal of Public Health Revue Canadienne de Sante Publique 97:8-14.

- Wilcox BA, Aguirre AA, Daszak P, Horwitz P, Martens P, Parkes M, et al. (2004). EcoHealth: A Transdisciplinary Imperative for a Sustainable Future. EcoHealth 1:3-5.

- Waltner-Toews D, and Kay J. (2005) The Evolution of an Ecosystem Approach: the Diamond Schematic and an Adaptive Methodology for Ecosystem Sustainability and Health. Ecology and Society 10: 38 Available at: http://www.ecologyandsociety.org/vol10/iss1/art38/

- Bunch M, McCarthy D, Waltner-Toews D. (2008). Chapter 8: A Family of Origin for an ecosystem approaches to managing for sustainability. In D Waltner-Toews, J Kay NM Lister. (Eds.), The Ecosystem Approach: Complexity, uncertainty, and managing for sustainability. New York: Columbia University Press.

- Forget G, & Lebel J. (2001). An ecosystem approach to human health. International Journal of Occupational & Environmental Health 7: S3-38.

- Charron D. (2011) Ecohealth Research in Practice: Innovative Applications of an Ecosystem Approach to Health, New York, NY: Springer / Ottawa, ON: International Development Research Centre.

- Dakubo CY. (2011). Chapter 1, Section 1.1: Introduction. *Ecosystems and Human Health: A Critical Approach to Ecohealth Research and Practice.* New York, NY: Springer, pp. 3-17.

- Parkes M, Panelli R, & Weinstein P. (2003). Converging paradigms for environmental health theory and practice. Environmental Health Perspectives, 111: 669-675.

SECTION 4: CASE STUDY

DESCRIPTION:

Using the same case study used in Section 1, students are challenged to identify the kind of questions that require an ecohealth approach. Complex questions are differentiated from complicated and simple questions and the strengths and weaknesses of each are discussed.

LEARNING OBJECTIVES:

- Identify and discuss the differences between simple, complicated and complex questions.
- Develop the ability to zoom in and out to place different studies in their larger context.
- Consider how framing the research question differently can lead to different kinds of studies.

KEY QUESTIONS:

- What research questions emerge from the case study?
- Which questions require an ecohealth approach? Another approach?
- Who decides which questions are asked, funded, identified?
- How might the different questions fit together? Or not?

KEY CONTENT:

Using the case study, pull out a variety of questions and perspectives. Demonstrate how, from the same case, simple, complicated and complex questions can emerge (see Figure 3). Complex questions and "wicked problems" (Rittel & Webber, 1973) are characteristic of ecohealth investigations, as they tend to require the weighing of different values and perspectives, at different spatio-temporal scales.

Figure 3. Scenario analysis to identify questions requiring an ecohealth approach

The terms simple, complicated and complex are often used to describe ecohealth thinking (and similar systems-based thinking in other fields, see for example Westley et al., 2006). Generally speaking: Simple systems are easily knowable – they respond well to relatively straightforward (often single discipline) investigation or action. Flying an airplane is an example of a simple system. Complicated systems are difficult to master but benefit from the combined expertise of a number of experts – e.g. multi-disciplinary and interdisciplinary research. Building an airplane is an example of a complicated system requiring the expertise of many actors.

Complex systems are inherently unknowable and unpredictable. Raising a child is an example of a complex system. Investigations tend to focus on trends, patterns, processes and relationships (Capra, 2005) in particular spatial-temporal contexts. Complex systems are characterized by non-linearities, autocatalysis, time delayed feedback loops, emergent phenomena, and chaotic behaviour (Kay and Regier, 2000; Costanza and Jorgenson, 2002; Gunderson and Holling, 2002). Incorporating multiple ways of knowing is an important theme (e.g. transdisciplinary research, Brown et al., 2010).

Another commonly used breakdown emphasizes linear, random and middle-number systems, whereby:

- Linear systems can be represented by mathematical equations (linear or quadratic) such as:

$$x + 2 = y \text{ or } x^2+2y+c = 0$$

- Random systems can be represented by various statistical methods, including mean, median, standard deviations, p-values, etc.

- Middle-number systems are neither linear nor random and are impossible to model mathematically. Middle number systems are defined by the observer. They characterize many social-ecological systems (Kay and Schneider, 1995).

EXAMPLES:

From x case, the following questions could emerge:

- Simple: What is the effect of x parasite on dogs?

- Complicated: How are dogs infected with x?

- Complex: How can we reduce the impact of x on dog populations?

ACTIVITIES:

- **Individually or in groups**: Read the case and develop research questions that emerge from it. Identify what kind of question each is; simple, complicated or complex. Discuss the differences between the kinds of questions and any gaps or differences in perspectives which they give rise to.

- **Plenary:** How are the questions related to different aspects of the social-ecological system?

SPECIFIC READING:

- Brown V, Harris JA and Russell JY. (2010) Tackling Wicked Problems: Through the Transdisciplinary Imagination. London: Earthscan.

- Capra F. (2005) Complexity and life. Theory, Culture & Society 22: 33-44.

- Costanza R and Jorgenson SE. (2002) Introduction: Understanding and Solving Environmental Problems in the 21st Century: Toward a new, integrated hard problem science. In: Costanza R. and Jorgenson SE. (eds.). *Understanding and Solving Environmental Problems in the 21st Century: Toward a new, integrated "hard problem science*. New York: Elsevier Science Ltd.

- Kay J and Regier H. (2000) Uncertainty, Complexity, and Ecological Integrity: Insights from an Ecosystem Approach. In: PA Crabbe, L Holland, Ryszkowski and L Westra (eds.) *Implementing Ecological Integrity: Restoring Regional and Global Environmental and Human Health.* Kluwer, NATO Science Series, Environmental Security.

- Kay J and Schneider E. (1995) Embracing complexity: the challenge of the ecosystem approach. Perspectives on Ecological Integrity 5: 49-59. DOI: 10.1007/978-94-011-0451-7_4

- Gunderson LH. and Holling CS. (2002) Panarchy: Understanding Transformations in Human and Natural Systems. Washington: Island Press.

- Rittel HWJ and Webber MM. (1973). Dilemmas in a General Theory of Planning. Policy Sciences *4,* 155-169.

- Westley F, Zimmerman B and Patton M. (2006). Getting to Maybe How the World Is Changed. Toronto, Canada: Random House Canada. See Simple, Complicated and Complex Problems. pp. 8-10

REFERENCES

Students pick 1-2 to read:

- Forget G, & Lebel J. (2001). An ecosystem approach to human health. International Journal of Occupational & Environmental Health 7: S3-38.

- Charron D. (2011). Ecohealth Research in Practice: Innovative Applications of an Ecosystem Approach to Health, New York, NY: Springer / Ottawa, ON: International Development Research Centre.

- Dakubo CY. (2011). Chapter 1, Section 1.1: Introduction. *Ecosystems and Human Health: A Critical Approach to Ecohealth Research and Practice.* New York, NY: Springer, pp. 3-17.

- Waltner-Toews D, & Kay J. (2002). An Ecosystem Approach to Health. Leisa Magazine March: 15-16.

- Wilcox B, Aguirre AA, Daszak P, Horwitz P, Martens P, Parkes, M, Patz JA, & Waltner-Toews D. (2004). EcoHealth: A transdisciplinary imperative for a sustainable future. EcoHealth 1: 3-5.

- Cole DC, Crissman C, Orozco AF. (2006). Canada's International Development Research Centre's Eco-Health Projects with Latin Americans: Origins, Development and Challenges. Canadian Journal of Public Health 97: 8-14.

COMPLEXITY

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Contributors: The *Incommensurability Activity* in the Foundations section was developed by David Waltner-Toews, Bruce Hunter, Karen Houle, Karen Morrison, and Cheryl Massey.
The *Mind Grooves Activity* was suggested and sketched by Martin Bunch and Renee Jackson during the June 2011 Workshop in Prince George

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CONNECTS WITH:
Participation and Research -- Gender

Table of Contents:

MODULE INTRODUCTION

DESCRIPTION

This module covers material related to complexity and its importance for ecosystem approaches to health. What is complexity? Are there different kinds of complexity, such as mathematical, technical and social? Are they really different? Are there particular aspects of complexity that are relevant for ecosystem approaches to health? What are they? How are they relevant?

The world we live in is complex. The complexity we see in the world around us is a function of the nature of the world itself, we who observe the world, and the questions we ask. If we ask how to fix a broken watch, we can think of the watch in fairly simple mechanical terms, and we do not need to invoke notions of complexity; if we ask about the function of watches in society, or the social, political, economic and ecological relationships required to acquire the resources and pull together the materials and skills necessary to build a watch, we need to invoke complexity. Similarly, if we wish to save people dying of cholera, we have the relatively straightforward, albeit challenging tasks of providing them with the potable sources of fluid replacement. If we wish to prevent cholera epidemics, we are faced with complex, interacting political, social, economic, biomedical and ecological forces.

Issues we see as being complicated are only that way if we narrowly define the boundaries of the problem. This is particularly true in agricultural and food systems, for instance. Industrial economies of scale make efficient use of certain kinds of resources if one externalizes interactions with the social-ecological context. This industrial efficiency is dependent on stable external conditions, and is very **brittle** in the face of changes in external resources and economic structures. If everyone is growing corn, and the price of fossil fuels goes up, or the markets for corn collapse, the system cannot adapt; people might go hungry because all the corn is used for fuel, or, conversely, because they can't sell their crops. Large slaughterhouses that require high through-put of animals may have to shut down completely in the face of border closings (due to diseases such as (SA) BSE or Foot and Mouth Disease). This can have cascading, devastating effects as farmers cannot even service local markets. Small slaughterhouses that serve local markets can, in some cases, keep functioning when large slaughterhouses shut down because of closed borders. A similar argument holds for why a power grid that relies on many different kinds of power is much more **resilient** than one which is based on a few large power stations.

Every description of the world is a simplification, and systems descriptions are no different in that regard. Complex systems are descriptions of complexity, that is, they are attempts to describe the world as we live in it and experience it, that attempt to accommodate multiple dynamic interactions of as many variables as possible. By definition, there are many such descriptions (and hence many complex systems) possible; different observers will see different things in the world, and model them differently, either formally, or perhaps just in their heads. Although mathematical models are useful to explain certain events such as pandemics or climate variability, there is no single mathematical model that can explain the complexity of the

world, and also predict the future. Managing a sustainable food system, or managing land use in a watershed where industry, human settlement, wildlife and food production are vying for space are similarly complex.

DIRECTIONS

Ideally, this is a participatory module. However:

- **In one hour,** an instructor can take a single case study and walk through it, emphasizing the different aspects of complexity.

- **In a few hours,** use several instructors from different backgrounds (ecology, philosophy, participatory research, health) and have them lecture as part of the same session, dealing with a single (or several) case studies. Each instructor is required to ensure that a particular aspect of complexity is addressed (scale, perspective, feedbacks, and so on). The teaching is intended to elicit questions from the students, as well as between the instructors.

- **Over a day or so,** one can better engage the students in learning. Ideally, the instructor should have several stacks of flip-chart paper and many marker pens. There should be a room with sufficient round tables to assign about 6 students per table. Pictures of a case (usually selected by the instructor) are either looped through a powerpoint or other slideshow presentation, or tacked to the wall around the room. The case study pictures should include people who live in the case area, pictures of problems (piles of garbage, free-running dogs, dirty water, erosion, and so on), as well pictures of how people make a living. Then, have the students work in groups to work up the case.

    - **Issues map.** Ask students to list, map, and draw the issues that they see in the case study pictures. This can just be a list or scattered notes on the paper. There is no right answer; the aim is to get students talking to each other. (*15 minutes*)
    - **Talk about it.** What is Missing? How are they linked? (*10 minutes*)
    - **Stakeholder map.** Ask students to name the stakeholders they see in the slides. This can be a list or just names or categories. (*15 minutes*)
    - **Discussion.** Who is missing? How are they linked? (*10 minutes*)
    - **Making connections.** How are the issues and the stakeholders linked? In general, what does one do with this information? What else do we need to know? (*30 minutes*)
    - **More discussion.** This activity is then followed up by discussions of scale, perspective, and feedbacks. Ideally, these will be drawn on a blackboard or flipchart. It is important to allow as much freedom as possible, emphasizing that increased precision and rigour can be worked out later. The first step is always to identify all the issues, people, policies (official and unofficial) scales, and how they interact.

AIMS/GOALS:

The goal of this module is for students to:

- Understand what complexity is, how it is manifested in the kinds of situations tackled by ecohealth approaches, and what the consequences are for policy and action;
- Identify ways to act and manage realistically within contexts of incommensurability and uncertainty;
- Explore some of the tools that help us to work with complexity, including concepts and models as well as mixed methods, and by doing so, offer some optimism to participants when faced with the overwhelming task of tackling complex problems; *and*
- Identify the types of questions that will enable us to characterise complexity.

GUIDING QUESTIONS:

- What makes a system complex and not merely complicated?
- Who is a stakeholder? What does it mean to have different perspectives on a situation?
- How does one determine which perspectives are relevant?
- How does the purpose of our inquiry change which perspectives we deem to be relevant (i.e. the purpose of understanding a system, compared with the purpose of managing it)? Who should make this determination? How?
- What boundaries are relevant (e.g. spatial, temporal, governance, scales, and so on) and how do you identify and select them? How does boundary relate to scale?
- Is there ever too much uncertainty to make a decision? What does that mean?
- How does one deal with anticipated, undesirable consequences of decisions that are intended to (and expected to) have a short term good?

WORKING TERMS:

- Multiple perspectives and stakeholders
- Temporal and spatial scales/nested scales
- Nonlinearity, emergent properties, interconnectedness, interactions, time lags
- Resilience, feedback loops, self-organization, and unintended consequences
- Uncertainty, science, and decision making

CASE STUDY EXAMPLES:

- The Kathmandu case study presented in *The Ecosystem Approach: Complexity, uncertainty, and managing for sustainability* (Waltner-Toews et al, 2008).
- The Cooum River case study in India presented in *An Adaptive Ecosystem Approach to Rehabilitation and Management of the Cooum River Environmental System in Chennai, India* (Bunch, 2000)

SECTION 1: FOUNDATIONS

DESCRIPTION:

Basic scientific questions about a virus might be answerable using widely used, peer-accepted techniques, but questions related to complex socio-ecological health issues use multiple techniques and dramatically different paradigms to delve into complementary aspects of the situation. This section introduces several such complementary approaches and explores why we would use (and what we can learn from) such things as mathematical modeling, ecological modeling, participatory techniques, epidemiological techniques, systems theories, basic biology, anthropology, and environmental management. This section also provides an overview of some of the key thinkers and methodologies of complexity and systems thinking. It will introduce the key features of complex systems, in particular, issues of scale, feedback loops (self-organization), multiple perspectives, and uncertainty. Instructors can introduce the section by presenting the scholarly literature on complexity (i.e. a few key papers), and suggesting some important features of complexity for ecohealth. This discussion could be based on asking questions related to open or closed cases. [See Developing and Using a Case Study in your Teaching]

LEARNING OBJECTIVES:

The goal of this section is to help students begin to understand the theoretical basis of ecohealth, including basic principles of complex systems theory, as well as the need for methodological pluralism and multiple stakeholder involvement.

KEY QUESTIONS:

- What is a system? What is a complicated system? What is a complex system? What is a complex adaptive system?
- What is the difference between complex and complicated?
- Where does complexity arise from? Is everything complex?
- Consider a system (preferably from your own work) that you think of as being complex. What are the elements included in this complex system? How have you chosen them? Based on what knowledge?
- How do the elements interact and how are they organized/structured? Based on what knowledge did you decide?

KEY CONTENT:

This section begins with an activity on “Incommensurability” to ensure that students become keenly aware of the need for tools for grappling with the complexity of ecohealth issues. The section should emphasize that it is not just that there are many different ideas on health and environment, but the knowledges which confront ecohealth issues do not match up neatly. This is the case both within the physical sciences, between the physical and the biological sciences, between the sciences and the social sciences, amongst the sciences and the humanities, between researchers and social workers, and amongst social workers and communities,

families, friends, and healers. The key content for this section includes post-normal science, systems thinking, complexity, resilience, non-linearity, uncertainty, scale, cross-scale interactions, panarchy/holons/nested scales, emergent properties, and self-organization.

EXAMPLES:

Instructors can use on of the examples listed at the beginning of this module, or use their own case study examples which demonstrate concepts of post-normal science, systems thinking, complexity, resilience, non-linearity, uncertainty, scale, cross-scale interactions, panarchy/holons/nested scales, emergent properties, and self-organization.

ACTIVITIES:

Activity 1: Incommensurability

LEARNING OBJECTIVES:

- Develop student's understanding that ecohealth issues cannot be reduced to simple problem-solving techniques because of the incommensurability of both the multiple perspectives involved in ecohealth issues, but and the different knowledges.
- Enable students to reflect on their dispositions towards multiple perspectives and knowledges.

INSTRUCTIONS:

STEP 1: Introduce the Issue

Introduce students to a concrete ecohealth issue in a particular situation (e.g. Kathmandu case study). Choose a situation that will prompt them to think an issue in its complexity: tar sands, wind turbines, climate change, vector-borne-disease, and so on. You can begin the section by showing diverse images of the issue to the students.

STEP 2: Statements and Expressions

Provide students with a list of true statements and expressions of the case study that express and represent different standpoints, disciplines and ways of knowing. These statements or expressions could include a description, map or model of the position of the animals in the situation, a First Nations territory map, and/or a significant sound that relates to the issue. Try to place conflict up front and to include statements and expressions of the following kinds:

- Value
- Spiritual
- Economic
- Political
- Cultural
- An equation of some sort
- A statement in a language different from your students
- A policy statement written in legal lingo

Note: *Pay attention to other modalities that you bring in throughout the course, and add these to the statements and expressions. For instance, if you have a poet or an Indigenous person as a guest, add statements or expressions to reflect this.*

STEP 3: Rank Statements and Expressions
Ask students to privately rate the statements based upon their initial reactions in terms of the following dispositions towards the statements:

- Useful
- I would consult with
- Is true
- Interesting
- I would collaborate with
- I would like to learn more
- I have expertise in this
- I can't do this
- I don't know anything about this
- I should know this
- I'm curious
- I wonder
- I think this is irrelevant

STEP 4: Reflect
Based on their rankings, ask students to reflect upon and take notes on how they felt when they experienced the dispositions and some of the thoughts or questions which came to mind. For instance, if they selected "I wonder" for one of the statements or expressions, what did they wonder about?

STEP 5: Discuss
Facilitate a group discussion around the following questions:

- Who are the stakeholders?
- What are the issues?
- What's missing?
- How would you approach this problem?
- How do you begin to work with these multiple perspectives?
- How do your dispositions make you more or less capable of approaching this problem and working with multiple perspectives?

Note: *It can be useful to ask students to write down all the issues they think are important in a kind of scattered way on a big page, then connect the ones they think are connected (talk about evidence for this) and then identify the stakeholders who either influence or are directly influenced by those issues.*

STEP 6: Debrief
Throughout the course encourage students to continue to flag the truths that they take to be true, the one's they feel they have expertise in, and the ones they find whacky and which make them uncomfortable. They can use this to critique their frame of reference and their capacity to put together a participatory project, or to choose stakeholders. Advise students to place their discomforts about their work upfront and to use this to inform their choices about how to proceed.

STEP 7: Follow-up
Ask participants to write a short reflective piece on any discomforts that they encountered with this exercise, and facilitate a short discussion around their reflections the next day. [Can be linked with the "Reflective Journal" in Transversal Activities.]

Activity 2: Mind Grooves

LEARNING OBJECTIVES:

- Demonstrate that humans have a tendency to think in linear patterns and have habits of thought which might disable us from noticing and thinking about something.
- Help students understand that complexity requires us to break out of some habits of thinking such as linear approaches to problem solving, and the belief that anything can be predictable.

INSTRUCTIONS:
Step 1: Write
Write the following words on a flipchart or a blackboard:

- slumber
- dream
- bed
- quiet
- nap
- pillow
- night
- blanket
- pyjamas
- snooze

STEP 2: Reflect
Tell the students to read the words written on the flipchart, but not to write anything down.

STEP 3: Recall
Remove the words from sight and ask the students to individually write down as many words as they can remember from the flipchart.

STEP 4: Share
Ask students to share what words they recalled. For instance, ask them who wrote down words that were on the flipchart list (e.g. 'slumber' or 'night'), and then ask them who wrote down words that were not on the flipchart list (e.g. 'sleep').

STEP 5: Reveal
Re-post the list of words on the flipchart.

STEP 6: Debrief
Lead a discussion around the following questions:

- What caused them to think that they saw the word 'sleep' on the flipchart when it wasn't?
- How might this tendency of the mind to associate and to work within "mental grooves" impair our ability to conduct participatory research, or to deal with complex, non-linear problems?
- How can we develop capacities for catching ourselves when we fall into mental grooves?

STEP 7: Follow-up Activity
Ask participants to take note of the mind grooves that they encounter throughout the course. Throughout the course, at the end of each day ask students what mind grooves they encountered.

SPECIFIC READINGS:

Funtowicz S, Ravtez J (N.d.) Post-normal science - Environmental policy under conditions of complexity. Robust knowledge for Sustainability. Available: http://www.nusap.net [accessed January 3, 2012]

Funtowiczand S, Ravetz J (2008) Beyond complex systems: Emergent complexity and social solidarity. In: Ecosystem Sustainability and Health: A Practical Approach, Waltner-Toews D, Kay JJ, Lister P (editors), New York: Cambridge University Press, pp 309–321

Waltner-Toews D (2004) Ecosystem sustainability and health: A practical approach, New York: Cambridge University Press

SECTION 2: NON-LINEAR THINKING FOR COMPLEXITY

DESCRIPTION:

This section explores how our response to manifold complexity can change our ability to see what's there, to understand, to respond, to be affected, and to be effective. In this section students will work through, collectively and individually, mentally and physically, some examples of concrete methods or practices which support abstract, non-linear, non-reductive, thinking and being: bodily practices, mental practices, linguistic practices and visualization/imagination practices.

LEARNING OBJECTIVES:

- Develop the ability to identify reductive, linear and binary thinking in and the problems associated with these.
- Develop capacities to think in complex, non-linear ways.

KEY QUESTIONS:

- Are there ways that we could develop the skills and capacities to see, perceive, think, and act in non-reductive ways?
- How are we (or how can we become) able to be reductive but in ways which actually handle, integrate, or harmonize a greater degree of complexity?
- Can we learn to tolerate, handle, and maybe even enjoy the discomfort that accompanies complex (and abstract) thought and action?
- Can we appreciate how this is a crucial component of the research cycle, not something to remove from it, but integral to the ability to do post-normal ecohealth research?

WORKING TERMS:

- reductive thinking
- binary thinking
- linearity and non-linearity
- post-normal science

KEY CONTENT:

Non-linear thought or ways-of-being, and non-reductive, non-binary thinking, is often required in situations of high uncertainty and maximum urgency. However, when we don't know something we have a tendency to clamp down, close off, simplify, reduce, throw bits overboard, and/or run away. Are there other things we could do? Does our response to confusion or manifold complexity change our ability to see what's there, to understand, to respond, to be affected, to be effective? This line of inquiry thus has scientific relevance (connected to truth-value and good-knowing) and ethical relevance (connected to something within our capacity to pay attention to, and do a better or worse job with).

EXAMPLES:

Instructors are encouraged to use one of the cases listed at the beginning of this module or to construct or use their own case study examples which demonstrate binary thinking in all its guises and problems, and strategies for developing the capacities to think in complex, non-linear ways.

ACTIVITIES: RESPONSES TO MANIFOLD COMPLEXITY

LEARNING OBJECTIVES:

- Work through and understand, collectively and individually, mentally and physically, some examples of concrete methods or practices which support abstract, non-linear, non-reductive, thinking and being; bodily practices, mental practices, linguistic practices and visualization/imagination practices.
- Explore ways that we could develop the skills and capacities to see, perceive, think, and act in non-reductive ways, and develop an understanding of how this can affect research practices and results.
- Witness the effects and unintended consequences of our word choices and illustrate that words are not simply "givens" hovering above the things they name, but are signs always carrying many possible meanings.

Activity 1: What could your body do?

INSTRUCTIONS:

- **Explore** one or more physical activities (yoga, karate, judo, dance, music, etc.). This activity would be a great opportunity to invite someone skilled in a particular activity to lead this part of the section. Or, one of your students might have such a skill and could lead the section.
- **Experiment** with bodies – arm movements, leg movements, extension and retraction, and capacity to grasp in order to explore how linearity and binaries are built into, as strong habits, our physical comportment.
- **Discuss:** Facilitate a group discussion about student's examples of their own bodies, their own somatic practices in the lab, in fieldwork. Questions for reflection and discussion:
    - How do different physical activities disrupt our ideas of purpose and function?
    - How does what we can do as somatic beings ratify or affect our work as mental beings, and vice versa?
    - What are some of the somatic practices of field work, research, and the lab?

Activity 2: What could your mind hold?

- **Activity:** Show students a couple of 'double aspect' drawings, for instance, the duck/rabbit illustration. (An internet search of: duck rabbit + double aspect + gestalt)
- **Discussion:** Ask students to reflect on and share some examples from their own research experience which are analogous to the 'double aspect' drawings.

Activity 3: What do your words do?

- **Read:** Jan Zwicky on metaphor
  - "I am interested in the phenomenon of 'seeing-as' because it encapsulates the mystery of meaning. The moment of recognition happens as if by magic; and yet, when we reflect on it, we see - its very name tells us this - that it is impossible without prior experience. What becomes puzzling then is the phenomenon of insight, the creation (apparently) of new meaning. Here, we forget that to re-cognize can mean to re-think, as in think through differently. It need not always signify mere repetition of a former cognition. We say in such cases not only that we recognize x (as Y), but that we realize x is y...

    'Recogniton' - even in the most straightforward cases of identification or recall - involves re-organization of experience - an act of contextualization, a sensing of connexions between aspects of immediate experience and other experiences. Thus the experiences of seeing how an assemblage of parts must go together, recognizing an old friend in an unfamiliar setting, and understanding a metaphor are species of the same phenomenon. They all involve insight, understood as re-cognition; a gestalt shift. And this is the origin of meaning." (Zwicky, 2003)

- **Experiment:** Try to consider metaphor as ***weight-bearing*** and ***shuttling between*** hetergeneous ***parts*** of the world. Letting what doesn't go together go together. Begin to see metaphor as an experiment with meaning-making. As a group, come up with a couple of metaphors for what is around the room or outside the window and think through Zwicky's description of metaphor (above) using yours as a working example.
- **Brainstorm:** Collectively brainstorm some health and ecology metaphors. Next, brainstorm the multiple meanings, concepts, and affects expressed by those metaphors.
- **Examples:** Present students with some examples of health and ecological metaphors from health and ecology literature. For instance, "contamination", "carrier," and "choking hazard."
  - **Discussion:** Discuss how our words or statements can silence or push one feature (aspect) of reality forward, leaving others out of focus. Admit that we cannot be overly poetic and and metaphorical in all of our work, but that there is a kind of action or accomplishment that goes along with how we speak, whatever idiom we use.

Activity 4: What could you see if you looked?

- **Read:** Jeanette Winterson excerpt on experiencing painting - http://www.randomhouse.ca/catalog/display.pperl?isbn=9780394281704&view=excerpt
    - "Long looking at paintings is equivalent to being dropped into a foreign city, where gradually, out of desire and despair, a few key words, then a little syntax make a clearing in the silence. Art... is a foreign city, and we deceive ourselves when we think it familiar... We have to recognize that the language of art, all art, is not our mother-tongue." (Winterson, 1996)

- **Discuss:**
    - How is our relationship with various art forms akin to our position as researchers grappling with the uncertainty of complex ecohealth issues?
    - What can our relationship with art can teach us about grappling with complexity and uncertainty?

Debrief: *Facilitate a group discussion around the following questions.*

1. Do we have a sense of what linear and non-linear thinking and processes are, or look like? What are good examples?
2. Do we know what binary thinking is, or feels like? What are good examples?
3. Do we have some working examples of reductivist thinking in science and/or living? What about non-reductivist thinking in science and/or living?
4. Do we know when it is, in fact, best to think non-reductively or in non-linear fashion, and do we have a sense of when reductive, linear, binary thinking(s) are actually more appropriate? What does that 'sense' consist in?
5. Are there ways that we could develop the skills and capacities to see, perceive, think, and act in non-reductive ways? Or, to be able to be reductive but in ways which actually handle, integrate, or harmonize a greater degree of complexity? Or, to be able to handle/tolerate (even enjoy) the discomfort that accompanies abstract complex thought and action? Can we appreciate how this is a crucial component of the research cycle, not something at remove from it, but integral to the ability to do post-normal ecohealth research?
6. Are there ways we could develop the skills and capacities to discern when it is better to open up, stay abstract, not collapse into binaries, or drive forward into efficiency and a solution versus when it is best to focus in, get concrete, lose degrees of abstraction and make decisions?

SPECIFIC READINGS:

Bunch MJ (2000) An adaptive ecosystem approach to rehabilitation and management of the Cooum River environmental system in Chennai, India. PhD Dissertation. Waterloo, Ontario, Canada: Department of Geography, Faculty of Environmental Studies, University of Waterloo.
Available: http://uwspace.uwaterloo.ca/bitstream/10012/597/1/NQ56673.pdf

Gislason MK (2010) Sounding a public health alarm: Producing West Nile virus as a newly emerging infectious disease epidemic. In: Understanding Emerging Epidemics: Social and Political Approaches, Advances in Medical Sociology, Volume 11, Mukherjea A (editor), Emerald Group Publishing Limited, pp.77–99

Winterson, J (1996) Art Objects: essays on ecstasy and effrontery. Vintage Books Canada.

Zwicky, J (2003) Wisdom & Metaphor. Gaspereau Press.

SECTION 3: MAPPING COMPLEXITY

DESCRIPTION:

There is no objective 'correct' way to map complexity; the goal of complexity mapping is to communicate the interrelations and interactions between particular elements with regards to a particular topic, as perceived at a particular time in a particular space. One hundred maps of the same topic by the same person would all be different, and would all be correct. Complexity maps are used to understand systems as wholes. The goal of this section is to get students comfortable with different ways of mapping and exploring the conceptual interrelationships (complexity) in their work, research projects, theses, and so on. The section is designed to develop student understanding of complexity and systems via discussion and a hands-on exercise.

LEARNING OBJECTIVES:

- Show students how to use a visual depiction to explore the complexity and interrelationships in different systems.
- Discuss the visual depiction of complexity not as a definition, but as the communication of perception.
- Compare and contrast different ways to represent complexity and interrelationships.

KEY QUESTIONS:

- What is complexity mapping?
- How does complexity mapping relate to systems thinking?
- How is complexity mapping useful in research and writing?

KEY CONTENT:

- Agent-based models
- Spaghetti diagrams
- Word clouds
- Holons & nested heirarchies
- Traditional brainstorms
- Feedback loops (including Hollings' infinity loop)
- Quadrants
- Venn diagrams

Visual Complexity

INSTRUCTIONS:

STEP 1: Brainstorm (20 minutes):

- Facilitate a discussion around the following question: What is complexity mapping, how can it be used in research?
- Within this discussion, extract overarching themes as identified by the students and write these themes on flipcharts that will be used as touchstones for the rest of the session.
- Touch on how complexity can be assessed and mapped conceptually. Examples of complexity/conceptual maps can be posted or projected in order to stimulate thinking.
- Emphasize that these maps can be subjective, and that the point of complexity mapping is to elucidate connections, issues, and emergent themes, ***not*** to 'do it right' or achieve some goal of 'the perfect mapping of a complex issue.'

STEP 2: Visual complexity activity (35 minutes)

- **Brainstorm:** Ask students to consider the complexity in their own research, and then help them conceptualize how the fragments can be depicted visually (5 minutes).
- **Speed-mapping:** Ask students to map the complexity in their own work using flipchart paper and coloured markers (15 minutes).
- **Share and Discuss:** Divide the room and students into two groups. Ask one side of the room to visit the other side to look at maps and pose questions to their creators, and then switch (15 minutes).

SPECIFIC READING

Bateson R (1979) Every Schoolboy Knows. In: Mind & Nature: A necessary unity, New York: E.P. Dutton. Available: http://www.oikos.org/m&nschoolboy.htm

Berlow T, (2010) How Complexity Leads to Simplicity. TED Talks [video]. Available: http://www.ted.com/talks/lang/eng/eric_berlow_how_complexity_leads_to_simplicity.html

Resilience Alliance (2011) The Resilience Alliance Workbook for Practitioners, version 2. Available: http://www.resalliance.org/index.php/resilience_assessment

SECTION 4: TRANSDISCIPLINARY THEORETICAL APPROACH

DESCRIPTION:

This section explores why grappling with complexity requires methodological pluralism and multiple stakeholder involvement, and how one might meet these requirements in a real-world research setting. It specifically addresses the issue of scale, and how it relates to accommodating multiple perspectives, different stakeholders, and feedback loops. It is important to relate the stakeholders to the scale of their interest and power, and to look at where feedback loops cross scales (for instance, national health concerns responded to by regulation which favours large scale), can undercut local resilience by uncoupling local feedbacks (such as agricultural production and environment).

LEARNING OBJECTIVES:

- Discuss and illustrate the particular challenges that complex ecohealth problems pose to research, action/intervention and policy in general and within one's own research and the case study (i.e. projects are a part of a bigger system).
- Practice critical thinking and reflection with regard to one's view of the world, choice of conceptual frameworks, roles, methods and actions.
- Reflect upon elements of one's ethical practice such as respect, reciprocity, relevance, and responsibility.
- Understand the importance of the observer and the context in what is observed, and therefore the need for multiple perspectives.

KEY QUESTIONS:

- What do different researchers mean by complexity and complex systems?
- Why do we use different approaches?
- How does one begin to synthesize the information from different approaches?

KEY CONTENT:

- Scale
- Feedback loops (self-organization)
- Multiple perspectives
- Uncertainty

INSTRUCTIONS:

STEP 1: Background Presentations

Identify a situation or open case study case study for this activity. The "situation" could be defined initially by landscape (e.g. Hamilton Harbour), issue (e.g. environmental degradation), or illness (e.g. Avian Influenza). Invite knowledgeable people to address particular aspects of complexity in the defined situation or open case study. There should be at least four brief presentations and the overall session should be facilitated by someone with skills in participatory methods.

STEP 2: Multiple Perspectives

After the four presentations, have student prepare for a mock town hall meeting ***or*** a debate on the open case study. The goal of the mock town hall meeting or debate is for students to be able to say or see how one would move toward making a decision.

- **Town Hall Meeting:** Have students prepare for a mock eeting where a policy or management proposal related to the case study is put forward. Divide the students into different groups and assign different stakeholder and/or academic perspectives to each group. Be sure to include different ages and genders in the perspectives you assign [see Module 5: Gender & Sex]. Then, ask the students to role play and debate the policy or management proposal from their assigned perspective.
- **Debate:** Have an open debate among the presenters and students about what this situation means in real life and what one does with this.

Scaling Down this Activity

- **Shorter version:** Invite two or more lecturers from different backgrounds to talk about complexity (e.g. social complexity versus mathematical complexity, and how this relates to policy and decision-making). The lectures should be followed by an open question period with students and (hopefully) some stakeholders from the case study situation.
- **Shortest version:** Present a lecture covering all the above topics, with one or more closed case studies illustrating the key points.

SPECIFIC READING

Brugha R, Varvasovzky Z (2000) Stakeholder analysis: A review. Health policy and Planning 15: 239–246

Waltner-Toews D, Kay JJ, Neudoerffer C, Gitau T (2003) Perspective changes everything: Managing ecosystems from the inside out. Frontiers in Ecology and the Environment 1: 23–30

Waltner-Toews D, Kay J, Lister N-M (2008) The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability. New York: Columbia University Press

Waltner-Toews D, Neudoerffer C (2010) Agro-urban ecosystem health assessment in Kathmandu, Nepal: A multi-scale, multi-perspective synthesis. In: Systems Practice: How to Act in a Climate Change World, Ison R (editor). London: Springer

Section 5: Conceptual and Concrete Tools for Working with Complexity

Description:

This section further explores concepts of systems thinking and introduces various tools and methods to help structure ecohealth research and programs. The students will apply these tools and frameworks to their own research and examine the challenges and opportunities that each provides.

Learning Objectives:

- To explore different approaches to structuring ecohealth research and programs;
- To implement one or more different approaches, such as:
    - Influence diagrams
    - AMESH diagram
    - Modelling scales
    - Mapping tools

Key Questions:

- How do you structure ecohealth research?
- Where are you going to get the history of the system?

Key Content

Systems thinking:

- Interacting systems: political, infrastructural, social, ecological, human, animal, and so on
- Ways of accessing or reading the history of systems: Elders, tree rings, core ice samples, hair sampling, bird feathers, dead people, newspaper archives, and so on.
- Temporal trends and cycles
- How to think about timelines: possible futures, synchronic and diachronic
- Degrees of anticipation: ways to read a situation, signs of possible future events
- Phase shifts: non-linear change

Concrete tools that enable you to put these things together:

- Spaghetti diagrams
- AMESH diagram
- Modelling scales
- Mapping tools

AMESH Diagram:

- **Present:** Present the example case or situation (e.g. Kathmandu case study) and describe the case in terms of the AMESH diagram
- **Activity:** Ask the students to create a AMESH diagram for their own research
- **Discuss:** In small groups, ask the students to discuss:
  - How the diagram works, or doesn't work
  - What was hard to fit in?
  - What's missing?
  - How might they adjust it?

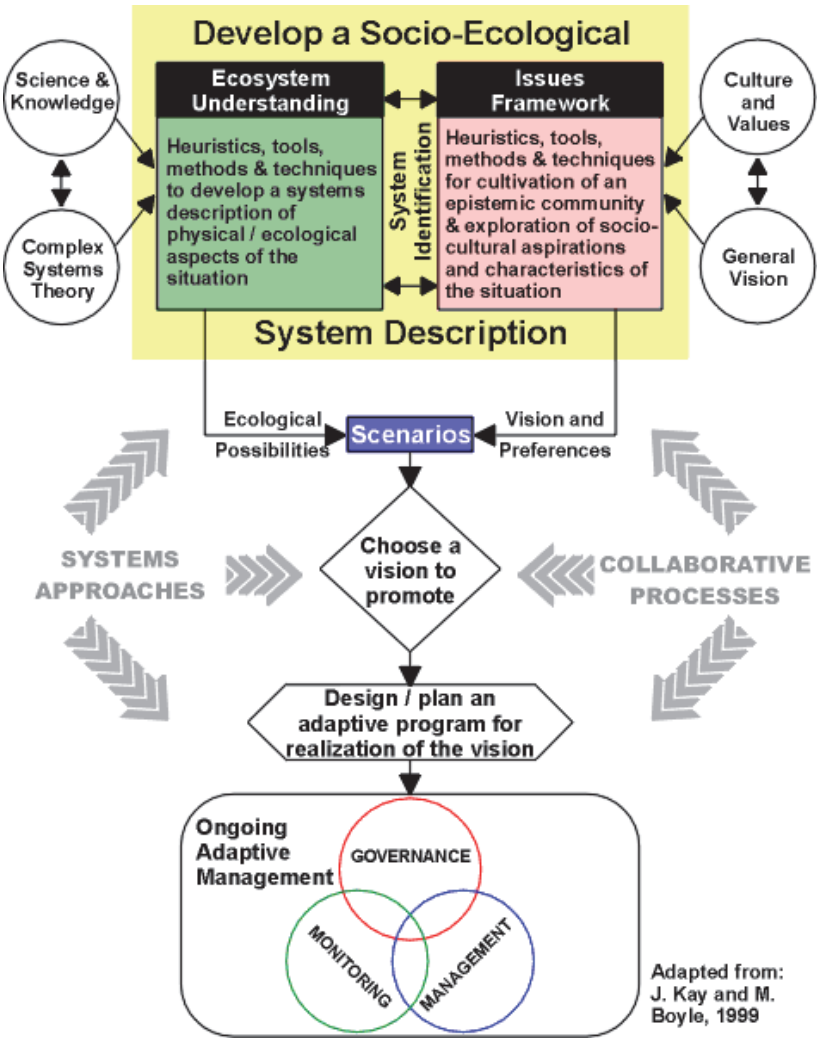

Figure 1: Adaptive Methodology for Ecosystem Sustainability and Health (AMESH) Diagram © Nesh 2003, reprinted with permission.

Influence diagrams

- **Present:** Present the example case or situation (e.g. Kathmandu case study) and describe the case in terms of the Spaghetti diagram.
- **Activity:** Ask the students to create a Spaghetti diagram for their own research
- **Discuss:** In small groups, ask the students to discuss:
    - How the diagram works, or doesn't work
    - What was hard to fit in?
    - What's missing?
    - How might they adjust it?

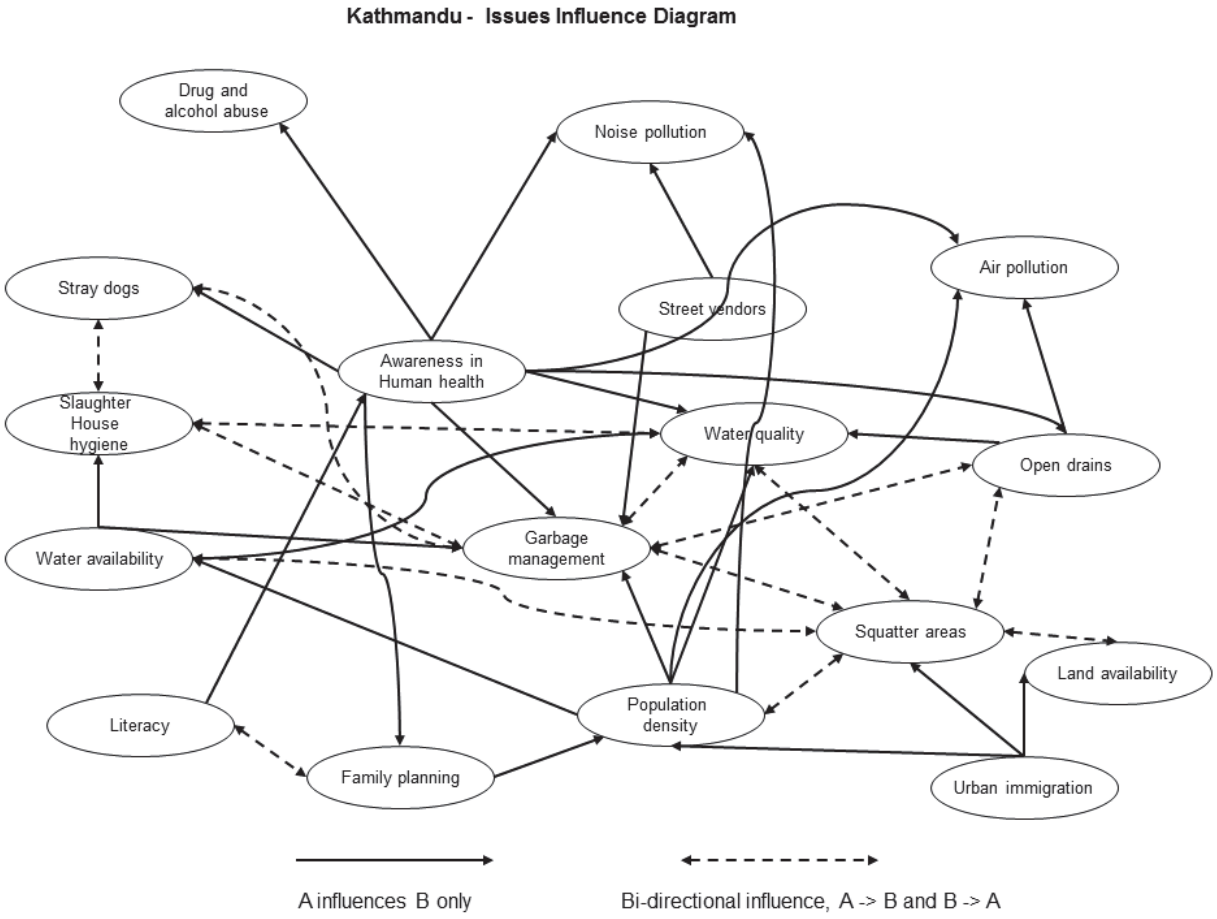

Figure 2: Influence Diagram © Nesh 2003, reprinted with permission. See Waltner-Toews D, Neudoerffer C (2010) Agro-urban ecosystem health assessment in Kathmandu, Nepal: A multi-scale, multi-perspective synthesis.

Scale diagrams

- **Present:** Present the example case or situation (e.g. Kathmandu case study) and describe the case in terms of a scale diagram
- **Activity:** Ask the students to create a scale diagram for their own research
- **Discuss:** In small groups, ask the students to discuss:
    - How the diagram works, or doesn't work
    - What was hard to fit in?
    - What's missing?
    - How might they adjust it?

Debrief

Facilitate a group discussion to explore each type framework and discuss re-occurring themes, observations, challenges, and opportunities.

SPECIFIC READINGS:

Allen TFH (2008) Scale and type: A requirement for addressing complexity. In: The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability, Waltner-Toews D, Kay JJ, Lister N-M (editors). New York: Columbia University Press

Evans K, Velarde SJ, Prieto RP, Rao SN, Sertzen S, Dávila K, Cronkleton P, de Jong W (2006) CIFOR's guide: Field guide to the future: Four ways for communities to think ahead. Available: http://www.asb.cgiar.org/ma/scenarios/field-guide.asp

Neudoerffer CR, Waltner-Toews D, Kay JJ, Joshi DD, Tamang MS (2005) A diagrammatic approach to understanding complex eco-social interactions in Kathmandu, Nepal. Ecology and Society 10: 12.
Available: http://www.ovc.uoguelph.ca/personal/ecosys/documents/DiagramPaper.pdf

Peterson GD, Beard D, Beisner B, Bennett E, Carpenter S, Cumming GS, Dent L, Havlicek T (2003) Assessing future ecosystem services: A case study of the Northern Highland Lake District, Wisconsin. Conservation Ecology 7:
Available:
http://www.cnr.uidaho.edu/css385/readings/peterson_assessing_future_ecosystem_services.pdf

Peterson GD, Cumming GS, Carpenter SR (2003) Scenario planning: A tool for conservation in an uncertain world. Conservation Biology 17: 358–366

Resilience Alliance (2011) The Resilience Alliance Workbook for Practitioners, version 2. Available http://www.resalliance.org/index.php/resilience_assessment

Waltner-Toews D, Kay J, Murray T, Neudoerffer C (2004) Adaptive methodology for ecosystem sustainability and health (AMESH). In: Community operational research: systems thinking for community development, Midgely G, Ochoa-Arias AE (Editors). New York: Plenum Publications/Kluwer Academic

SECTION 6: INTERVENTIONS – EXAMPLES FROM RESEARCH AND POLICY

DESCRIPTION:

In this section students will be introduced to examples of work where people have taken complex systems into account and made system adjustments or policy change.

LEARNING OBJECTIVES:

- Develop skills to identify how scholarly research, intervention, and policy are related from the viewpoints of various stakeholders.
- Develop skills to identify links between policies across jurisdictional boundaries, bureaucratic mandates, and geographic scales.
- Develop skills to identify how policy and ecohealth research influence each other, and the dangers and opportunities afforded by these mutual influences.
- Develop effective language and communication skills that would be appropriate for policymakers at various scales and constrained by various bureaucratic mandates.

KEY QUESTIONS:

- How (if at all) is an intervention or policy that takes complexity into account different from one that doesn't?
- What are the relationships between science, policy, and intervention in a complex ecosystems approach? What are the dangers as well as the benefits of these relationships?
- Consider some examples: How did the tools of complexity and/or ecohealth inform these interventions or policy?

EXAMPLES:

There are a number of excellent examples to demonstrate the main topics of this section, including the following case studies:

- Chopra K, Leemans R, Kumar P, Simons H (2005) Millennium Ecosystem Assessment: Responses Assessment. Island Press.
  Available: http://www.maweb.org/en/Responses.aspx
- Gale RJP (1997) Canada's Green Plan. In: Nationale Umweltpläne in Ausgewählten Industrieländern [a study of the development of a national environmental plan with expert submissions to the Enquete Commission "Protection of People and the Environment' for the Bundestag (German Parliament)]. Berlin: Springer-Verlag pp. 97–120.
  Available: http://www.ecological-economics.org/pages/greenplan.html
- Goy J, Waltner-Toews D (2005) Improving health in Ucayali, Peru: a multi-sector and multi-level analysis. Ecohealth 2:47–57

ACTIVITY:

Bureaucrat Q&A

INSTRUCTIONS:

STEP 1: Presentation
Invite a bureaucrat to give a short lecture about a policy change which was informed by complexity, followed by a Q&A session.

STEP 2: Activity
Ask students develop their posters [Transversal Activity] based on insights they gain during this session.

STEP 3: Debrief
Facilitate a group discussion guided by the *Key Questions* for this Section.

SPECIFIC READING:

Gitau T, Gitau M, Waltner-Toews D (2008) Integrated assessment of health and sustainability of agro-ecosytems. New York: Taylor and Francis/CRC Press

Gitau T, Waltner-Toews D, McDermott J (2008) An agroecosystem health case study in the Central Highlands of Kenya. In: The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability, Waltner-Toews D, Kay JJ, Lister N-M (editors). New York: Columbia University Press pp 191- 212

Glouberman S, Zimmerman B (2002) Complicated and complex systems: What would successful reform of Medicare look like? Discussion Paper Number 8, Commission on the Future of Healthcare in Canada

Kay JJ, Regier H (1999) An ecosystem approach to Erie's ecology. In: The State of Lake Erie (SOLE) – Past Present and Future. A tribute to Drs. Joe Leach & Henry Regier. Munaar M, Edisall T, Munawar IF (editors). Netherlands: Backhuys Academic Publishers. pp 511-533

Murray T, Waltner-Toews D, Sanchez-Choy J, Sanchez-Zavala F (2008). Food, floods and farming: An ecosystem approach to human health on the Peruvian Amazon frontier. In: The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability, Waltner-Toews D, Kay JJ, Lister N-M (editors). New York: Columbia University Press pp 213–235

Pagnutti C, Azzouz M, Anand M (2007) Propagation of local interactions create global gap structure and dynamics in a tropical rainforest. Journal of Theoretical Biology 247: 168–181

Waltner-Toews D, Neudoerffer C (2010) Agro-urban ecosystem health assessment in Kathmandu, Nepal: A multi-scale, multi-perspective synthesis. In: Systems Practice: How to Act in a Climate Change World, Ison R (editor). London: Springer

Waltner-Toews D, Neudoerffer C, Joshi DD, Tamang MS (2005) Agro-urban ecosystem health assessment in Kathmandu, Nepal: Epidemiology, systems, narratives. EcoHealth 2, 155–164

Waltner-Toews D, Noronha L, Bavington D (2006) Science and society in place-based communities: Uncomfortable partners. In: Interfaces Between Science and Society: European Commission Joint Research Centre, Pereira AG, Vaz SF, Tognetti S (editors). Greenleaf Publishing: Sheffield

REFERENCES:

Beishon RJ, Peters G (1972) Systems behaviour, New York: Open University Press

Capra F (1982) The turning point: Science, society, and the rising culture, London: Wildwood House, pp. 265–304

Capra F (1996) The web of life: A new scientific understanding of living systems, New York: Anchor Books

Casti JL (1994) Complexification: Explaining a paradoxical world through the science of surprise, New York: HarperCollins

Checkland PB (1981) Systems thinking, systems practice, Toronto: John Wiley & Sons Ltd

Holling CS (2001) Understanding the complexity of economic, ecological, and social systems. Ecosystems 4: 390–405

von Bertalanffy L (1968) General system theory: Foundations, development, applications (Revised ed.), New York: George Braziller Inc

Waltner-Toews D, Kay JJ, Neudoerffer C, Gitau T (2003) Perspective changes everything: Managing ecosystems from the inside out. Frontiers in Ecology 1: 23–30

SOCIAL NETWORKS

Authors: Dr. Johanne Saint-Charles, Dr. Pierre Mongeau, Dr. Jena Webb

CONNECTS WITH:
Complexity – Gender – Participation and Research

TABLE OF CONTENTS:

The lead author would like to thank Frédéric Mertens and Marie Eve Rioux-Pelletier, former students and now collaborators on many research projects linking social networks with health and environment issues. Although they did not contribute directly to this module, our continued collaboration is an inspiration for my work, as has been and continues to be my work with colleagues of Cinbiose and CoPEH-LAC.

MODULE INTRODUCTION

DESCRIPTION:

People are embedded in relationships forming patterns and structures that both constrain and enable beliefs and actions. We call these patterns social networks or human communication networks (Monge & Eisenberg, 1987; Monge & Contractor, 2003; Saint-Charles & Mongeau, 2005). At its most basic, a network is the pattern formed by a set of links uniting a set of "nodes." Both links and nodes can be of different natures: roads and cities, synapses and neurons, radio waves and routers. The qualifier "social" implies that links and nodes are related to living organisms, most often humans. Although one can study animal networks, human-animal networks or artefact-human networks, this module will focus on human networks, the networks created by the relationships between individuals or groups of individuals.

Social network analysis is both a paradigm and a method (Wellman, 1988; Borgatti & Lopez-Kidwell, *in press*). As a paradigm, social network can be considered a complex systems perspective on relationships. Nowadays, in many of our societies, the focus is upon the individual, we see numerous studies on "identities," we blame individuals for their choices, we invite them to become entrepreneurial, we promote healthy behaviours and lifestyles as if this all depended solely on the individual while, paradoxically, talking about social determinants of health.

The social network perspective proposes another lens: a focus on links, on relationships. From this perspective, identities are constructed and modified through our relationships. For example, rather then trying to "prove" that someone is a born leader (something that has been largely disproved – Fisher, 1986, Mongeau & Saint-Charles, 2005; Stogdill, 1948, 1974) or a born entrepreneur, we look at the position of this person in the social network and see how this gives him or her opportunities for leadership and entrepreneurship (Brass & Krackhardt, 1999; Burt, 2000). As a method, social network analysis (SNA) offers a wealth of mathematical, qualitative and graphing tools to analyse the patterns formed by relationships (Loblich & Pfaff-Rudiger, 2011; Wasserman & Faust, 1994). People from many disciplines, such as anthropology, biology, communication, sociology, mathematics, physics, psychology, etc, have studied social networks. Although nourished by all of these disciplines, the perspective proposed here is communicational – meaning it is most interested in the process of sense-making and self-making through relationships.

The guiding principles of ecosystem approaches to health imply "dealing" with relationships: when working with transdisciplinarity and participation, there is a need to encourage the development of relationships between people from various contexts; and when integrating gender equity and social justice, one has to understand the underlying patterns of relationships between social groups and the norms that guide them.
Using social network lenses as a heuristic, this module explores its potential to contribute to ecosystem approaches to health research and intervention.

DIRECTIONS

The first section sets the scene as to 1) the importance of relationships in the construction of self and society; and 2) the "system view limitations" when looking at social networks. The second section presents some basic concepts used in the study of social networks in non-technical language. Finally, the second section offers some ideas on how to use social network thinking as a heuristic in a research or intervention project without having to engage in the full (and cumbersome) process of social network analysis. Any combination of these modules can be taught, but module 3 - being essentially conceptual - is not really a stand-alone; it can, however, be broken down into parts quite easily.

AIMS/GOALS

- To introduce participants to "network thinking" as a heuristic for better understanding the complexity of human relationships.
- To invite participants to reflect upon the construction of personality through relationships.
- To offer participants tools to apply network thinking to their research / intervention.

GUIDING QUESTIONS

- What is a relationship?
- How do relationships both allow and constrain actions?
- How does the pattern formed by various relationships influence the constitution of the self?
- How does the pattern formed by various relationships both reflect and create underlying power structures and dynamics?
- How does an "informed knowledge" of the network linking people help specific ecohealth research or interventions?

WORKING TERMS

- Networks
- Boundary
- Links and relationships

SECTION 1 – DEFINING THE NETWORK

This first session deals with the "definition" of the network that will be observed and studied. Links can be made with systems thinking [see Module 3: Complexity]. It can be conducted as a very short session by removing parts of it and combining it with any of the other sessions in this module.

LEARNING OBJECTIVES:

- Understand the role played by relationships in the development of identity.
- Develop a perspective on the opportunities and constraints created by the relationship pattern of an individual.
- Develop a sense of how the definition of nodes, relationships and boundaries affects our perception of a network.

KEY QUESTIONS:

- What role do relationships play in the definition of the self, in the opportunities and constraints affecting the person?
- What are the boundaries of the network studied?
- Who are the actors in this network?
- How do they relate (or not) to one another?
- What patterns are emerging from these relationships?

DISCUSSION QUESTIONS:

- What is my personal relationship trajectory? How does it affect my being here today?
- How can I develop sensitivity to others' relationship trajectories?
- Can a relationship really be defined?
- Who knows the truth about relationships: an outside observer? Those involved in the relationship? What if they don't agree?
- What equity issues affect the composition of one's social network?

KEY CONTENT:

Histories of individuals are often told in terms of their deeds, sometimes contextualised by social origins or the broader social context. But what if we were to tell our history through the lenses of the network of relationships we are embedded in? We would probably discover how influenced we are and have been by these relationships.

The idea of the importance of relationships is far from new: As a net is made up of a series of ties, so everything in this world is connected by a series of ties (Buddha, c 563-483 BCE). More recently, we can think of the work of symbolic interactionists in the exploration of the importance of interactions and relationships (Blumer, 1969). And, of course, many social network studies show that attitudes, beliefs and behaviours are very much related to how and with whom people are connected (Borgatti & Lopez-Kidwell, in press).

Along the lines of connectivity is the famous "Small World Theory" which postulates that everybody is connected to everybody on our planet by a mean of 6 interpersonal connections, painting a picture that you can easily have access to anybody and to the resources they have access to. While this mean is substantiated by the results of some studies (Milgram & Travers, 1977; Watts, 2003), it is, as any mean, not representative of the differences between individuals. The length of the path between one individual to another is very much affected by homophily and equity. Homophily is the tendency of humans to form relationships with similar others, such similarity being based on a combination of socio-demographics attributes and attitudes, values and beliefs (McPherson, Smith-Lovin, & Cook, 2001) – these relationships, in turn, contribute to the construction of our attitudes, values and beliefs. So, as we all know, there are "social groups" that do not mix easily together and there are status differentiations between these groups. So, in the end, the length of the path is influenced by social differentiations.

If a network is a set of "nodes" and "links," then defining what constitutes the set, what (or who) are the nodes and what type of links we are talking about should be important (Laumann, 1983; Richards, 1985). Your first tools in doing this are the objectives of the research / action and some knowledge about the network you intend to study or understand. Whether you plan on doing a "real" social network analysis or you intend to be more observant about the relationships in your research / action (see section 3), these considerations are necessary.

Another way of talking about the "set" would be to talk about defining the boundaries of the system. Often times, what comes to mind are the more "formal" boundaries: members of a group or an organisation, inhabitants of a community, stakeholders in a watershed, and so on. This is a very logical place to start, but the questions we end up asking may change this: what is the purpose of understanding the network? Do you want to know how the information about health and environment might circulate in the community? Do you wish to find out who are the most trusted people in the community when it comes to health problems or farming issues? These two questions are easy ones: the name of the boundary – it's the community. But what if you want to know more about the social capital of the community? Then it becomes trickier. Social capital has to do with how people support one another in a group or community, but it also has to do with the ability of community members to have access to resources outside the community. So where is the boundary here? The whole world? Hum… a bit ambitious.

Once you have defined the boundaries, you need to figure out the nodes. Will they be individuals? Couples? Households? Groups? Organisations? If you select households or organisations, do you need everybody or only representatives? If you opt for representatives, who will you chose: Official representatives? Secret informants? Men? Women?

Finally, which relationships are relevant? People have various types of relationships: work related relationships, friendships, support relationships, advice and influence relationships. Moreover, most people have what is called **multiplex relationships** combining affective, cognitive and behavioural aspects. So, if we are to map the network of a bounded group, which relationships are relevant for our objectives? The question is pertinent in terms of our objectives, but it cannot be answered "from the outside." The meaning of "friendship" is very different from one culture to another (Bidart, 1997) and you cannot just ask people "who are your friends?" without having an idea of what it means to them.

All of the above means that you can't go about doing a network study without having some knowledge of the types of relationship and of their meaning for the people involved. Fortunately, this doesn't mean you have to launch a full 10-year anthropological study before doing any kind of network study (see section 3 about "how to use a network perspective without doing a network study").

Now, let's talk a little bit about "personal networks." So far, we have been talking mostly about the social network of a group, an organisation or a community (called "sociocentric networks"). But we can also map the personal network of an individual (an "egocentric network" or "ego network") and many of the concepts and measures used with sociocentric networks can be applied to ego networks. As we have seen in the introduction, our relationships have a lot to do with who we are, which values and beliefs we hold. For example, knowing the composition and structure of the ego network of various individuals or groups of individuals may help understand if people have social support (Barrera, 1986, Cohen et al., 2000; Wellman et Wortley, 1990).

ACTIVITIES:

Activity1:
Construction of self through relationships: Personal communication network[1]

This exercise is self-reflexive and helps seeing oneself as constructed through relationships. It invites participants to reflect upon how the relationships they have had throughout their life have influenced their way of being. All they have to do is follow the step-by-step instructions below. Copies can be made and students can be asked to complete the exercise on their own. An open discussion, of varying lengths, about what has emerged can be held soon after participants have completed the exercise.

MATERIALS:

- Copies of the Past and Present Relationship Table

[1] Translated from Mongeau P (1982) Les réseaux d'influence. Psychologie 151: 43-45. Adapted for CoPEH-Canada by Johanne Saint-Charles, with the author's permission.

- Copies of Circle no.1 and Circle no. 2 diagrams

INSTRUCTIONS:

STEP 1: Past relationships
In the first column of the table "Past relationships" write down the name (first name is sufficient) of up to fifteen individuals or groups with whom you have had a significant relationship.

- The relationships you identify can be with individuals but also with groups (e.g., sport groups, band of teenagers you hanged around with).
- You can select both "good" and "bad" relationships – the keyword here is "significant."
- The duration of the relationship does not matter – it could be a 20 years relationship or a 2 hours relationship as long as you think it was significant for you.
- It can also be a relationship with a pet or a fictional character.

STEP 2: Present relationships
Repeat the process for "Present relationships."

- The distinction between "past" and "present" is up to you since the length of what we consider the present varies. Usually in times of intensive change we tend to consider that the last few months are "present time" while in times of stability such "present time" may represent a few years.
- You can consider a relationship to be both part of the past and part of the present.
- Since "present" is bound to be shorter than "past" you may well have fewer names for the present.

STEP 3: Keywords
Go back to your lists and write down beside each relationship one or two keywords representing what you consider to have learned with these relationships.

- We are influenced in various ways by our relationships. Brainstorm a little bit for the words to come to your mind and select the one that is most significant for this relationship. In can be things like "to assert oneself," "to appreciate food," "to laugh," "competition," "care," and so on.
- If a relationship is repeated in the past and present lists, its keywords do not have to be the same for both periods.

STEP 4: Circles
Copy the keywords for relationships of the past in the *circles no. 1,* writing the most significant in the innermost circle and the least significant in the outermost.
Repeat the operations for the present relationships in the *circles no. 2*.

Past Relationships	Keywords
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	

Present Relationships	Keywords
1.	
2.	
3.	
4.	
5.	
6.	
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8.	
9.	
10.	
11.	
12.	
13.	
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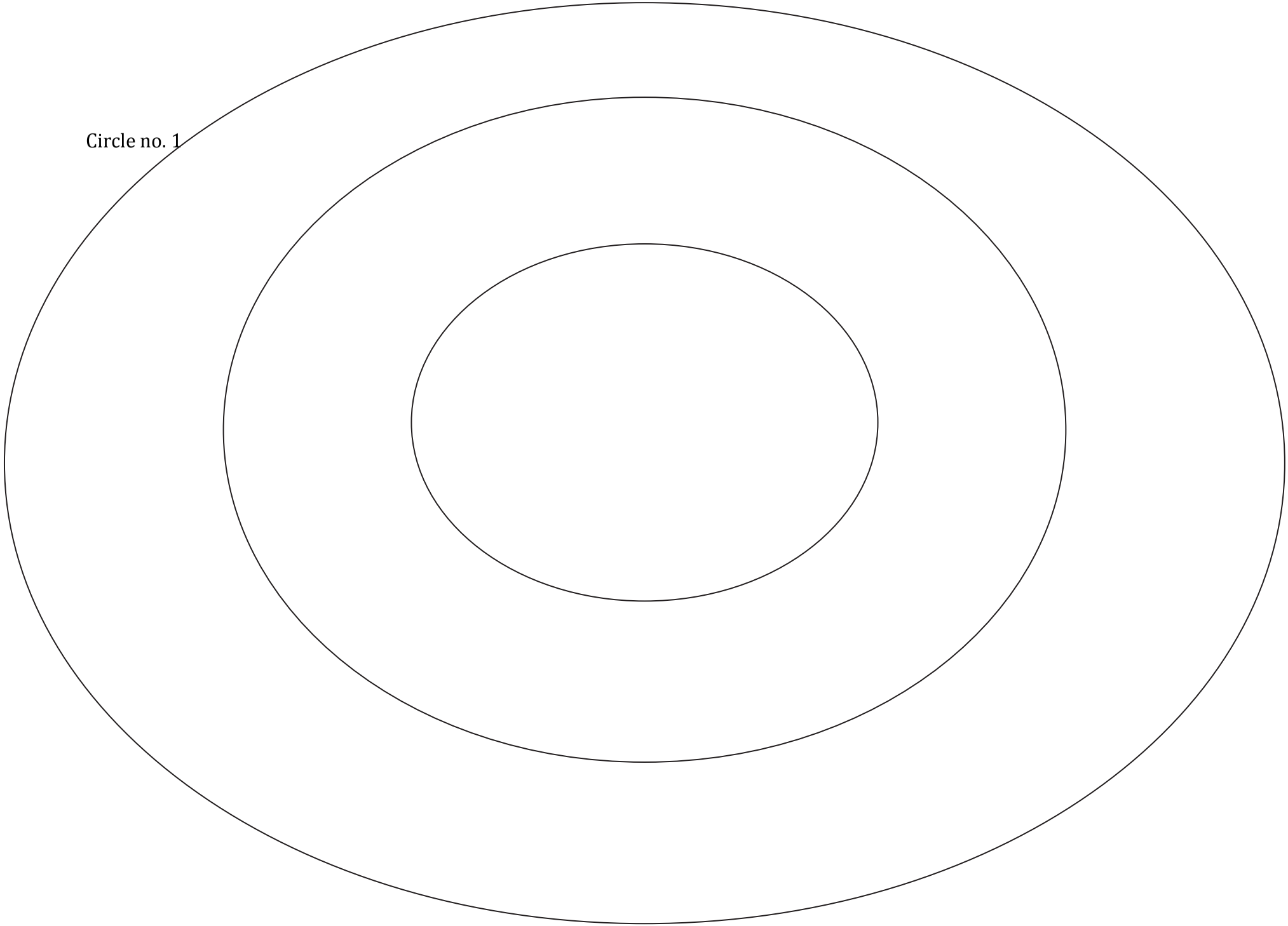
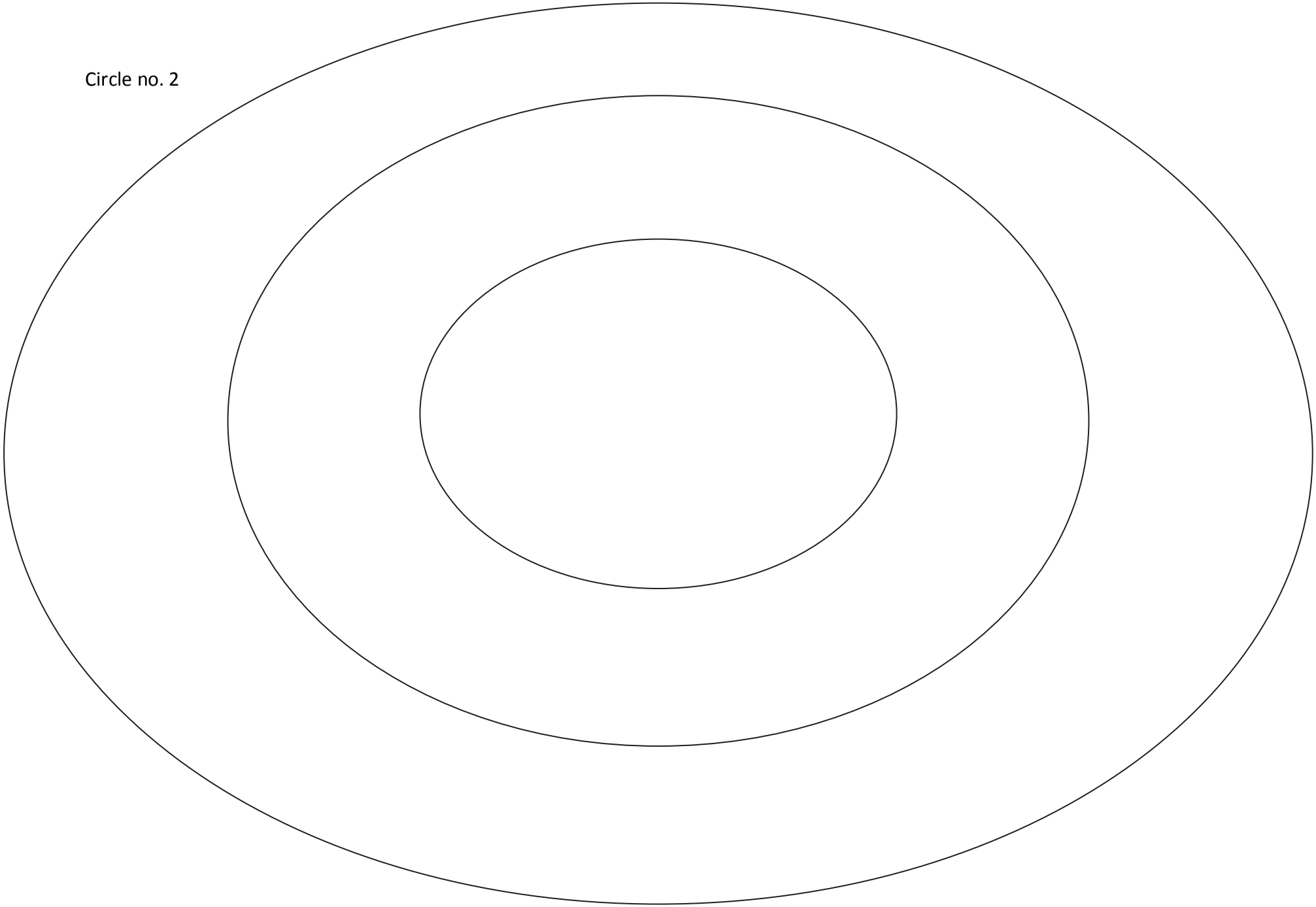
15.	


Circle no. 1

Circle no. 2



Activity 2: How many people do you "know"?

TOTAL TIME: 60 minutes

DIRECTIONS:

From a 2-3 page list of names (taken from a phonebook, for example), ask people to list every person they know or have known with any of those names or surnames. "Knowing" here is being able to recognize this person on the street (provided she or he has not changed too much ☺) and she or he would be able to recognize you. Stop the exercise after 10-15 min. The result should be impressive for most. According to Degenne & Forsé (1994), our relationships are organised in "concentric circles" where there are close to 5000 acquaintances, 200 people in our entourage, 20 people with whom we have regular interactions and 2 or 3 confidents. These are means that do not take into account the context in which live (e.g. urban vs. rural), the social group to which we belong and the mobility possibilities we have. Have people examine their results in terms of gender, region and even name similarities (Mateos et al. 2011) for 15 minutes and discuss them (30 minutes).

SPECIFIC READINGS:

Barrera MJ (1986) Distinctions Between Social Support Concepts, Measures, and Models. American Journal of Community Psychology 14:413-445

Blumer H (1969) Symbolic interactionism: Perspective and method. Englewood Cliffs, NJ: Prentice Hall

Borgatti SP, Lopez-Kidwell V (in press) Network theory In: The SAGE Handbook of Social Network Analysis, Scott J and Carrington PJ (editors) London: Sage Publications

Cohen S, Underwood LG, Gottlieb BH (2000) Social support measurement and intervention. New York: Oxford University Press

Degenne A, Forsé M (1994) Les réseaux sociaux. Paris, Armand Colin

Laumann EOA-M (1983) The Boundary Specification Problem in Network Analysis. Applied Network Analysis (p. 19-34). Beverly Hills: Sage

Mateos P, Longley PA, O'Sullivan D (2011) Ethnicity and Population Structure in Personal Naming Networks. PloS one 6:e22943

McPherson M, Smith-Lovin L, Cook JM (2001) Birds of a Feather: Homophily in Social Networks 27:415-444

Milgram S, Travers J (1977) An Experimental Study of the Small World Problem. Social networks: a developing paradigm (p. 465). New York: Academic Press

Mongeau P (1982) Les réseaux d'influence. Psychologie 151: 43-45

Richards WDJ (1985) Data, Models, and Assumptions in Network Analysis. Organizational Communication: Traditional Themes and New Directions (p. 109-128). Beverly Hills: Sage

Wasserman S, Faust K (1994) Social Network Analysis – Methods and Applications. Cambridge: Cambridge University Press

Watts DJ (2003) Six Degrees - The Science of a Connected Age. New York: W. W. Norton & Company

Wellman B, Wortley S (1990) Different Strokes from Different Folks: Community Ties and Social Support. American Journal of Sociology 96:558-88

Wellman B, Carrington PJ, Hall A (1988) Networks as Personal Communities. Social Structures: A Network Analysis (pp. 130-184). Cambridge, UK: Cambridge University Press

SECTION 2 – BASIC CONCEPTS

LEARNING OBJECTIVES:

- Develop skills in "reading" networks through the use of some basic concepts in social network analysis.
- Understand the basic tendencies of human networks.
- Develop a vocabulary to speak about social networks.

KEY QUESTIONS:

- What specific patterns appear in the network under study?
- Are any of these patterns typical?
- How can these patterns be related to other aspects of the network (cohesion, social capital, equity, power relationships, information diffusion, etc.)?

KEY CONTENT:

The whole idea of mapping the social network of a group or a community is to elicit the patterns formed by the relationships and to try to understand how these patterns are related to some aspects of the community. For example, this could be its resilience (Mertens et al. 2008), its potential for the diffusion and appropriation of scientific research results (Saint-Charles et al. 2012), its social capital (Krishna & Uphoff, 1999; Krishna, 2002), the successful completion of its goal (Pagliccia et al., 2010), natural resource management (Bodin and Crona, 2009), etc. Throughout the years, researchers have identified quite a few concepts and measures that help to "read" a network. Here we will present some of the basic ones which will help people to understand data from social network analysis.

"Normal biases" in human networks

A social network is never random: if you try to generate a series of random networks with the same number of links and nodes, your social network will always be skewed towards certain configurations. This is because there are human tendencies at play. Here we present 3 of these.

Triangle closure: when person « A » has a strong relationship with both persons « B » and « C » then there will probably be, at least, a weak relationship between B and C.

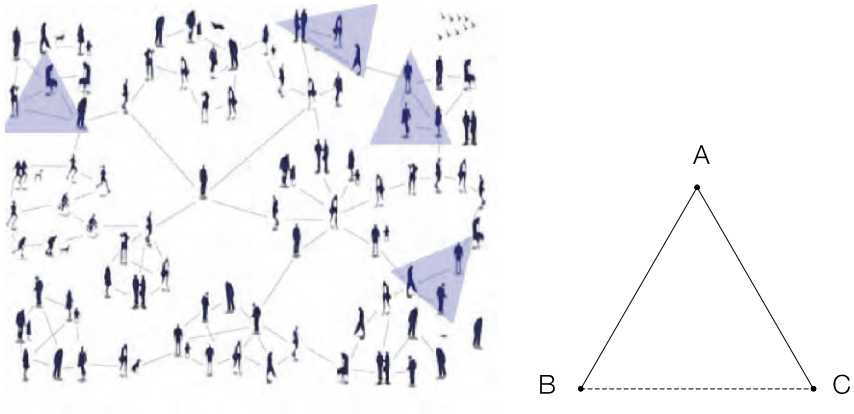


Figure 1: Triangle closure

Homophily: People have a tendency to associate with people who resemble them. These people are said to share a homophily link. This bias refers to the "degree" of similarity of the individuals who interact (Rogers, 2003). Homophily is not a new concept (Lazarsfeld and Merton, 1954). Aristotle said people "love those who are like themselves" and Plato claimed, "similarity begets friendship" (McPherson et al., 2001). The first studies of this phenomenon, conducted in the beginning of the 20th century, showed that people in homophile networks resemble each other in terms of sociodemographic and psychological characteristics. Sex, age, ethnicity, membership to the same group, values/attitudes/beliefs are all attributes which people could share (McPherson et al., 2001; Rogers, 2003). The relative "difference" of two people will translate into a "distance" in the network (McPherson et al., 2001).

Reciprocity: the probability that a link will be reciprocal. If a link from "a" to "b" exists then the probability that a link from "b" to "a" exists is significantly greater than chance (Fararo & Skvoretz, 1984).

Figure 2: Reciprocity

Groupings

As we have seen, people tend to gather themselves along the lines of homophily, reciprocity and relational proximity (triangle closure). Such tendencies form "pockets of density" in a network and it is not unusual to find in a group, an organisation or a community "areas" where there are noticeably more relationships between a group of people then between these people and the rest of the network. With certain types of relationships (advice relationships, for example), we may even see that the network is not connected – that there are "components" meaning that there is no relational path between certain people (at least for the studied

relationships). A good example of this would be the tendency of people in an interdisciplinary research network to seek advice primarily from people from their own research discipline, despite existing connections with people from other disciplines.

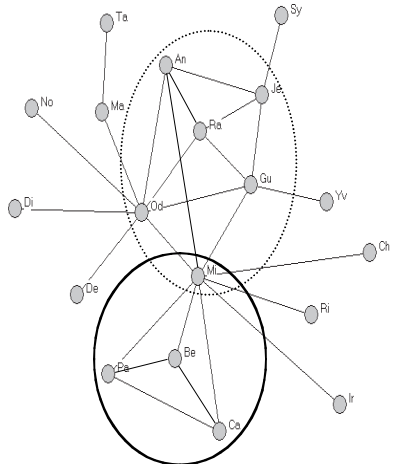


Figure 3: Pockets of density

Scholars of social networks have created a wealth of measures to capture these groupings: cliques, clans, components, core and so on (Scott, 2000; Wasserman and Faust, 1994). But a simpler way to look at these components without having to go through all of the measures is to measure the density of the network and of its various components and to compare the measure thus obtained. Density is the number of existing relationships divided by the number of possible relationships based on the number of nodes in the network.

A starting hypothesis in resource management is that a higher network density leads to greater communication and trust between actors and, hence, a better outcome in co-management of resources (Bodin and Crona, 2009). High density has also been shown to increase knowledge flow but only up to a certain point. When the network contains too many ties a homogenization of knowledge can occur which can be counter productive for resource management (Bodin and Crona, 2009).

From an individual point of view, the density of one's personal network (often called "ego network") can be a source of social and emotional support but it can also act as a prison (Saint-Charles et al., 2008).

These various groupings eventually form larger structures, some of which are typically found in social networks. Here we will present two of these: the core-periphery structure and the small-world structure.

Core-periphery structure: The core periphery structure is very frequent (Borgatti and Everett, 1999) and is to be expected in many groups and communities. For example, in natural resource management, core-periphery structures can facilitate co-management through 1) creating a centre where diverse ecological knowledge from the periphery can be concentrated (in the core) and 2) creating a hub (the core) of information dissemination to the periphery. The fact that there are not competing subgroups, but rather one coherent group, can also reduce issues related to "us-vs.-them" (Bodin and Crona, 2009). Communities of practice also often develop "core-periphery" structures, a development aided by the fact that most communities of practice emerge from the coming together of a small group of devoted and passionate people (Saint-Charles and Thoër, in press).

Risks exist though. Core-periphery structures have the potential to succumb to power issues between the core and the periphery and these social networks can also be very sensitive to the removal of key individuals, reducing their resiliency (Bodin and Crona, 2009; Mertens et al., 2008). A study evaluating intersectoral action on health determinants in Cuba, which has a decentralized health care system, found that three sectors – health, education and the People's Power Assembly – accounted for most of the observed links in the network (Pagliccia et al., 2010). The authors point out that to improve the interconnectedness of the network (network density) policy makers should strive for more intersectoral balance. The concentration of links to these three sectors creates a situation where the system is at risk of seeing these sectors control information and resources.

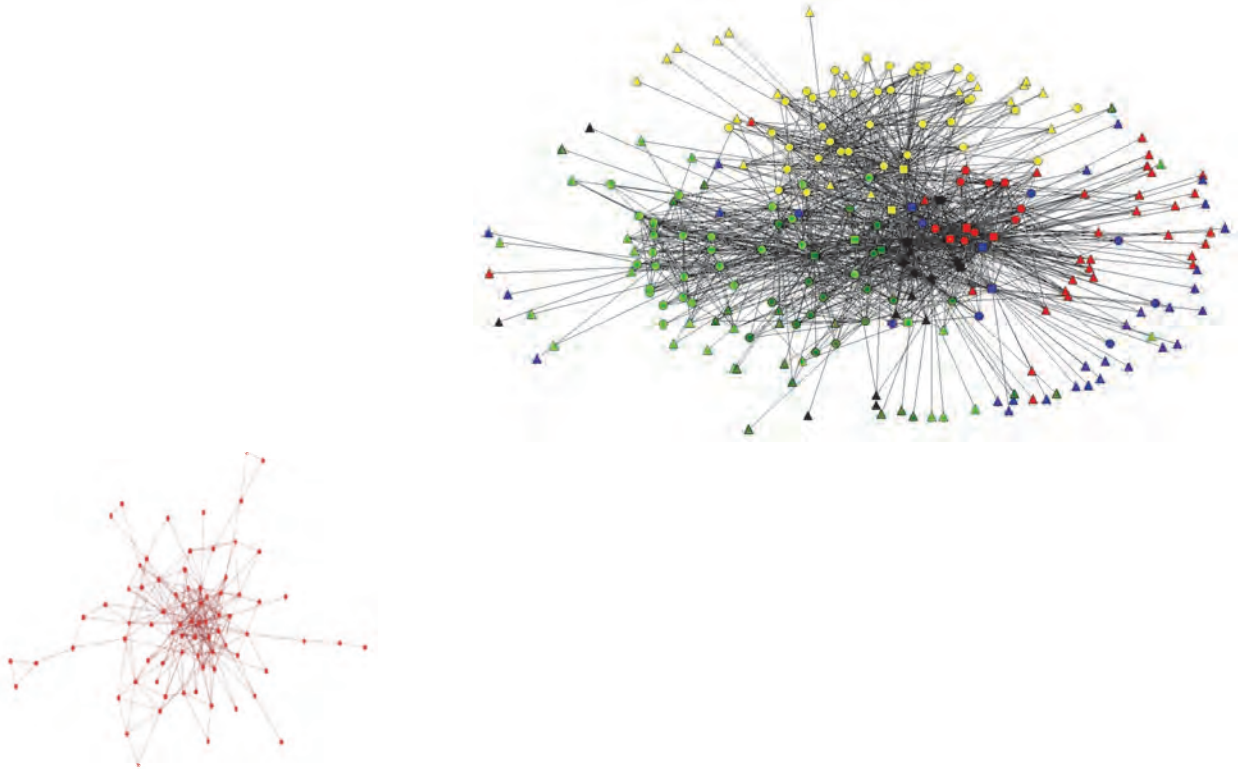


Figure 4: Core-periphery structure

Small World: We have already talked about the limitations of the "Small World Theory" in terms of equity (or the lack of). That doesn't mean that the theory doesn't hold, only that we need to nuance its interpretation. Behind the theory, is a pattern frequently found in human networks (and other types of networks as well, see: Watts, 2003). Small World Networks have high local clustering and low path-length. Figure 5 illustrates clearly that there are small densely connected groups themselves connected by a few "transversal" lines creating short-cuts between the groups. The small groups are generally connected by strong ties, which tend to fragment the network into non-connected small groups, while intergroup connections tend to be made by weak ties (Granovetter, 1973, 1983; Hansen, 1999; White & Houseman, 2003).

Nodal characteristics

As we have seen earlier, who we are is strongly influenced by the relationships we hold. These relationships are not only influential in themselves (for example being influenced by the opinion of loved ones), but they are also embedded in a structure that can facilitate or hinder our actions. Social network analysts have developed concepts and measures to better understand the role of the structural position of a node (Borgatti and Lopez-Kidwell, *in press*; Erickson, 1988). Here we will explore three concepts of "centrality." These three concepts have been chosen because they are easily observable without having to do a comprehensive social network analysis.

When Moreno (1934) created "sociometry," one of the ancestors of quantitative social network analysis, "popularity" was among the first concepts to be explored. "Popularity" (now more often called *prestige*) was the number of nominations received by an individual. In social network analysis this concept was expanded to include both received and sent nominations and was formalised as *degree centrality*. *Indegree centrality* is the part of degree centrality expressing popularity.

Degree centrality is easy to grasp as a concept and easy to measure as well. It is also easy to observe. There are other ways of being central which are equally important for the understanding of the network. In a seminal article in 1979, Freeman uncovered "three distinct intuitive conceptions of centrality" (Freeman, 1979 : 215): degree centrality, betweeness centrality, closeness centrality. Subsequent studies have supported these "intuitions" and demonstrated their importance. It is far beyond the scope of this module to review all of these studies, but an exploration of these three basic notions should contribute to the development of a "network lens."

Aside from the "popularity idea," which is self-explanatory, **degree centrality**, as measured by the number of links of a node, expresses the "communication activity" of an individual. **Betweeness centrality**, is the number of times an individual is on a path between two others who are themselves not directly connected. It has to do with the control of communication in the network. When these links connect two subgroups, rather than two individuals, they are referred to as "bridging ties." Finally, **closeness centrality** measures the mean distance of a

node to all other nodes in the network and has to do with the independence or efficiency of a node. Individuals who occupy a central position in a social network often have substantial influence. In natural resource management, "bridging ties" between subgroups allow the central individuals to have access to the specialized ecological knowledge of each group (Bodin and Crona, 2009). They can then facilitate the transfer of tacit knowledge between groups, if they are willing, that is.

Let us note in conclusion that these three measures have all been shown to be related to influence and to the diffusion of ideas or practices (Bodin and Crona, 2009; Brass, 1992; Ibarra and Andrews, 1993; Valente, 2010).

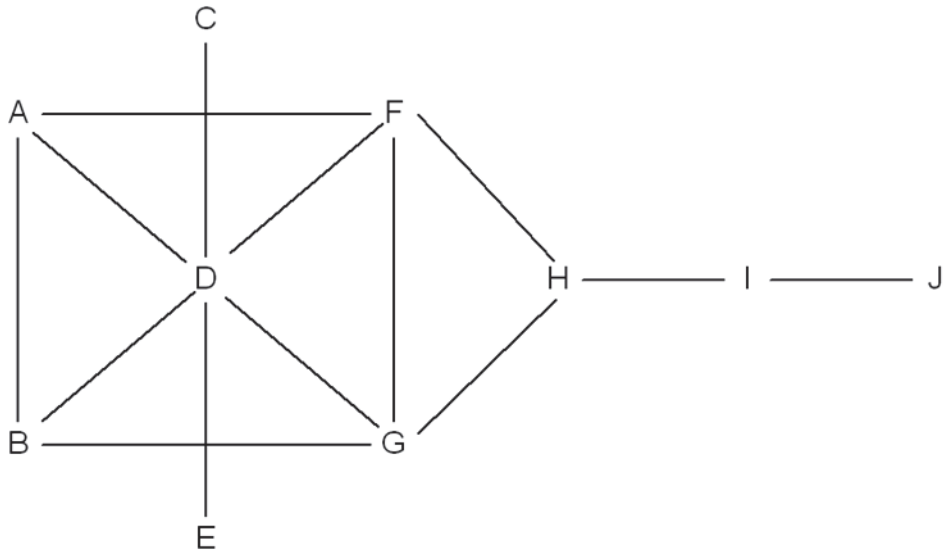


Figure 6: Centralities – In this kite structure, "D" has the highest degree centrality, while F and G are ex-aequo in terms of closeness and H is the most intermediate (source: Krackhardt, 1990: 351).

ACTIVITIES:

Activity 1: Construction of the group's social network

TOTAL TIME: 45-90 minutes

DESCRIPTION: This exercise is a group activity and helps to see oneself and others as constructed through relationships. This activity can follow a session on social networks to help grasp the concepts, but it is also a nice activity to build a feeling of community. If you are going through the exercise for this purpose it might be helpful to briefly demonstrate a few of the social network concepts before embarking. It can be a nice activity to end a course or workshop on as it gives a feeling of something that is growing.

MATERIALS: several large pieces of paper, tape, a large empty wall, markers, a chair.

BEFORE THE ACTIVITY: tape together as many pieces of paper as will fill your wall. Tape the gigantic paper to the wall. Have markers and a chair on hand.

STEP1: Constructing the group's social network prior to the course (*45 minutes*)
Ask everyone in the group to think of the people who they knew working in one way or another with the ecosystem approaches to health before arriving at the course. Then ask the participants to come up one by one and write their name and the name of those other people on the paper with a line connecting themselves to these people. If someone has already been written on the paper they are not written a second time but rather the line is made to the original instance of this person. After everyone has taken their turn have people step back and contemplate the structure of the network. Ask people to comment on what they see. You can end the activity here or move onto step two.

STEP 2: Constructing the group's social network after the course (*30 minutes*)
Now ask someone to come up and draw lines between everyone who participated in the workshop or course (only if a line didn't already exist). Now look at the image. What has changed? Which structures have emerged? What impact might this have on the functioning of the community?

Activity 2: Changing the focus of one's project

TOTAL TIME: 60-90 minutes

STEP 1: Analysis of one's own project (*20 minutes*)
Invite participants to define boundaries, relationships and actors in their own project. Have them mentally explain why they made these choices.

STEP 2: Small group discussion (*40 minutes*)
Then, having participants working in small groups of 4-5 people, propose that one of them present his / her choices while the others strive to find other boundaries, actors or relationships they think would be relevant for his / her project. Invite people to refine the arguments supporting their choice (including resource limitations). You can end the activity here or move on to step 3.

STEP 3: Visualizing the network (*30 minutes*)
Individually, have the participants draw the network that has emerged from steps 1 and 2. Once all the links are on paper, have them identify the structures described in this module and think about what consequences these structures have on the issue being studied.

SPECIFIC READINGS:

Bodin Ö, Crona BI (2009) The role of social networks in natural resource governance: What relational patterns make a difference? Global Environmental Change 19:366-374

Borgatti SP, Everett M (1999) Models of Core-Periphery Structures. Social Networks 21:375-395

Borgatti SP, Lopez-Kidwell V (in press) Network theory In: The SAGE Handbook of Social Network Analysis, Scott J and Carrington PJ (Editors) London: Sage Publications

Brass DJ (1992) Power in Organizations: A Social Network Perspective. Research in Politics and Society 4:295-323

Erickson B (1988) The Relational Basis of Attitudes. Social Structures: A Network Approach (pp. 99-121). Cambridge: Cambridge University Press

Fararo TJ, Skvoretz J (1984) Biased networks and social structure theorems: Part II. Social Networks 6:223-258. doi:10.1016/0378-8733(84)90012-1

Freeman LC (1979) Centrality in Social Networks : Conceptual Clarification. Social Networks 1:215-239

Granovetter MS (1983) The Strength of Weak Ties: A Network Theory Revisited. Sociological Theory 1:201-233

Granovetter MS (1973) The Strength of Weak Ties. American Journal of Sociology 78:1360-1380

Hansen MT (1999) The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. Administrative Science Quarterly 44:82-111

Ibarra H and Andrews SB (1993) Power, social influence and sensemaking: effects of network centrality and proximity on employee perceptions. Administrative Science Quarterly 38:277-303. doi:0001-8392/93/3802-0277

Krackhardt D (1990) Assessing the Political Landscape: Structure, Cognition and Power in Organizations. Administrative Science Quarterly 35:342-369

Krishna (2002) Active Social Capital: tracing the roots of development and democracy. New York: Columbia University Press

Krishna A, Uphoff N (1999) Social Mapping and Measuring Social Capital: A conceptual and Empirical Study of Collective Action for Conserving and Developing Watersheds in Rajasthan, India. Washington DC: The World Bank

Lazarsfeld PF, Merton RK (1954) Friendship as a Social Process. Freedom and Control in Modern Society (pp. 18-66). New York: Nostrand D. Van

McPherson M, Smith-Lovin L, Cook JM (2001) Birds of a Feather: Homophily in Social Networks 27:415-444

Mertens F, Saint-Charles J, Lucotte M, Mergler D (2008) Emergence and robustness of a community discussion network on mercury contamination and health in the Brazilian Amazon. Health Education and Behavior 35:509-521

Moreno JL (1934) Who Shall Survive? Washington, Dc: Nervous and Mental Disease Publishing Company

Pagliccia N, Spiegel J, Alegret M, Bonet M, Martinez B, Yassi A (2010) Network analysis as a tool to assess the intersectoral management of health determinants at the local level: A report from an exploratory study of two Cuban municipalities. Social Science & Medicine 71:394-399

Rogers EM (2003) Diffusion of Innovations. New York: Free Press

Saint-Charles J, Mongeau P, Biron J-F (2008) A Communication Perspective on Video Lottery Terminals. International Gambling Studies 8:233-247 doi:10.1080/14459790802405848

Saint-Charles J, Rioux-Pelletier M-E, Mertens F, Mongeau P (2012) Diffusion of environmental health information: the role of sex- and gender-differentiated pathways. What a Difference Sex and Gender Make: A Gender Sex and Health Research Casebook. Can be downloaded on the Web : http://www.cihr-irsc.gc.ca/e/44734.html [French version: Saint-Charles, J., Rioux-Pelletier, M.-E., Mertens, F., & Mongeau, P. (2012b). Diffusion d'informations en santé environnementale : le rôle des chemins différenciés selon le sexe et le genre. Recueil de cas sur la recherche liée au genre, au sexe et à la santé.]

Saint-Charles J, Thoër C (in press) Les communautés de pratique virtuelles en santé In: Internet et Santé, Lévy J and Thoer C (Editors) Presses de l'université du Québec

Scott J (2000) Social network analysis a handbook. London: Sage

Valente TW (2010) Social Networks and Health. New York: Oxford University Press

White DR, Houseman M (2003) The Navigability of Strong Ties: Small Worlds, Tie Strength and Network Topology. Complexity 8:72-81

SECTION 3 – HOW TO USE A NETWORK PERSPECTIVE WITHOUT DOING A NETWORK STUDY

This short section is intended to highlight some ways one can integrate a social network perspective into one's work without having to learn the all the tricks of the trade.

LEARNING OBJECTIVES:

- Explore "tricks and techniques" to make use of a "network perspective."
- Reflect upon the idea that social network analysis is primarily a social science not a mathematical science.

KEY QUESTIONS:

- How clear is my "internal picture" of the social network I am concerned with?
- Who would be the most critical informants in helping me to better understand the social network I am concerned with?
- How can I include some aspects of a social network perspective in my current project?

Observation

What if Uncle Jim and Aunt Alice were not the enemies you thought them to be but rather secret lovers? It is not uncommon to "discover" such surprising connections between people we thought we knew well (Casciaro et al, 1999). This points out that it is not easy to have a perfectly clear picture of a social network by observation alone.

This is not pointed out simply to discourage you from using your observational skills to better understand a social network. Rather, it is to invite you to refine those skills. For example:

- In a meeting, note who is sitting next to whom (and the corollary: far from whom), in front of whom, in diagonal with whom.
    - Sitting places, especially when they become "habitual" are an expression of the network.
- In a discussion, note the patterns of interaction: who talks after whom? Who never does?
- Note also who is "building upon" the discourse of someone else to construct his or her own. Who is making a synthesis of what was said? In such synthesis, are anybody's ideas left out?
- From these observations, draw a portrait of the network: how does this portrait reflect your impression about the relationships between these people? Are there seeming contradictions? If so, explore them; try to understand what they mean.

Informants

When doing ecohealth research or conducting an intervention, we are often outsiders and having informants tell us about the network might be a good idea. But, how to choose a "good" informant? There is no perfect recipe here, but you might want to remember that, among other things, positive affectivity and central position in the network have been shown to positively influence the accurate perceptions of other's relationships in a network (Casciaro et al, 1999; Krackhardt, 1990). Care should be taken here though: the very positive, very central individual in a community is also well placed not to see discontent or not to be aware of factions.

Group Diagnostic

Inspired by the activity "Construction of the group's social network" proposed in Section 2 of this module, you could devise an activity for the group you are working with to have them draw a picture of their network. Be mindful of sensitivities – don't ask people to say publicly who they like or dislike – rather choose a more "public" relationship. Have people talk about the emerging picture they are creating.

- The AMESH methodology (Waltner-Toews et al., 2003) although addressing a much larger realm than social networks also offers interesting insights on this. [See Complexity Module]
- Finally, Clark (2006) proposes a way to use a social network analysis program (*UCINet*) for the simplified mapping of social networks.

Adding a network question to a questionnaire

If your research or intervention involves using a questionnaire, you may find it interesting to add one network question to it. For example:

- You may ask people who they go for advice or whom they believe to be knowledgeable on the topic x in their group or community. This would give you an idea of trusted individuals in the community. Knowing whether or not there is consensus is in itself valuable information.
- You may have a more general question on whether people feel they have social support and what type of support they have.
- Related to these two questions could be a question about access to resources – either information resources or support resources. You could ask who in the community is most connected to sources of information (internet access, libraries, government data, well connected individuals, etc.) or support outside the community (family members working abroad, links to government programmes, etc.).

SPECIFIC READINGS:

Casciaro T, Carley KM, Krackhardt D (1999) Positive Affectivity and Accuracy in Social Network Perception. Motivation and Emotion 23:285-306

Clark L (2006a) Network Mapping as a Diagnostic Tool. La Paz, Bolivie: Centro Internacional de Agricultura Tropical

Clark L (2006b) Manual para el Mapeo de Redes como una Herramienta de Diagnóstico. La Paz, Bolivie: Centro Internacional de Agricultura Tropical

Krackhardt D (1990) Assessing the Political Landscape: Structure, Cognition and Power in Organizations. Administrative Science Quarterly 35:342-369

Waltner-Toews D, Kay J, Murray TP, Neudoerffer C (2003) Adaptive Methodology for Ecosystem Sustainability And Health (AMESH) : An Introduction. Community Operational Research: OR and Systems Thinking for Community Development (Contemporary Systems Thinking). Kluwer Press

REFERENCES:

Adamsa AM, Madhavanb S, Simon D (2002) Women's social networks and child survival in Mali. Social Science & Medicine 54:165-178

Borgatti SP, Lopez-Kidwell V (in press) Network theory In: The SAGE Handbook of Social Network Analysis, Scott J and Carrington PJ (editors) London: Sage Publications

Boulay M, Valente TW (2005) The Selection of Family Planning Discussion Partners in Nepal. Journal of Health Communication 10:519–536

Brass D, Krackhardt D (1999) Social Capital for Twenty-first Century Leaders. In: Out-of-the Box Leadership Challenges for the 21st Century Army, Hunt, JG and Phillips, RL (Editors), Emerald Group Publishing Limited (pp. 179-194) http://www.andrew.cmu.edu/~krack/academic/papers.html

Burt RS (2000) The network structure of social capital. In: Research in Organizational Behavior, Sutton RI and Staw BM (editors), JAI Press.

Fisher AB (1986) Leadership. When Does the Difference Make a Difference, In: Communication and Group Decision-making, Hirokawa, RY and Poole MS (Editors), (pp. 198-215). Beverly Hills: Sage

Loblich M, Pfaff-Rudiger S (2011) Network analysis: A qualitative approach to empirical studies on communication policy. International Communication Gazette 73(7):630-647. doi:10.1177/1748048511417159

Mertens F, Saint-Charles J, Mergler D (In press) Social communication network analysis of the role of participatory research in the adoption of new fish consumption behaviors Social Science & Medicine

Mertens F, Saint-Charles J, Demeda K, Castro M, Passos C J S, Lucotte M, Guimarães JRD, et al. (2006) Community Network Analysis For Addressing Gender, Equity And Participation In Ecohealth Research. Proceedings of IDRC's participation in the 11th World Congress on Public Health. Rio de Janeiro, Brazil: CRDI

Mertens F, Saint-Charles J, Lucotte M, Mergler D (2008) Emergence and robustness of a community discussion network on mercury contamination and health in the Brazilian Amazon. Health Education and Behavior 35:509-521

Mertens F, Saint-Charles J, Mergler D, Passos CJ, Lucotte M (2005) A network approach for analysing equity in community involvement in participatory research. Ecohealth 2:1-15

Monge PR, Contractor NS (2003) Theories of Communication Networks. New York: Oxford University Press

Monge PR, Eisenberg EM (1987) Emergent Communication Network. Handbook of Organizational Communication: an Interdisciplinary Perspective. Beverly Hills: Sage

Mongeau P, Saint-Charles J (2005) Communication et émergence du leadership dans les groupes, In: Communication : horizons de pratiques et de recherche, Saint-Charles, J., and Mongeau, P. (editors). Montréal, Presses de l'Université du Québec

Saint-Charles J, Rioux-Pelletier M-E, Mertens F, Mongeau P (2012) Diffusion of environmental health information: the role of sex- and gender-differentiated pathways. What a Difference Sex and Gender Make: A Gender Sex and Health Research Casebook. Can be downloaded on the Web : http://www.cihr-irsc.gc.ca/e/44734.html [French version: Saint-Charles, J., Rioux-Pelletier, M.-E., Mertens, F., & Mongeau, P. (2012b). Diffusion d'informations en santé environnementale : le rôle des chemins différenciés selon le sexe et le genre. Recueil de cas sur la recherche liée au genre, au sexe et à la santé.]

Saint-Charles J, Mongeau P (2005) L'étude des Réseaux Humains de Communication. In : Communication : horizons de pratiques et de recherches (pp. 73-99). Québec: Presse de l'Université du Québec

Stogdill RM (1948) Personal factors associated with leadership. Journal of Psychology 25:35-71

Stogdill RM (1974) Handbook of leadership. New York: Free Press

Valente TW (2010) Social Networks and Health. New York: Oxford University Press

Wasserman S, Faust K (1994) Social Network Analysis – Methods and Applications. Cambridge: Cambridge University Press

Wellman B (1988) Structural Analysis: from Method and Metaphor to Theory and Substance. In: Social Structures - A Network Approach, Wellman B and Berkowitz SD (editors), Greenwich, Connecticut: JAI Press, pp. 19-61

GENDER & SEX

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CONNECTS WITH:
Participation and Research – Health – Complexity - Ethics

TABLE OF CONTENTS:

INTRODUCTION: A WORD OF WELCOME!

Welcome to the Gender & Sex ecohealth module! Thanks so much for joining us. We hope you will find this module educational, helpful and enjoyable.

AIMS AND OBJECTIVES:

After working through this module the whole team (instructors and students) will be better able to:

- Understand the concepts of sex and gender on their own, what the concept 'gender↔sex ' means and why we are starting to see it more.
- Talk about gender↔sex linkages to help break us out of our experiential and disciplinary silos, and our black-and-white thinking.
- Learn, see and be able to describe clear examples where gender↔sex are independent and dependent determinants of human, animal and environmental health. This can be in our everyday lived realities, in the learning environment, or in the research context.
- Imagine how to better integrate and operationalize gender↔sex in your work, both methodologically and theoretically. (Work with the teaching team to plot these changes.)
- Develop a critical point of view on gender↔sex , recognizing its profound applicability and also its limits.

GUIDING QUESTIONS:

Note: *These questions can be used as reflective or discussion prompts throughout the entire course.*

- Is there gender↔sex in this?
- Where is gender↔sex in this?
- What temporal and spatial scales are you seeing these factors at work in? (Family, Neighborhood, Municipality, Province, Region, Country, Continent?)
- Why might gender↔sex be important or relevant?
- What have I (male) understood and misunderstood about the realities and perspectives of you (female)? Vice-versa.
- How might I be able to get at or approach gender↔sex: Operationally? Analytically? Statistically? Conceptually?
- What implications might getting at gender↔sex have for my current research?
- What implications might getting at gender↔sex have for the direction of my future research?

- What implications might getting at gender↔sex have for the community I am working in and with?
- What implications might getting at gender↔sex have for policy?
- How might a student who identifies as another gender, respond to my work?
- What is preventing me from taking up gender↔sex in my work?
- What is supporting the inclusion of gender↔sex questions in my work?

KEY CONCEPTS OF THIS MODULE:

- Sex
- Gender
- Gender↔sex
- Equity and Equality
- Difference
- Situated Knowledge
- Marginality/Invisibility
- Power
- Scale (Temporal and Spatial)
- Environments (Living and Work)

Session Topics

Here are some titles of sessions you could design and deliver on the theme of gender↔sex . The last one of these is developed in further detail later in this module.

1. THE BIOLOGIES AND SOCIOCULTURES OF SEX AND GENDER: HUMAN, ANIMAL, PLANT.
2. RESEARCH METHODS I: QUANTITATATIVE DATA ANALYSIS OF GENDER↔SEX
3. RESEARCH METHODS II: QUALITATIVE METHODS AND ANALYSIS OF GENDER↔SEX
4. RESEARCH METHODS III: MIXED METHODS
5. WAYS OF KNOWING ACROSS SEX AND GENDER DIFFERENCES: EPISTEMOLOGY
6. VALUES ACROSS SEX AND GENDER DIFFERENCES: ETHICS AND POLITICS
7. **GENDER↔SEX AND HEALTH (THIS MODULE IS WORKED-UP IN SKELETAL FORM, BELOW)**

DIRECTIONS:

Practical Tips for Scaling the Module Up or Down

Gender & Sex as a major component in a course (2 or more sessions):

- Include several of the sessions listed above.

A short introduction to Gender & Sex (1-2 hrs):

- Use parts of this module as required reading and facilitate a discusssion around relevant issues and ideas.

- The team could work through the definitions of "sex" and "gender" discussed in this module and then foster an open dialogue on gender↔sex linkages in their own research areas.

INTEGRATED WITHIN THE OTHER MODULES:

- Assign something from this module as required reading for the course.
- The team could ask any of the "Guiding Questions" at a given moment in another module. (This brings gender↔sex from being an implied category to one that is explicitly discussed).
    - During the course planning phase, take some time to flag the moments in the course where it would be effective to make a connection with sex and gender. This could be as simple as asking a question, or making a brief statement that draws attention to the relevance of sex and gender to the topic at hand.
- Add gender↔sex as an explicit element in APPRECIATIVE APPROACH [Participation and Research]
- Use "Guiding Questions" as a round in the POSTER SESSION [Transversal Activities]
- Adapt capacity-building exercises from the PARTICIPATION AND RESEARCH module, substituting 'gender' for the gender-generic categories of "people" & 'stakeholders.'
- Adapt the map making exercises [in the Complexity Module] to gender↔sex. For instance, ask people to draw maps of where they go, what they do, who makes up their 'community', what they own, etc.
- Use "Guiding Questions" as a layer in a SOCIAL NETWORK session.
- Make sure there are girls and women, boys and men, in ROLE PLAYING exercises to draw out the age-indexed differences in sex and gender. Afterwards, discuss whether the roles managed to bring out something true or not. This works well in STAKEHOLDER MEETING role-playing.

Building Capacity in the Teaching Team to Deliver a Module on Gender↔sex :

This section is designed to address the teaching team before the course is designed. It provides some points for reflection on why gender↔sex sometimes falls by the wayside, and *what might be done* during the preparation stage of a course to ensure that doesn't happen. Some suggestions are given for ways to increase participation, build confidence and develop capacity in the teaching team for tackling the topic of gender↔sex .

Lessons Learned from Four Years of Ecohealth Teaching in Canada.

Even when scholars with experience or expertise in gender↔sex research and teaching are on-hand, and the teaching team is committed to ensuring that gender↔sex is included among the sessions in an ecohealth course, we have discovered it can still be very difficult to actually get any substantive gender↔sex content into the course!

Working questions for the Teaching Team:

- Would you feel comfortable teaching a gender↔sex module, or part of a module? Why or Why not?
- What do you feel you have to offer this topic and this pedagogical work? From a scholarly perspective? From your personal experience?
- What do you see or know about gender↔sex from where you are situated? What assumptions are you bringing to the table? What messages are those assumptions conveying?
- Look back at a formative experience in your academic or professional development that relates to gender↔sex (PhD fieldwork, medical school, seminars, a keynote speaker's message that really hit home, etc.) How might that situation have been different if you were to 're-write' it with a protagonist of a different gender?

REFLECTION: WHY GENDER & SEX DOESN'T GET INCLUDED?

1. **UNEASE.** This topic is more political than most covered in ecohealth courses. Instructors may be personally uncomfortable talking about these questions. This unease may also be felt among participants in stakeholder meetings, among community members at roundtables, and among the students coming to the course.
   - Dealing directly with this unease as a teaching team will help you to avoid gender↔sex being pushed to the margins.

2. **INVISIBILITY.** One strange thing about gender↔sex is that it is everywhere and nowhere. Folks think it's already "in" discussions because it's all around us. Yet, in terms of explicit, careful scholarly uptake of the questions, and using the research available to frame and help answer those questions, it actually doesn't make it "into" our conversations. Being visible isn't the same as being adequately treated. There are feminist scholars around the world working in every imaginable subject area; natural science, social science, the humanities, and this work has been done for hundreds of years. And yet, a common experience is to find that gender↔sex is absent from the indices of the standard, classic texts we read and teach, whether art history, social network theory, mink farming, endocrinology or public policy.
   - As a team, strategize ways in which you can make gender↔sex visible in your course. Consider dividing up and taking responsibilities for a series of actions which will bring gender↔sex explicitly into the course.

3. **IDEOLOGY.** Sometimes gender↔sex isn't all that relevant or applicable to one's reseach question or context, or doesn't or shouldn't have as much priority as other factors, like race or economics. There's a challenge around being sensitive and including the axis of sex↔gender where it is often overlooked but should be taken up; versus being overly sensitive and believing, ideologically, that gender↔sex should always be taken up or is always the most productive hypothesis.
   - Discuss as a team how to achieve the right balance for your course.

4. **"EXPERTISE"**: Gender↔sex research and expertise is often marginalized in industry and academia, and this can reproduce itself when a teaching-team is built. Gender↔sex is typically a secondary area of expertise and this has ramifications in terms of workload fairness in a team. Folks who have no background in gender↔sex research or teaching tend to stick to what they know best and retreat to the background when gender↔sex teaching is orchestrated. They do this out of respect for their peers' expertise but what happens is that, just like housework, gender↔sex researchers and teachers (mostly female) end up doing extra work, or doing the work that gets less

recognition in terms of scholarly value. Further, the tendency to defer to those who do have competencies occludes the crucial fact that everyone *does* have experience or some competencies with gender↔sex by virtue of our lives. Everyone can, and should, share in building these questions into the course, and share in grappling with the answers, together.

- Make a team commitment to share in bringing the topic of gender↔sex into your course, and to be attentive to ensuring a fair distribution of the work.

BUILDING GENDER & SEX INTO YOUR COURSE:

Early in the Design of the Course:

- Set aside time to have an open-facilitation session among the team of instructors to collectively work through the above reflections.

- Search out course instructors (core or guest) who have an interest and/or secondary expertise in gender↔sex . This might take a bit more sleuthing than finding teachers for other topics. Look at the titles and bibliographies of their publications. If you see *sex* and *gender* in their titles, chances are, this is a scholar who could speak to gender↔sex in his or her area of research, and in general. Don't mistakenly presume this is work that only women are interested in and do, or work that only Humanities' folks do. Men also do excellent teaching and research taking sex and gender into account. As do physicists and chemists. Similarly, don't presume all women are interested in, or do work on gender↔sex . Many female scholars have no gender↔sex questions in their teaching or research. Bring in people for whom these questions are vital.

- Support bringing this topic to the center of the course by modeling active participation on the part of the whole team. This action sends the message that this labour is intellectually important and must be shared.

- **Testimonial:** Ask a team member to speak to the challenges and successes she or he has experienced in trying to work with this axis of analysis in the lab or in the field (for an example, see the testimonial below from a member of the CoPEH-Canada team). This helps to show the rest of the team that such work is really challenging, calls for input and help from colleagues (in the same way any other difficult scholarship would) and showcases feminist research.

- Make time to have an open-facilitation session among the team of instructors to:
  - Address any unease with the topic of Gender & Sex directly.
  - Support critical reflexivity around gender↔sex.
  - Tap into the collective experience and informal expertise in the topics of gender↔sex.
  - Take collective responsibility for continuing to centralize gender↔sex questions.

- You could work through parts of this module together.
- (Other activites which can be adapted for use here are the 'Keystone Activities #1 'Finding Uncommon Commonalities' and #2, 'Rules of Engagement Session' from the Participation and Research module. Ideas about group cohesion, honest self-reflection, good dialogue and building participation, can be brought into this session.)

Early in the Delivery of the Course: Schedule in feedback time that specifically asks team members and students to reflect on whether and how gender↔sex has been adequately handled in discussions and activities up until this point in the course.

- This could be as simple as a team member, identifying as the Gender↔sex advocate, providing feedback.
- Generate feedback from the group on what, with regards to gender↔sex, you should STOP doing, START doing, and CONTINUE doing.
- You can also use "Guiding Questions" to facilitate an open discussion.

TESTIMONIAL VIGNETTE FROM A COPEH-CANADA RESEARCHER:

Several researchers in CoPEH-Canada work in the Amazon and need to include gender in their research. A research study conducted in Ecuador and Peru looking at mercury and hydrocarbon levels in indigenous populations living near oil wells gives a good illustration of the challenges faced in field work when encountering and trying to work with gender roles. Getting women to speak in women-only focus groups during the data collection phase was not difficult, but subsequently engaging them in mixed gender, public activities proved challenging. As part of the research dissemination phase, a play was designed to explain the results and a video was produced for a wider audience (to see the video: http://vimeo.com/6812936). Community members acted out the parts of the oil-well, the fish, a fisherman and someone cooking with water. In each performance, we insisted that a woman come up to fetch the water, because this is traditionally a woman's task. After some prodding from her compatriots, we always ended up with a woman who seemed happy to play the role. We could have tried harder to involve more women as actors from the beginning, but we didn't want to overstep the social and cultural boundaries. The same problem arose in making the video. We asked several women to give testimony but none volunteered and we thought it more respectful not to insist. Traditionally, men in Kichwa communities occupy public posts, are more vocal at community meetings, and tend to speak better Spanish. This example raises the question of to what extent we should or even could insist on having equal representation in our ecohealth activities? It also suggests that the kinds of gender dynamics and patterns that arise in other contexts, such as the typical classroom, could serve as excellent rehearsal spaces for critiquing and working with what will eventually be encountered in some form or another in the field and vice-versa.

OVERVIEW AND RATIONALE:

KEY CONTENT:

Question: Why is Gender↔Sex an important component of ecohealth research?
Answer: Answering this question requires that we first get a firm handle on the two key concepts, and how they are connected.

"SEX"

Every living body is marked by what we call *basic sex categories:* male or female. There are male or female gametes, male or female human bodies, male or female parts of flowers. But the more we study sex categories the more we can see it is not a simple story. From DNA through to protein expression, cellular organization, organ systems, phenotypes, and intersubjective chemical cues – all important moments in sex biology – evidence suggests that even this so-called basic biological category ("sex") involves dynamic, complex, multi-scalar systems of signals, mechanisms and feedback loops.

Why sex categories are (or should be) included as a part of ecohealth research:

- One of the fundamental premises of ecohealth research is that animals, humans and plants are inseparable from the point of view of health. Sex is a fruitful avenue of approach for investigating that premise. Biological sex is a constant and ubiquitous factor in all living systems and it confirms and illustrates how, animals, humans, plants and environments share common ground and are linked across material realities.
- Relations between and among sexed beings (as sexed bodies) is a permanent fact, a constant part of the dynamic of all social spaces; the field, the laboratory, the boardroom, the stakeholder meeting, during theses defences, on granting committees, in the warehouse and in every classroom.
- You can get better science -more focused questions, more profound hypotheses, more interesting and meaningful results, better practical outcomes - when you attend carefully and systematically to sex categories. Cells, tissues, systems, individuals, groups, and even populations are sexed, and these differences can be crucial to the phenomenon under study whether it is a chemical pathway, a pattern of cell proliferation, the impact of technologies on work safety, or different learning and communication styles.

Like sex, gender is ubiquitous. All cultures – including mammals and social insects – exhibit gendered organization. All bodies, insofar as they are in relationships, are gendered: masculine, feminine, or different admixtures and degrees of these (Driskell, 2011, and Herdt, 1993). Distinct types of behavior, stereotypes, roles, aspirations, affects, sexualities, comportment, style, idioms, imaginations, expectations and narratives are marked as either masculine or feminine. The axis of gender is always present although its power to shape situations and the degree to which it is performed varies enormously in time and place (Butler, 1990). What counts as appropriate masculine attire, for instance, is different at a wedding than in the library. Whether we want it to be the case or not, gender is one of the main ways we identify ourselves and each other. This also seems true of the animal kingdom. Fish, for instance, can switch their gender according to social cues (Kobayashi et al, 2009). The emotional and affective lives of primates and pachyderms are as marked by gender as our own. (See the writings of Dutch primatogist and ethnographer, Franz Vander Waals). We also read gender into inanimate objects and cells, even while we are trying to be objective, such as when we are looking through a microscope! (Martin, 2003). Gender is not a black and white category. It involves a dynamic continuum of lived realities as we express, become conscious of, name and take on (or are given) degrees of feminine or masculine to ourselves, to others, and to the things around us in the world.

Why gender is (or should be) included as a part of ecohealth research:

- Looking at the ubiquitous factor of gender helps us to see deep patterns - how relations shape lives at all scales and across all kingdoms, and between them.
- The subtle and on-going variations of gender help us to see and appreciate the grey-areas.
- Asking the "gender question" can lead to better science, more interesting and meaningful results, and better health outcomes. Ecosystem Approaches to Health "address how human health and environmental quality are determined by complex relationships" (www.idrc.ca/ecohealth). Gender is a factor and part of any relationship and thus many health impacts can be carefully traced to gender.
- The commitment to **equity, fairness, inclusivity and justice** that are guiding principles in ecohealth can be operationalized by bringing explicit attention to gender.

Working with Gender in your Ecohealth Course and Ecohealth Training:

Addressing and working with gender in the learning environment *can* be part of effective training for working across difference in the field. Many students and researchers will be working in cultural contexts that are very different from the ones where they grew up or studied; different food, different religious beliefs, different etiquette, different social orders. This can be very challenging. The quality of one's fieldwork experience can be made or broken by the ability to work with and through these differences. Explicitly foregrounding the factor of gender in our training programs - a kind of difference that will *always* be present - is one way test our assumptions and work at being able to think through, and become capable of cognitively and emotionally handling, deep differences.

BUT WAIT!! *GENDER ↔ SEX ↔ GENDER↔ SEX ↔GENDER ↔ SEX…*

These two categories are not nearly as distinct as we think. We are just starting to see that sex and gender are entwined, and work together in fascinating ways! Up to now it has been understood that biological realities (such as having breasts and being able to lactate) play a role in gender (social realities such as being able to dream about being a "mommy"). But the interactions go the other way too. Recent studies in an array of fields, including embryology, nutrition, genetics, biochemistry, and cognitive science find that "external factors" such as gendered behavioral norms, taboos, work habits, cues, experiences and expectations, can and do impact how biology *happens*. This is true from the patterns of chemical pathways in cells, development of cell lines, DNA and RNA expression, gamete strength to fertilize (Ainsworth, 2002), organ development, whole systems, hormonal profiles in utero and hence the 'sex' of the offspring, disease manifestations, aging patterns, morbidity and mortality. It is likely that this happens across kingdoms too, but at present, the science of tracking and cross-referencing all these different factors and influences, even within the human realm, is exceedingly challenging.

Example

Here is an example to get you thinking about the reciprocal, on-going, complex interactions of sex and gender:

Taboos and cultural values surrounding menstruation operate at many levels:

- Underfunding of "menses" research
- Overprescripton of birthcontrol drugs to manage hormone fluxes, even in women past a reproductive age, and in nuns (Hirschler, 2012)
- Expectations that females who are menstruating should conceal it, for instance, by using tampons (Houppert, 1999).

These gender factors can have profound effects on girl's and women's mental and physical health.

- What chemicals bleach the cotton that tampons are made out of?
- What heavy metals are in the cotton?
- What plasticization is in the tampon applicators?
- What synthetic chemicals are in hormone pills that remain active in urine?

Think further: What about menses-related cultural practices that enter the ocean currents and hydrological cycles? What are the health impacts of these behaviours and products (estrogen, dioxin, plastics, pills, bleach) on creatures and ecologies who live 'downstream'? On fish, for instance? It is not unreasonable to imagine a causal connection between these factors and the documented phenomena of increased gonadal switching in fish populations (Kobayashi et al., 2009) and the collapse of fish populations (Kidd et al., 2007). These fish, in turn, are consumed as food, or fed to our gardens and plants (fertilizer) or pets (protein in dog and cat food). They end up in the air, in wells, in the stomachs and flippers of dolphins and whales, in our (and animals') drinking water, and in the water we use to irrigate our crops and wash our food and dishes with.

Now take the next step, and think these latter phenomena through to the medically confirmed facts of earlier and earlier onset of menses in human females, the 'feminization of boys' in utero, the decrease in fertilization power of sperm (Ainsworth, 2002), the anthropologically-confirmed fact of an increasingly sexualized culture (younger and younger women are expected to be sexy; older and older women are expected to maintain their sexiness) and off-kilter sex-ratios in many areas of the world. We aren't just talking about girls and women. The effects of gendered behaviour dovetails back into further taboos, illustrating feedback loops and a complex entwinement of what we tend to think of as 'cultural' and 'biological' axes.

The schema below begins to map social and biological factors together as reciprocal and indissociable, **but notice that we haven't included the wider ecological relations** within which these links take place. Ecological relations are impacted by social and biological factors, and also impact them.

These insights call for a **special term**: "**GENDER↔SEX**"

Now we are in a good position to answer our very first question:

Q: Why is gender↔sex an important component of ecohealth research?

Health. These reciprocal, complex and on-going interactions have profound consequences for the health and well-being of humans, animals, and the environmental sphere. Scholars and practitioners genuinely concerned with the health of all beings, at all levels, can better achieve those goals if they explicitly integrate **gender↔sex** into their worldview and research methods, whether they be hydrologists, nutritionists, molecular chemists, NGO workers, oncologists or psychologists.

Justice.

> "There remain significant disparities in healthcare access and health outcomes for men and women. Every cell in our bodies is "sexed" and we must improve our understanding of how sex-based biological factors influence the way we respond to medication and other treatments. Every health interaction and behaviour is influenced by gender, and we need to understand the unique healthcare needs of men and women, girls and boys….Men continue to die at a younger age…while women experience a heavier burden of chronic illness…. There is emerging evidence that there may be many important ways in which sex and gender influence health that, if better understood, could inform interventions and programs designed to improve the health and well being of all people." (Institute for Gender and Health, http://www.cihr.ca/e/8677.html).

Attention to gender↔sex in ecohealth research can better inform interventions and programs wishing to improve the health and well-being of all living beings; fish, rivers, trees, and even of our home planet thought by Latin American peoples (and many other groups around the world) as Mother, as female, as Pachamama.

Complexity & Humility. The multi-scalar, multi-factoral complexity of gender↔sex embedded within dynamic, lived, ecological and cultural realities, is a perfect touchstone for reminding us just how messy things really are. This reminder of the limits of any one line of questioning or situated position in the world pushes us to find out how things work. [Connects with 'Experiencing Health' in Health Module and 'Critical Perspectives' (on gender- and race-based assumptions) in the Participation Module].

ACTIVITIES:

Activity 1: Brainstorming to stimulate thinking about "GENDER↔SEX":

Imagine that you are a graduate student and want to study heavy metals and human health.

STEP 1: Read all or some of the following questions out loud to the group or to yourself. You could also photocopy this page, and have students work through these on paper. After each question is a list of very basic reasonable choices you might make. (Read these out loud as well).

Note: *You can add anything to this question and answer list, you don't have to be an expert in the field. This is just an exercise to see how and where we omit, or could include, gender↔sex when thinking about our ecohealth research.*

Here are a few very basic questions you would have to ask yourself to frame your research project:

- **Which heavy metals are you going to test for?**
  - Cadmium? Selenium? Mercury? Lead? Arsenic? Nickel? Manganese?
- **What do you want to find out?**
  - How these negatively impact human health.
- **Where do you want to study? Which humans?**
  - India? Sweden? Brazil? Canada
- **What health issues are you concerned with, or funded to investigate?**
  - Cancer? Lesions?
- **What are you going to study? Test? Measure?**
  - Exposure levels
  - Transport mechanism in the cells and body system
  - Biochemical pathways (up- and down- regulation; methylation, metabolic pathways)

- **How are you going to study these things?**
    - Human hair samples
    - Water samples (Drinking? Washing? Irrigation?)
    - Blood samples
    - Mice and rats (Whole organisms? Behavioural? Cell lines?)
- **What do you hope to accomplish or contribute to?**
    - Better risk assessment
    - Mitigation strategies and health policy
    - Basic knowledge
- **How are you funded?**
- **Where will you study?**
    - With whom?
- **How will you disseminate your research results?**
- **How long do you think it will take you to do this work?**

STEP 2: Go back through each of these steps and for each one, brainstorm alone or in small groups how gender and sex might be relevant: shaping or impacting the options or possible outcomes.

STEP 3: Plenary Discussion
What did you come up with?

STEP 4: Now, you can really make it interesting by bringing into the hypothetical conversation some actual lab-based and field-based research findings. Cut the following claims into strips. Put them in a bag, pass it around and have people draw out and read one of the 'findings'. Give the group a chance to respond, before moving on to the next person and the next finding. You can stop whenever you want or need to.

Note: *If you don't want to cut into strips, the leader of session could choose several, read them out, and then ask the group to consider how their research project might change, in light of these findings.*

Actual lab-based and field-based research findings:

- Early studies (occupational health) mostly looked at men. Risk assessment was based on male work places and behavioral patterns, such as miners.
- Experimental (lab) animals are still almost all male.
- Gender differences in environmental health (stratifying analysis for sex) was seldom evaluated before 2005.

- The sex of the source of cells studied in laboratories was not recorded or reported, and is still rarely so.
- A development project in Bangladesh drilled wells and did not check for levels of arsenic. Half the wells are contaminated. If they are drilled deeper this will increase manganese levels in the water.
- Boys are more susceptible to lead than girls, but this depends on the 'environment': "One gender may be more sensitive than another under different environmental circumstances." (Bellinger, 2000)
- An additional source of lead is the tin pots water is carried in from wells, and food is cooked in. (Both done by women)
- Arsenic is linked to skin lesions. Men are more adversely affected physiologically. But women's cultural capital plummets if they have lesions, especially on their faces, because of gendered beauty norms. Some are kicked out of homes.
- There is a prevalence of nickel allergy among women in Bangladesh. The source turns out to be earrings and other adornments which are linked to cultural expectations for femininity. But only among poorer women: wealthier women can afford jewelry containing less toxic metals.
- The water from contaminated wells is used for watering rice paddies and animals.
- Zinc from mining waste is released into rivers, and used to flood paddies and fields.
- Polished rice (some GMO strains) has little cadmium but equally little nutritional value.
- There are the highest levels of cadmium in the healthiest foods: root vegetables, whole wheat, unpolished rice.
- There are unexpected links between arsenic and cancer: oral exposure of arsenic (water, food) leads to lung cancer. There are also links to bladder and liver cancer.
- WHO reports smoking is a known risk for bladder cancer. This has to do with levels of cadmium in the inhalation, the cadmium being in the tobacco plants.
- Women of the 3rd world are currently the fastest-growing group of 'smokers.'
- 'Elderly women's diseases' (hip fractures, kidney damage, bone loss') attributed to too many pregnancies. Risk of fractures doubles in relation to cadmium levels: studies are starting to look at heavy metals correlated with second-hand smoke, diet, exposure to radiation (even preventative, such as mammograms)
- The biomechanisms of cadmium and arsenic metabolism are still being worked out. It looks like there may be entirely different metholation pathways in men and women.

- Women's bodies but not men's can produce choline, (also sourced in eggs), and this methales arsenic into homocysterol ('MMA'). The methalated form is more toxic than the organic form. Methylation (upregulation) stops after menopause.
- Women have double the concentrations of cadmium in their blood. This could be linked to iron transport mechanisms: the body is trying to compensate for iron loss during menstruation, taking up iron through intestinal transporters. Possibly aiming for iron but having an affinity for cadmium.
- MMA implicated in placental environment in fetal development.
- Pathways involve MMA in epigenetic events: after fertlization see a demethylization of DMA; then in implantation, a remethylization, before human blastocele cells differentiate into lung cells, epithelial cells, and gonadal tissue.
- Exposure can and does involve itself in the endocrine pathways of the developing fetus, i.e. masculine and feminine traits, possibly sex ratios.
- Conventional wisdom is that Cadmium (2+) is trapped by the placenta and does not cross placental barrier, nor 'pass over, into breast milk, but the placenta also traps zinc, and this prevents nutrient uptake in fetus.
- Cadmium is linked to estrogenic effects on endometrium, and birthweight.
- Comparison of boys and girls at birth measure: weight, length, head circumfrence, and chest circumfrence.
- Lots of research is concerned with cancer, but very little looks at reproductive health and child development (mental and physical).
- There is a decrease in IQ with early and prenatal exposure to heavy metals (arsenic especially). Main IQ effect is on girls. (Linkage studies of average concentration in urine and IQ effects). This is especially marked around age 5, when schooling starts. Not so important for individual girls, but devastating at the population level; affecting "women's overall status".
- Need to take the maternal-fetal and then maternal-child as a single unit. Test for exposure with a variety of tests: longitudinal sampling (women, then pregnancy, then at birth, up to 10 years of age): urine (from pregnancy test), all through pregnancy (blood, hair, urine), breast milk, then birth outcome physiological and psychomotor testing, nutritional tracking.

This exercise was inspired by the incredible work of Dr. Marie Vahter, Institute of Environmental Medicine, at the Karolinska Institute, Stockholm, Sweden.

Activity 2: Passport

One effective way that the Copeh-Canada Teaching Team inserted gender↔sex prompts into our course was through a tool we designed and called "The Official Ecosystem Approaches to Health Passport." This passport was carried by the students and faculty and contained pages earmarked for the topics in the course. Students used the pages for reflexive exercises and to jot down pertinent notes and questions on the topics.

Here is what the relevant pages looked like:

QUE FAIRE AVEC CE PASSEPORT?	HOW DO I USE THIS PASSPORT?	
Voici votre passeport officiel pour l'aventure. Gardez-le toujours sur vous. Après chaque session ou activité nous vous invitons à prendre quelques instants pour réfléchir à la pertinence d'intégrer ce que vous avez appris à votre travail ou projet et à noter ces réflexions (mots, musique, dessins, etc.). Nous vous invitons à utiliser les pauses, dîners, et activités sociales pour parler avec au moins cinq personnes du cours au sujet de votre travail. Quelle perspective unique ces personnes apportent-elles? Utilisez-les dernières pages pour conserver des informations importantes (courriel, références, site Web, etc.).	This is your official passport to adventure. Carry it at all times. After each class or activity take a moment to reflect on how what you learned could be integrated into your work or your project and write it down (words, music, drawings, etc.). Throughout the course use the breaks, lunches and social events to speak with at least five participants about your work. What unique perspective do they bring to your subject area? Use the pages at the end of the passport to keep track of important information (emails, references, web sites, etc.).	 Genre / Gender

REFERENCES:

Ainsworth, Claire. "'Gender-benders' cause sperm burnout" *New Scientist* (July 2002) http://www.newscientist.com/article/dn2493-gender-benders-cause-sperm-burn-out.html

Butler, Judith. Gender Trouble, (New York: Routledge) 1990.

Coghlan, Andy. 'Gender-bending' chemicals found to 'feminise' boys. NewScientist.com news service, 2005

Driskell, Qwo-Li, Chris Finley, Brian Joseph Gilley, Scott Lauria Morgensen, Queer Indigenous Studies: Critical Interventions in Theory, Politics, and Literature. University of Arizona Press, 2011.

Gould, Stephen Jay. The Mismeasure of Man. (Penguin, 1992)

Herdt, Gilbert, ed. Third Sex, Third Gender. (New York: Zone), 1993.

Heron, Barbara. The Desire for Development: Whiteness, Gender, and the Helping Imperative. Wilfred Laurier Press, Waterloo, ON. 2007.

Hirschler, Ben, 'Should Nuns Take Birth Control?' The Globe and Mail Friday, December 9th, 2012.

Houppert, Karen. The Curse: Confronting the Last Unmentionable Taboo. Farrar, Straus and Giroux, 1999.

Kidd, KA et al. 'Collapse of a Fish Population after exposure to a synthetic estrogen' *Proc.Natl Acad Sci USA*. 2007 May 22; 104 (21): 8897-901.

Kobayashi et al. Sex Change in the Gobiid Fish Is Mediated through Rapid Switching of Gonadotropin Receptors from Ovarian to Testicular Portion or Vice Versa. *Endocrinology* March 2009 150(3): 1503-1511.

Martin, Emily. The egg and sperm: How science has contructed a romance based on sterotypical female-male role. Constructing Sexualities: Readings in Sexuality, Gender, and Culture. Upper Saddle River, NJ: Prentice Hall, 2003. 23-33.

The Woman in the Body, (Boston: Beacon Press) 1987.

BRAINSTORMING ACTIVITY REFERENCES:

Women and Chemicals- Is there a problem? Women in Europe for a Common Future WECF, 2005

Vahter M, Akesson A, Liden C, Ceccatelli S, Berglund M. Gender differences in the disposition and toxicity of metals. Environ Res 2007; 104(1):85-95.

Skin Lesions & Arsenic Exposure are indexed to gender and socieconomics: *Journal of Epidemiology and Community Health, 2006, 60, 242-24; Hassan et al, 2005.*

Arsenic exposure: *The Lancet* Vol. 376 Issue 3753, p. 1641, 13 Nov. 2010.

Pre- and post-natal exposure (drinking water and food): *International Journal of Epidemiology* 39(5), 1206-16 (2010).

Intellectual Impairment in School-Age children due to Manganese exposure: Bouchard et al. *Environmental Health Perspectives*, Sept. 2010.

Cadmium accumulation in placenta, zinc: Kippler et all (2011).

Cadmium found in ‘healthier food’: Vahter et al, 1991.
Cadmium uptake in intestines linked to Iron stores: Berglund et al, 1994; Akesson, 2000.
Influence of Lead (Pb): Impairment of development in children (Koller et al, 2004)
Nickel allergy prevalence among women: *WHO report, Lidén, 2004; NBHW, 2001)*
Chemicals and gender: UNDP report
Manganese in drinking water: Mergler, D. *Environmental Health Perspectives, 2000.*
Cadmium estrogen interactions: *Nature. August 2003, Vol. 9, No. 8*
Cadmium and increased Risk of fractures: Staessene et al, 1999
Women, smoking and cancer: WHO 2005

SESSION OUTLINE: SEX<->GENDER AND HEALTH

DESCRIPTION:

More and more studies have found that so-called "external factors" such as gender - social /cultural/contextual variance in realities, expectations and experiences – can and do play a feedback role in biology. What are called 'environmental exposure pathways' can modify and modulate the range and expressions of gender and sex in ways we are only just beginning to imagine. Many environmental health researchers and health professionals are committed to taking sex and gender considerations seriously in their fundamental (basic) research; however it is much easier to incorporate sex in science studies than to incorporate gender.

It is commonly recognized that boys and girls and men and women are biologically different. That their experiences bring them into contact differently with their physical and social environments during their lifespans. Yet, environmental and health research are still struggling to translate this truth into methodologically-sound approaches or studies that adequately consider sex *and* gender. This sub-section presents the challenges of integrating sex and gender into environmental health research and examples of some approaches approaches that address these challenges.

LEARNING OBJECTIVES

- Understand why and how to integrate integrate the concepts of sex and gender in fundamental research in environmental health.
- Propose approaches to addressing gender and sex as independent and dependent determinants in a range of health research approaches.
- Recognize that gender is relevant to our work even if we are not "studying gender".

KEY QUESTIONS:

Here are some key questions which underlie gender↔sex in basic health research:

- How do sex and gender manifest themselves biologically in relation to human health?
- Are the differences between males and females more plastic and fluid at the sociocultural level than at the cellular level? Is this an assumption on our part or is it well-grounded?
- How can we put sex and gender together in fundamental biological studies? Is this possible? What good models or working examples could we study that have managed this?

- Why is it so hard to incorporate gender and sex in experimental environnemantal health research? (The fundamental problem we face is that in the basic sciences, the scientific method is deliberately built to "remove" context. How do we put gender in when gender is inherently about context?)
- What are the difficulties in incorporating gender into experimental environnmental health research? Can you define/articulate it?
- Do animals, plants, and cells have gender in addition to sex characteristics? How can we account for these in basic research?
- If gender becomes infeasible to examine in research approaches and the questions don't get addressed because we don't have tools or methods to address them: what do we do given that we are in fact, committed to equality, equity, justice, etc?

KEY IDEAS:

- Biology (sex) and social conditions (gender) are in dynamic interaction and vary throughout life. Environmental factors can affect one or the other (or both differently), with important consequences on health and wellbeing.
- No single factor or axis (social or biological) can be considered to cause diseases. Rather, it's the interaction of many risk factors; genetic predisposition, biochemical, physiological, psychological, social, and cultural.
- Sex hormone levels vary widely across the lifespan for both men and women; estrogen, progesterone, and testosterone levels increase dramatically at puberty, and drop again post-menopause in women, and also in older men.
- Gender is not experienced or performed in the same way by all individuals, and designing studies to account for this variance is undoubtedly a complicated matter.
- Sex and gender can also confound one another, making the analysis even more difficult.

SPECIALIST PRESENTATION:

A formal presentation on the integration of sex and gender in health research should be included, whenever possible. It could be someone from your teaching team, if you have expertise, or you could invite a guest. It can be from any scientific discipline so long as the focus is on the integration of sex and gender in research in environment and health.

A topic example: *Epigenetics and fetal programming involves environment as well as sex and gender impacts.*

ACTIVITIES:

Activity 1: Create a 'gender lens' tool for basic research:

Plenary Discussion: What questions and frames of reference do we need in order to bring a "gender lens" to our research?

Here are some initial questions to be discussed, developed, added to and arranged by the group.

- Make a list of all of the gender↔sex issues you can think of that are relevant to you research question.
- Situate yourself.
- What kinds of assumptions about gender↔sex are you making?
- What system are you using?
- Identify how any of these things can feasibly be addressed in meaningful way within the constraints of your experimental models and approaches
- What could be gained by making things more complex? What could be lost by making things more complex?

Activity 2: Link to posters

STEP 1: Students can work together or in groups with a leader to concretely apply the question of how to integrate gender↔sex in their projects (research question, hypothesis/objectives and data analysis).

STEP 2: Return to their research hypotheses and, with the freest possible imagination, imagine the causal linkages, loops and interrelations going on among gender and sex.

SPECIFIC REFERENCES:

McCarthy MM and Konkle ATM. When is a sex difference not a sex difference? Frontiers in Neuroendocrinology. 2005;26(2):85-102.

Annandale E and Hammarstrom A. Constructing the 'gender-specific body': A critical discourse analysis of publications in the field of gender-specific medicine. Health (London). 2010.

Abdelouahab N, Mergler, Takser L, Vanier C, St-Jean M, Baldwin M, Spear PA, Chan HM. Gender differences in the effects of organochlorines, mercury and lead on thyroid hormone levels in lakeside communities of Quebec (Canada), *Environ. Res* 2008 Feb 27; [Epub ahead of print]

Arbuckle TE. 2005. Are there sex and gender differences in acute exposure to chemicals in the same setting? *Environ Res* 2005; 101(2): 195-204.

Shepard KN, Michopoulos V, Toufexis DJ, Wilson ME. (2009) Genetic, epigenetic and environmental impact on sex differences in social behavior. Physiol Behav. 97(2):157-70.

Gochfeld M. Framework for gender differences in human and animal toxicology. Environ Res 2007; 104:4-21.

Gochfeld M. Gender in toxicology and risk assessment. Environ Res. 2007;104:1

Klein W, Gochfeld M, Davis B. Background on the Scientific Group on Methodologies for the Safety Evaluation of Chemicals and Workshop 16: Gender differences Environ Res 2007; 104(1):2-3.

Arbuckle TE. 2005. Are there sex and gender differences in acute exposure to chemicals in the same setting? Environ Res 2005; 101(2): 195-204.

Fetal programming general reference :
http://journals.cambridge.org/action/displayJournal?jid=DOH

P. D. Gluckman, M. A. Hanson and T. Buklijas (2010). A conceptual framework for the developmental origins of health and disease. Journal of Developmental Origins of Health and Disease, 1, pp 6-18

Barker DJ. Developmental origins of adult health and disease. J Epidemiol Community Health. 2004;58:114–115

Susan E Ozanne & Miguel Constância (2007) Mechanisms of Disease: the developmental origins of disease and the role of the epigenotype Nature Reviews Endocrinology 3, 539-546

Joanna Burger, Cristina Fossi, Patricia McClellan-Green, Edward F. Orlando Methodologies, bioindicators, and biomarkers for assessing gender-related differences in wildlife exposed to environmental chemicals Environmental Research, 104, (1), 135-152

http://onlinelibrary.wiley.com/doi/10.1002/msj.20176/abstract

REFERENCES:

Key Websites:

Institute for Gender and Health (IGH), Canadian Institutes of Health Research (CIHR) : http://www.cihr.ca/e/8677.html

Équipe sur le Genre, l'environnement et la santé : http://www.geh.ges.uqam.ca/Page/default.aspx

Gender and Health Collaborative Curriculum Project: http://www.genderandhealth.ca/

Genre en Action Bulletin: www.Genreenaction.net

Circle: Institute of Gender and Health: Theory and key concepts in gender, sex, and health research: https://circle.ubc.ca/handle/2429/27571?show=full

Guide des IRSC sur genre et santé-CIHR, undated. Gender and Sex-Based Analysis in Health Research: A Guide for CIHR Researchers and Reviewers http://www.cihr-irsc.gc.ca/e/32019.html consulted October 27, 2007.

Bridge Institute of Development Studies
'Bridging the Gaps between Theory, Policy and Practice with Accessible Gender Information': www.bridge.ids.ac.uk
'What a Difference Sex & Gender Make: A Case Study Book' CIHR publication, PDF available: http://www.cihr-irsc.gc.ca/e/44734.html
"Sex and Gender: Nature or Nurture?' University of Plymouth, Department of Psychology, Study and Learning On-Line materials for a course developed by Dr. C.A.P. Kenyon (2006) http://www.flyfishingdevon.co.uk/salmon/year1/psy128psychosexual_differentiation/sexdiff.htm#nature_nurture

Films and Videos:

Adjust Your Set: The Static is Real
Inequity in the Classroom

Journal Articles and Books:

Guattari, Felix. "La Borde: A Clinic Unlike Any Other", Chaosophy: Texts and Interviews *1972-1977*, ed Sylvère Lotringer, trans David L. Sweet, Jarred Becker, and Taylor Adkins. Los Angeles: Semiotext(e), p. 176-194.
Guattari, Felix, "La Grille" Chimères 34 (1998) : 7-20.
Germaine M. Buck Louis, Enrique F. Schisterman, Anne M. Sweeney, Timothy C. Wilcosky, Robert E. Gore-Langton, Courtney D. Lynch, Dana Boyd Barr, Steven M. Schrader, Sungduk Kim, Zhen Chen and Rajeshwari Sundaram, on behalf of the LIFE Study. Designing prospective cohort studies for assessing reproductive and developmental toxicity during sensitive windows of human reproduction and development – the LIFE Study
Article first published online: 20 JUN 2011 | DOI: 10.1111/j.1365-3016.2011.01205.x
Fonow, Mary Margaret, and Judith Cook. Beyond Methodology: Feminist Scholarship as Lived Research. Indiana University Press, 1991.
Gergen, Mary M. Feminist Thought and the Structure of Knowledge New York University Press, 1988.
Gilligan, Carol, "Remapping Development: The Power of Divergent Data" The Impact of Feminist Research in The Academy edited by Christie Farnham. Indiana University Press, 1987, pp. 77-94.
Greyson DL, Becu AR and Morgan SG. Sex, drugs and gender roles: mapping the use of sex and gender based analysis in pharmaceutical policy research. Int J Equity Health. 2010;9:26.
Haraway, Donna. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," Feminist Studies 14:3 (1988)
Harding, Sandra. Whose Science? Whose Knowledge: Thinking from Women's Lives Cornell University Press, 1991.

The Science Question in Feminism Cornell University Press, 1986
Sex and Scientific Inquiry (co-edited with Jean O'Barr), Chicago: University of Chicago Press, 1987.
Hubbard, Ruth. "The Emperor Doesn't Wear any Clothes: The Impact of Feminism on Biology" Men's Studies, Modified, Dale Spender, ed. New York: Pergamon Press, 1981, pp. 213-235.
Jacobus, Mary, Evelyn Fox Keller and Sally Shuttleworth, Body/Politics: Women and the Discourses of Science, Routledge, 1990.
Messing, K., Stellman, J.M. Sex, gender and health: the importance of considering mechanism. *Environmental Research.* 2006; 101:149-162.
Messing K, Punnett L, Bond M, Alexanderson K, Pyle J, Zahm S, Wegman D, Stock SR, de Grosbois S. "Be the fairest of them all: challenges and recommendations for the treatment of gender in occupational health research. *Am J Ind Med* 2003; 43:618-29.

Messing, K. "Don't Use a Wrench to Peel Potatoes: Biological Science Constructed on Male Model Systems is a Risk to Women Worker's Health." Changing Methods edited by Lorraine Code and Sandra Burt, University of Toronto Press, 1995, pp. 217-264.
Mertens F, Saint-Charles J, Mergler D, Passos CJ Lucotte M. Network approach for analyzing and promoting equity in participatory ecohealth research. *Ecohealth* 2005 2 : 113-126.
Nelson, E.D. and Barrie Robinson. Gender in Canada Prentice-Hall, 1999.
Nielsen, Joyce McCarl. Feminist Research Methods: Exemplary Readings in the Social Sciences. Westview, 1990.
Phillips SP. Measuring the health effects of gender. 2008. J. Epidemiol. Community Health 62 : 368-371.
Reinharz, Shulamit, Feminist Methods in Social Research. Oxford, 1992.
Rosser, Sue. Teaching Science and Health from a Feminist Perspective, (New York: Pergamon Press), 1986.
Scheman, Naomi. "The Unavoidability of Gender," Women, Knowledge and Reality, Ann Garry and Marilyn Pearsall, eds. Routledge, 1996, pp. 26-33.
Williams, Walter. "Amazons of America: Female Gender Variance" in Gender in Cross-Cultural Perspectives Brettell and Sargeant, eds. Prentice-Hall, 1992, pp. 2020-213.
Wylie, Allison, Kathleen Okruhlik, Sandra Morton, and Leslie Thielen-Wilson, "Feminist Critiques of Science: A Comprehensive Guide to the Literature," in Resources for Feminist Research, Canada (90:2), 1990.
"Feminist Critiques of Science: The Epistemological and Methodological Literature," Women's Studies International Forum 12:3, 1989.

PARTICIPATION AND RESEARCH

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CONNECTS WITH:
Power and equity – Complexity - Gender

Table of Contents:

MODULE INTRODUCTION

DESCRIPTION:

This module examines relationships between participatory processes and research. The emphasis on participation and research is especially relevant to learning about 'multi-stakeholder participation' and 'knowledge to action' as central aspects of an ecohealth approach. This extends beyond a methodological emphasis on 'participatory research' and acknowledges that not all ecohealth approaches involve 'participatory research' processes per se.

To explore the theory, practice and examples of both participation and research this module draws on concepts and literatures related to participatory (action) research (PAR), participatory learning & action (PLA), participatory development (PD), knowledge translation and exchange (KT&E) and other relevant fields.

A guiding principle of this work is the idea of reciprocity between researcher(s) and research participants, which challenges us to go beyond the '*why*', '*how*' and '*who*'? of research or practice to explicitly ask '*for whom?*' and/or `*with whom?*' is the ecohealth research, activity or initiative being conducted? The module therefore includes a series of sessions that prompt **critical reflection on the role and nature of 'participation'** of researched, or affected, individuals and communities. This participation requires attention to different types of relationships between and among different groups including (more conventionally defined) researchers, 'ecohealth' professionals or practitioners (spanning ecosystem, health, development concerns) as well as various agencies and communities of concern.

Recognising researchers as having an active role in these relationships also demands critical reflection on the role of the **researcher as a participant** in a research process, with explicit links to the processes of reflection and the careful negotiation of roles, responsibilities and 'rights' of different types of research participant. The module therefore addresses issues that are not unique to 'ecohealth' research, but are pertinent to research, participation and knowledge exchange and the associated demand for the scholarship of integration, application and engagement.

DIRECTIONS:

A key aspect of this module will be getting the students to 'walk the talk' as much as possible by drawing on and reflecting upon their existing experience, and/or linking with the case-study of the specific module. Along similar lines, many of the specific activities could be used in other modules as examples of tools and activities that model different dimensions of the 'principle' of participation.

The module is closely linked with the idea of Reflective Journal [See Transversal Activities].

AIMS/GOALS:

The collective aim is that, at the end of the module, participants will be able to:

- Explore 'participation' and 'research' as interrelated concepts, and their relevance to ecohealth research and practice.
- Experience practical exercises that demonstrate the links between participation and research, including practical 'how-to' strategies.
- Demonstrate critical thinking and reflection on ecohealth research and practice.
- Build skills to develop and reflect upon one's ethical practice such as respect, reciprocity, relevance and responsibility.
- Describe and critique the requirement for and nature of 'multi-stakeholder participation' and 'knowledge to action' as guiding principles of ecosystem approaches to health (see Charron, 2012).
- Compare and contrast different approaches to participation and research, proposed by different scholarly and knowledge traditions.
- Demonstrate how principles regarding participation and research could be helpful in their own work.

GUIDING QUESTIONS:

The following over-arching questions are relevant across all sessions/sections in this module, and could also be adapted to develop reflective questions in addition to, or complementary with, reflective journal questions (see Transversal Activities):

1. What are some of the opportunities, challenges and characteristics you have experienced at the interface of 'participation' and 'research'?
2. Informed by your particular experiences of the interaction between participation and/or research;
   - What roles have you played? Articulate this in terms of 'researcher' and 'participant'.
   - How do your experiences compare what the literature assigned for this session?
   - What have been your best experiences of the combination of participation and research? Can you identify principles that might help to build on or seek to reproduce these successes?
3. What are the 'stories behind the stories' of participatory research? Where do you get to read about these and /or discuss these dynamics?
4. Can you provide an example of "learning by doing" in relation to participation and research?
   - Can you give an example of how your 'theoretical' understanding (e.g. from the literature) was enhanced by the practical experience of a failure, challenge or successful experience in the context of participation and research?
   - How did this experience inform your future work?
5. How could interactions between a researcher and another research participant contribute to the 4R's: *respect, relevance, reciprocity and responsibility* (see Kirkness 1991) during the process of research and/or publication?
6. What are your preferred approaches to reflection? How does reflective practice contribute to your understanding of participation and research?
7. How is your work informed when you:
   - Challenge assumptions including those of authors or peers in relation to your or their work?

- Ask yourself "what if" questions as a means to put yourself into a scenario to consider consequences and actions?
- Shift your focus from 'participation' to a focus on integration (what knowledge counts, how are we joining the dots?), engagement (who is involved and how?), and application (including how and when knowledge can be applied)?
- Value and integrate different types of knowledge or 'knowledge cultures' in your work – see for example Brown's approach to collective learning with 'individual', 'community', 'specialised', 'organisational' and 'holistic' knowledge (Brown 2010);
- Ask 'sub-questions' about participating, to identify the 'type', 'mode' and 'place' of participation, (see Parkes et al 2012), by asking who is participating? How are they participating? Where are they participating?

KEY CONCEPTS:

- Participation and its variants (including multi-stakeholder participation, participatory learning and action)
- Research (and its variants in the context of this module, including Participatory Research/ Participatory Action Research/ Participation Research, Evaluation and Monitoring/ Participatory Rural Appraisal)
- Knowledge Translation/Knowledge to Action
- Critical Reflection/Reflexiveness, and Reflective Practice
- Different types of Scholarship (especially participation as it relates to the scholarship of integration, engagement and application (see Boyer 1997, Woollard 2006)

KEYSTONE ACTIVITIES

This module commences with a description of two keystone activities (see below) that are considered integral to whichever subsequent sessions are used.

It should be noted that these keystone activities:

- Do not have to be associated with the themes or modules of participation and research, and could be used in any module relating to the principles of ecohealth.
- Are most useful when conducted in conjunction with reinforcing activities e.g. transversal activities such as poster exercises and rich-picture map, that examine similar themes in an applied way.
- Provide a focus of link for linking with reflective journal questions, which provide good opportunities for personal reflections on the group dynamics involved with these keystone activities.
- Can be usefully trialled by the teaching team as a warm-up to the course.

Keystone Activity 1: Uncommon Commonalities Activity

This activity serves as an excellent activity to introduce collaborative work, appreciative thinking and foster group cohesion. If there is time, it can be conducted directly prior to the "Rules of engagement session" (Keystone Activity 2, below). The uncommon commonalities exercises is adapted from Kagan's (1994) *Cooperative Learning* and is well known as an ice-breaker activity that establishes a foundation for future cooperation, collaboration and working together.

LEARNING OBJECTIVES:

At the end of this exercise students will be able to:

- Identify areas of common interest.
- Describe a range of unusual experiences, preferences and surprises from within their group.
- Propose ways in which future team-work could build on existing areas of commonality.

PROCESS AND DYNAMICS:

STEP ONE: Orientation to the exercise. (5 minutes)

Assign participants to work in groups of four or five (preferably groups would include both members of the teaching team and students)

STEP TWO: Small Group Discussion (10 minutes)

Ask each small group to determine what unusual attributes or experiences they may have in common. The goal is for them to generate a list of the most unusual (uncommon) attributes or experience that they have in common. It can be very helpful for the teaching team to have 'trialed' the exercise in advance to provide 'live' examples. Some examples of uncommonalities that have come-up in the past iterations of these exercises include that everyone in the small group:

- Likes making fire-works
- Has survived a near-death experience
- Is an only child (or middle child etc).

Typically the small group discussions encourage appreciative brainstorming that tends to emphasize humour and dynamic interactions. It also serves as a concrete example of a "group work" task that can be used as a point of reference when discussing the "Rules of Engagement" later on. The tone of the activity is often lighthearted with laughter.

STEP THREE: Plenary Discussion (10 minutes)

Each group shares their list with the entire class, identifying if there was similarities with other groups or notable observations from the exercise.

STEP FOUR: Plenary Discussion (If time allows).

Spend a few moments extending the exercise further to:

- Discuss how future team-work could build on the areas of commonality and other unusual experiences or preferences among the group.
- Share the most surprising or informative examples from their small group discussions.
- Try to determine one commonality that unites the entire group.

Kagan, S. (1994). *Cooperative Learning.* San Clemente, CA, Kagan Publishing. See also www.KaganOnline.com

Keystone Activity 2: Rules of engagement session

This keystone activity offers a powerful pre-cursor to group work in ecohealth training initiatives, giving students a sense of volition and ownership over their learning experience, especially in groups.

LEARNING OBJECTIVES:

At the end of the class, students will be able to:

- Describe specific features that enhanced and optimised their participation and learning with others in the past.
- Explore how factors that enhanced and optimised their participation and learning compared with other's experience.
- Discuss common or emergent features that arose from the list generated by the group;
- Refer to the co-created list in future exercises and activities.

TIMING:

This activity is planned to take ~30-40 minutes depending on group size. If time is limited, it could be initiated at the outset of the course. A collective effort to develop common rules of engagement has been observed to work very successfully as the basis for a 'first class in a semester', especially when group work will be involved. In a longer course it can be a useful exercise to reflect on the students' experiences to date, to re-orient to ideas introduced in earlier parts of the course and, perhaps most importantly, to provide the foundation for upcoming group work.

PROCESS:

The exercise involves the students working in small groups to identify ideas that will be synthesised (in plenary) into an agreed list of 'rules of engagement' for the upcoming course and group activities. It should be emphasised throughout this process that this list will be used to guide their future work and (if relevant) inform future reflective learning exercises. (See Reflective Journals in Transversal Activities).

STEP ONE: Introduce session and ask and students form groups of 3-4. (5 minutes)

STEP TWO: Small groups (10 minutes)
Ask students to reflect on, identify and share specific features about past experiences that have enhanced and optimised their participation and learning with others. Examples may be drawn from this course, or previous group learning experiences.

STEP TWO: Plenary (10 minutes)
Ask each group to share the most notable features and skip ideas that other groups have mentioned. Sharing the features that have helped participation and learning generates a list of ideas for 'optimising participation and learning with others'. *(10 minutes)*

STEP FOUR: Present a set of 'rules of dialogue' or 'rules of engagement' from another source.
(5 minutes)

A well known list is provided below, but you may prefer to identify another list, or simply refine the list provided by the students.

STEP FIVE: Ask students to compare their list with the list you have presented, and to make any adjustments or clarifications to their list. (10-15 minutes)

RULES OF EFFECTIVE DIALOGUE:

Throughout the dialogue:

- Commit yourself to the process.
- Listen and speak without judgement.
- Identify your own and others' assumptions of reality.
- Respect other speakers and value their opinions.
- Balance your need for any particular outcome.
- Listen to yourself and speak when moved to.
- Take it easy, go with the flow, enjoy.

Source: Brown V (2008), *Rules of Effective Dialogue*: Box 4.6. Adapted from Bohm 1996, Gang & Morgan, 2004.

Brown, V. (2008) *Leonardo's Vision: A guide to collective thinking and action,* Sense Publishers, Rotterdam, The Netherlands

SECTION 1: PARTICIPATION, LEARNING AND ACTION: ORIENTING TO DIFFERENT RELATIONSHIPS AND ROLES IN RESEARCH

DESCRIPTION:

The complex dynamics between participation and research have been central to the development of ecosystem approaches to health. 'Multistakeholder participation' was described as a central pillar of ecohealth approaches (Forget and Lebel 2001; Lebel 2004, see also Charron 2012). The participation of involved individuals and communities is intrinsically relevant to the complex disciplinary, sectoral and cultural terrain that characterises ecohealth issues. It is essential, therefore, to recognise the wealth of knowledge and scholarship associated with participatory research, learning and action, and to consider the relationship of participation and research as part of long-standing and ongoing debates.

In this module we introduce some of the origins and theories of participatory learning and action, explore their relevance to ecohealth, and use case study examples and activities to illustrate and emphasise key points and concepts. Although participatory learning and action may be considered a 'priority' for ecohealth initiatives, many of the challenges that it poses for different researchers, practitioners and institutions are common to many other fields of endeavour – especially those that span health, equity, environment and development concerns. The importance of critical perspectives and reflective practice are developed in Section 3.

LEARNING OBJECTIVES:

At the end of this session, participants should be able to:

- Articulate the difference between traditional research and intervention projects, and various kinds of participatory projects.
- Contextualize participation in research as a historically rich and constantly evolving body of knowledge, and discuss origins of this knowledge.
- Relate participation to related concepts such as equity, transdisciplinarity, and knowledge-to-action or praxis.
- Distinguish between 'stakeholders' and 'participants' and discuss this in relation to the 'stakeholder-participant transition'.

KEY QUESTIONS:

- How and when did participatory learning and action approaches emerge?
- What are some reasons for using participatory approaches?
- What are your experiences of participation? Participation and research? Participatory learning and action? How do your responses differ based on the linking of 'participation' with 'research', or with 'learning and action'?
- What are some of the challenges that arise by trying to distinguish:
    - Who participates? ("types" of participant)
    - How are they involved or how do they participate? ("modes" of participation)
    - Where does this take place? ("place" of participation")
    - Also see overall questions for this module.

KEY CONTENT:

Participation in research has been a key component of ecosystem approaches to health in its various guises. Use of participatory approaches is motivated by a number of different considerations, and has been extensively applied in health (Cargo and Mercer, 2008) and environmental management (Kapoor, 2001). An important feature of participatory research is the shift in role from those involved in the research being 'subjects' of research and action through some kind of data collection (e.g. recipients and respondents in a survey, sharing their knowledge in a focus groups), to a more active role in defining project priorities, methods and goals, sometimes to the point of carrying out research and intervention activities in collaboration with researchers and practitioners.

Many authors have identified and classified the range of participatory practices. Arnstein's (1969) "ladder of citizen participation" ranging from 'manipulation' to 'citizen control' provided a foundation that has informed many descriptions of participation and research. Other categorizations link different types of relationships among people and researchers from *co-option* where research is conducted 'on' people, to *co-learning* and *collective action* where research is conducted 'with' and potentially 'by' people other than the researcher (Parkes & Panelli 2003; after Cornwall 1995 and Pretty et al 1995). Cargo and Mercer (2008) describe a spectrum from simple consultation aimed at making community-involved research and action run more smoothly (i.e. achieving 'buy-in') to radical empowerment-based approaches in which 'consciousness-raising' activities are facilitated by researchers with the goal of challenging inequitable power dynamics. While participatory learning and action is often associated with qualitative methodologies, it has been applied to very quantitative processes, such as government budgeting (e.g. in Brazil) or quantitative health research (so-called 'popular epidemiology', San Sebastian et al., 2005).

Participatory research, learning and action can be seen as a reaction to traditional 'top-down' research approaches where research priorities and orientation originate from outside of the affected communities – sourced primarily from the academic literature or other forms of specialised or institutional knowledge rather than from those directly affected by the issue. Participatory learning, action and research often requires challenging prior assumptions regarding the superiority of knowledge brought to communities by researchers and other 'experts' from outside (Freire, 1970) and connecting explicitly with other knowledge cultures (Brown 2011).

The need for engagement with other forms of knowledge remains a pragmatic and ongoing motivation for a critical examination of the dynamics of participation and research in ecohealth. Growing recognition that complex environment-health systems behave in ways that are not predictable by scientists working within narrowly-defined knowledge systems (e.g. academic disciplines) has led to awareness that managing such complex systems demands research approaches that can meaningfully engage with and be informed by other forms of knowledge, especially knowledge held by those most familiar with local ecosystems (i.e. the people who live there) – often referred to as traditional ecological knowledge, local knowledge, place-based knowledge etc. (see Berkes 2000; Waltner-Toews and Kay, 2005; Brown 2011).

The engagement of Indigenous scholarship in the emergence of participatory learning and action has led to considerable methodological innovation and also critique. Many researchers are wary of traditions of research that have compounded and contributed to the marginalization of Indigenous peoples worldwide. These research traditions can be seen as instruments of ongoing colonization (e.g. Tuhiwai Smith, 1999; Denzin et al 2008; De Leeuw et al, in press). Amidst these challenges and debates the development of guidelines for research with Aboriginal peoples, such as the National Aboriginal Health Organization guidelines (Schnarch, 2004) and CIHR Guidelines for Health Research involving Aboriginal Peoples (CIHR 2004), have made a strong case for principles such *as community control, benefits and capacity* to be built into research with Aboriginal peoples in Canada. The development of these guidelines and 'best-practices' have encouraged the emergence of new kinds of critical conversations and approaches to examining the relationship between participation and research, with relevance far beyond Indigenous peoples. Yet across the board there remains a need for ongoing critical reflection and debate, not least regarding the potential hazards of 'good intentions' of participatory research (Kapoor 2001; Cargo & Mercer 2008; De Leeuw et al in press).

While there is a general 'participatory mindset' has the potential to achieve good outcomes by trying to ensure that community-university partnerships (for example) are characterized by humility, trust, equity and good communication, those seeking to learn about the relationship between participation and research should be aware of the extensive range of specific participatory methods and tools that have been developed and documented in both academic and other literatures (e.g. Stringer, 2007; Pretty et al., 1995). In general, methods drawn from social sciences such as anthropology and sociology are helpful in systematically eliciting community priorities (for example ethnographic methods, Schensul and Lecompte, 1999), while methods such as participatory rural appraisal (Mukherjee, 2004) and participatory monitoring and evaluation (McAllister, 1999) have been influential in international development practice. Appreciative or asset-based inquiry is another powerful approach to participatory learning and action, in which community strengths and successes are used as a starting point for discussions of how to define and achieve common goals (see Section 2, below). These methods must all grapple with persistent challenges to the equitable and effective achievement of participatory processes, and the importance of critical practice in building awareness of these dynamics, as emphasised in Sections 3 and 4, below.

Examples and Connections:

Finding, reading, discussing and profiling real examples of the interaction between participation and research (and/or participatory learning and action) is a key component to this module, and most of the activities outlined below. Identifying and selecting examples should preferably involve a combination of:

- The students' experiences of participation and research.
- Critical reflection on the instructors' own experiences.
- Identification and critique of examples from the literature.

Where possible, try to identify an example of an ecohealth project that was not initially participatory, but had to evolve in that direction because it was not working. Ideally find an example that illustrates the overlap between participatory research, learning and action and transdisciplinarity, equity, gender, and knowledge-to-action.

If you do not have examples from your own experience, you could draw on papers and examples, such as:

- "A Cleaner City and Better Health in Kathmandu", is a case-study from Nepal that reflects on how a traditional scientific approach failed to address the complexity of disease causation, necessitating a (participatory) ecohealth approach. This case-study has been described as one of the IDRC Case-studies, profiles at: http://web.idrc.ca/en/ev-29131-201-1-DO_TOPIC.html. Related work has been profiled in Waltner-Toews (2004) and Waltner-Toews et al (2005)
- Other IDRC case-studies might provide examples that are especially relevant to the specific course or context. See: http://web.idrc.ca/en/ev-27268-201-1-DO_TOPIC.html
- If you have developed a case study as part of the course learning activities, then you can make connections with it and in this section. [See How to Use and Develop a Case Study in your Ecohealth Teaching.]

ACTIVITIES:

Activity 1: The experience of Participation and Research (the 'stories behind the stories')

TOTAL TIME: 90 Minutes

NOTE: This interactive activity draws on the experience of researchers in the teaching team who have been involved in initiating participatory and collaborative research in different settings as an 'entrance' to cultivating critical reflection on the students' own practice or experiences.

Prior to the session, students will have read at least one paper or document written by the teaching team that shares their experience of participation and research. The purpose is not for these to be 'perfect' papers, but to create a sense of 'journal club with the authors', to model critical reflective practice and to demonstrate the principles of 'learning by doing' as well as the fact that there is always room to learn and develop one's approaches to participation and research. The teaching teams' papers will serve as a platform to examine the role of researcher as participant in a process of collaborative learning and exchange with others.

STEP 1: Introduction (20 minutes)
Teaching team member(s) will provide a brief introduction to participatory and collaborative features of their research project(s) – providing critical reflections to complement those represented in the papers that the students should already have read.

STEP 2: Small group discussion (25 minutes)
Explore the "stories-behind-the-stories" of participatory and collaborative research described in the papers and presentations. Assign each group one of the two papers presented, and ask them to compile reflections to share back with the whole group.

Ask each group:

1. To distinguish and discuss the "types of participant" (what kind of stakeholder group do they represent) and "mode of participation" demonstrated in the research process (how are these different types of participant involved in the project – what is their 'role'? interviewee, assistant? advisor?). Pay particular attention to the roles the researcher plays, and how this informs the research process and outcomes;
2. To identify an example *from within their group* that demonstrates participatory dynamics comparable to the example. What types of participant and modes of participation were involved? Did the types of people involved or roles they played seem to influence the process of participation or research?
3. To identify one researcher-participant relationship in the paper and discuss it in the context of the 4R's of: *respect, relevance, reciprocity* and *responsibility* (Kirkness & Barnhardt, 1991). How did the 4R's play out during the process of research? And/or the process of publication. How, in hindsight, could it have better contributed to the 4Rs?
4. To pose a question or clarification that their group would like to ask one of the researchers about the "story behind the story" of their research?

STEP 3: Plenary sharing (20 minutes)
Ask each small group to share their reflections on questions #1-3.

STEP 4: Plenary discussion (15 minutes)
Facilitate a discussion focused on the group's questions to the researchers #4.

SPECIFIC READING:
The session leader(s) identifies one or more papers that reflect their experience of participation and research.

Activity 2: Role Play Activity

Role-play a community-university (or community-health system, or community-industry, or community-consultant) interaction involving a researcher, one or more grad students, one or more community members (pick appropriate gender, class, race roles to achieve particular learning outcomes as per group and facilitator goals). A good example is the exercise where members of the group start a situation and then someone declares 'stop' at which point a new person/character enters to carry on the scenario.

Activity 3: Identifying roles and relationships among researchers and participants: Defining With Who? How? and Where? participation occurs

TOTAL TIME: 60-80 minutes

This activity is best conducted with students who have a specific project, and can usefully be conducted in conjunction with the **'poster' exercise** [see Transversal Activities]. The activity is intended to help students to engage with some important questions that will influence their 'research design', including making the transition

- From 'listing' stakeholders (often the list of 'everyone involved' provided on student posters)
- To 'distinguishing' the type of participation (who?), the mode of participation (how?) and the place of participation (where?).

A flip-chart or powerpoint slide that outlines the following differences may be helpful.

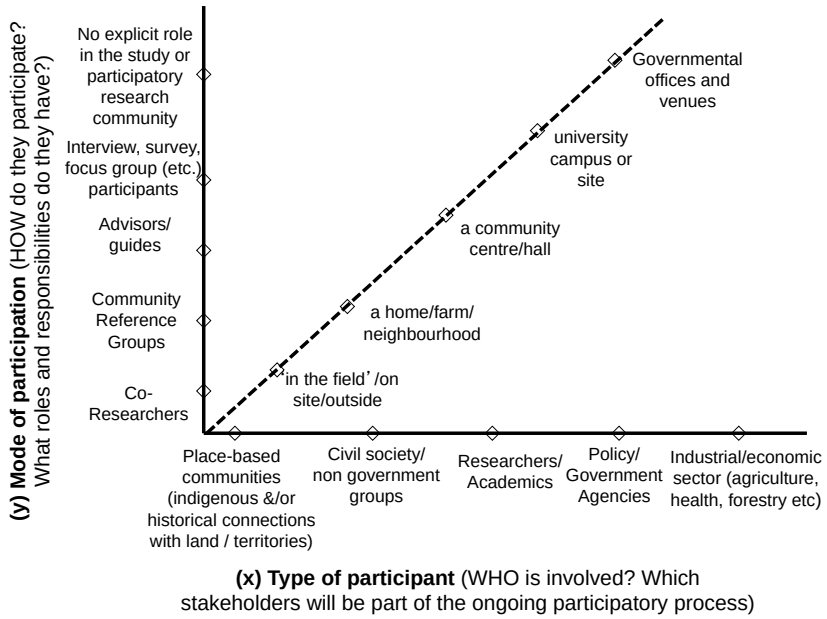

Figure 1.1: Type, mode and place of participation as three axes influencing the development of participatory processes. The current citation has been approved by the copyright holder.

STEP 1: (15 minutes)
This session could begin with a brief introduction to the difference between 'stakeholders' and 'participants', making reference to Figure 1.1, Parkes et al (forthcoming) or Brown 2012 (different types of knowledge: individual, specialised, community, organisational, holistic).

STEP 2: (10 minutes)

Ask individual students to work on the 'for and with whom' part of their poster, differentiating between 'stakeholders' and 'participants'. Start with the different 'types' of stakeholder they have identified, in response to the questions:

- **WHO** is involved? Once this has been defined, for each 'type' of stakeholder ask the questions:
- **WHO** will participate? What roles and responsibilities will they have in your research? (Consider: If they don't need to sign a consent form, are they 'participants' in your research?)
- **WHERE** do they participate i.e. take part, share and exchange in your project?

STEP 3: (20 minutes)
Divide the students into groups of 2 or 3 and give each students 5 minutes to present to the 'for & with whom' section of their poster, distinguishing the different aspects from above.

STEP 4: (10 minutes)
After presenting to each other, get them to discuss and identify one common dilemma or query arising from this exercise.

STEP 5: (20 minutes)
Return to the large group for discussion of these queries and/or guiding questions.

SPECIFIC READING:

Arnstein, S. R. (1969). "A Ladder Of Citizen Participation." Journal of the American Planning Association 35(4): 216 - 224.

Cargo, M; Mercer, SL. (2008) The value and challenges of participatory research: Strengthening its practice. *Annual Review of Public Health 29*: 325-350.

Kapoor, I (2001) Towards participatory environmental management? *Journal of Environmental Management 63:* 269-279.

Pretty, J. N., I. Guijt, J. Thompson and I. Scoones (1995). *Participatory Learning and Action: A trainer's guide*. London, International Institute for Environment and Development.

Waltner-Toews, David; Kay, James (2005) The evolution of an ecosystem approach: The diamond schematic and an adaptive methodology for ecosystem sustainability and health. *Ecology and Society 10*(1): 38.

OTHER WORKS CITED IN SECTION 1:

Arnstein, S.R. 1969. A Ladder Of Citizen Participation. *Journal of the American Planning Association* 35 (4):216 - 224.

ASOCIAL and Classen (2008.) Campesinos Cientificos, Farmer Philosophies on Participatory Research in L. Fortman, editor. *Participatory Research in Conservation and Rural Livelihoods*. Wiley-Blackwell. (*)

Berkes, F., J. Colding and C. Folke (2000). "Rediscovery of traditional ecological knowledge as adaptive management." *Ecological Applications* 10(5): 1251-1262.

Boyer, E. L. (1997). *Scholarship Reconsidered: Priorities of the Professoriate*, (2nd ed). Carnegie Foundation for the Advancement for Teaching.

Brown, V.A. 2010. *Collective Inquiry and Its Wicked Problems. In Tackling Wicked Problems: Through the Trandisciplinary Imagination*. , edited by V. A. Brown, J. A. Harris and J. Russel: Earthscan

Charron, D., F (2012). "Ecohealth: Origins & Approach" In. Charron D (ed) *Ecohealth Research in Practice: Innovative Applications of an Ecosystem Approach to Health*. Springer, New York, NY, USA / International Development Research Centre, Ottawa, Canada.

CIHR (2007). CIHR Guidelines for Health Research Involving Aboriginal People. Available online at: http://www.cihr-irsc.gc.ca/e/29134.html

Cornwall (1995). What is Participatory Research? *Social Science and Medicine* 41: 1667-1676.

Classen L, Humphries S, Fitzsimmons J, and Kaaria S (2008). Opening Participatory Spaces for the Most Marginal: Learning from Collective Action in the Honduran Hillsides. *World Development* 36:2402–2420

Denzin, NK., Lincoln YS. and Smith LT. (2008). *Handbook of Critical and Indigenous Methodologies*. London, SAGE Publications.

de Leeuw, S., Cameron ES. and Greenwood ML. (in press). Participatory, Community-Based Research, Indigenous Geographies, and the Spaces of Friendship: Sites of Critical Engagement. *Canadian Geographer / Le Géographe Canadien.*

Freire, P (1970[2006]) *Pedagogy of the oppressed*. Continuum, New York.

Humphries S, Jimenez J, Sierra F, and Gallardo O (2008). Sharing in Innovation: Reflections on a Partnership to Improve Livelihoods and Resource Conservation in the Honduran Hillsides. in L. Fortman, editor. *Participatory Research in Conservation and Rural Livelihoods*. Wiley-Blackwell. (*)

Kirkness V, and Barnhardt R (1991). First Nations and higher education: The four R's - respect, relevance, reciprocity, and responsibility. *Journal of American Indian Education.* 30:1-15.

McAllister, K. 1999. Understanding Participation : Monitoring and evaluating process, outputs and outcomes. Ottawa: International Development Research Centre.

Mukherjee, A (2004) *Participatory rural appraisal: Methods & applications in rural planning.* Concept, New Delhi.

Parkes M, and Panelli R (2001). Integrating Catchment Ecosystems and Community Health: The Value of Participatory Action Research. *Ecosystem Health* 7:85-106. (**)

Parkes, M. W., D. Charron and A. Sanchez (2012). Better Together: Field-building Networks at the Frontiers of Ecohealth Research. In. Charron D (ed) *Ecohealth Research in Practice: Innovative Applications of an Ecosystem Approach to Health*. Springer, New York, NY, USA / International Development Research Centre, Ottawa, Canada.

Parkes, M.W. Forthcoming. Just Add Water: Dissolving Barriers to Collaborative Learning and Research to Address Health, Ecosystems and Equity. In Hallstrom, Guehlstorf and Parkes (eds) *Beyond Intractability: Convergence and opportunity at the interface of environmental, health and social issues.* UBC Press.

San Sebastian, M., Hurtig, A. K. (2005) Oil development and health in the Amazon basin of Ecuador: the popular epidemiology process. *Social Science & Medicine 60*: 799-807.

Schensul, J; LeCompte, M (1999) *The ethnographer's toolkit: Designing and conducting ethnographic research.* Rowman Altamira, Walnut Creek CA.

Schnarch, B (2004) Ownership, Control, Access, and Possession (OCAP) or
Self-Determination Applied to Research. *Journal of Aboriginal Health 1*: 80-95.

Stringer, E (2007) *Action Research*. Sage, Thousand Oaks CA.

Tuhiwai Smith, L (1999) *Decolonizing methodologies: Research and Indigenous peoples.* Zed Books, London.

Waltner-Toews, D., J. Kay, C. Neudoerffer and T. Gitau (2003). "Perspective changes everything: managing ecosystems from the inside out." *Frontiers in Ecology and the Environment* 1(1): 23-30.

Waltner-Toews, D. (2004). *Ecosystem Sustainability and Health: A Practical Approach*, Cambridge University Press.

Woollard, R. F. (2006). "Caring for a common future: medical schools' social accountability." *Medical Education* 40: 301-313.

SECTION 2: APPRECIATIVE INQUIRY AND ASSET-BASED APPROACHES TO PARTICIPATION AND RESEARCH

DESCRIPTION:

In this session learners and teachers will both explore and apply an *appreciative inquiry* approach to current issues and projects. This approach, when applied with some rigor, has proven more effective than the standard SWOT analysis (*S*trengths *W*eaknesses, *O*pportunities and *T*hreats) in addressing *complex* as opposed to *complicated* problems .Gouberman and Zimmerman (2002) elaborate important differences between complex and complicated problems, highlighting why many of our institutions and modes of inquiry have proven inadequate to address today's complex problems. Brown (2010) builds on the work of others to describe these challenges in relation to 'wicked' problems, and highlights the importance of collective, asset-oriented approaches to learning and inquiry.

Since ecohealth challenges are invariably embedded in complex systems, the approach we use to analyse the context is a prime factor in determining how well we will be able to understand and address particular issues and concerns. The stance of *appreciative inquiry* proposes an alternative to traditional problem-oriented approaches to understanding context and identifying pathways to address complex problems. A central assumption of appreciative inquiry is that in any system or organization, no matter how unhealthy it may seem, *something* is working well. This 'something' is embedded in a complex series of non-linear feedback loops that are can be examined to identify how we can "grow" this success to "infect" the rest of the system with - if nothing else - an enthusiasm for positive change. This is in marked contrast to the traditional approach of trying to isolate what is wrong and then further analyzing the "barriers to change" that prevent positive adaptation. Few of these barriers are readily susceptible to change since, as Berwick reminds us, "every system is perfectly designed to get the results it produces" (Berwick, 1996).

In this module students will learn and trial how an appreciative approach offers a rigorous process that leads to positive change in ways that analytic and problem-focused approaches are rarely, if ever, able to achieve. The focus on 'appreciative inquiry' provides one example of what can be considered to be a 'family' of appreciative and asset-based approaches, some of which are described in Section 1.

LEARNING OBJECTIVES

At the end of this session, students will be able to:

- Apply an understanding of appreciative inquiry and asset-based approaches in simulated and real life situations.
- Demonstrate the contrast between appreciative and problem-oriented approaches to addressing complex challenges.
- Describe the theory and give historic examples of successful use of appreciative approaches to complex organizational and ecosystemic challenges.
- Describe the hazards of the phrase "barriers to change".

KEY QUESTIONS:

- What is the theoretical basis for the appreciative approach to analysis and planning in complex situations?
- What is the historical and organizational evidence for the utility of an appreciative approach?
- What are the practical steps and activities (the "Four Ds") involved in the application of appreciative inquiry?
- How can this approach be applied to one or more of the learner's current projects, theses or activities?

KEY CONTENT:

Appreciative inquiry is particularly useful in addressing complex problems and their relationship to health. It offers an opportunity for an alternative approach to solving complex problems. Central features of an appreciative approach are worth re-iterating from above:

- That in any system or organization, no matter how unhealthy it may seem, something is working well.
- The something working well is embedded in a complex series of non-linear feedback loops
- Examination and analysis of these feedback loops can identify potential opportunities to influence to "grow" what is working well, and to "infect" the rest of the system with this success and an enthusiasm for positive change.

Facilitating a session on appreciative inquiry requires specific attention to *key definitions and concepts*. Diagrams and figures that have been found to be extremely useful in communicating these ideas are included here for reference and explanation, with due acknowledgement to valuable references and online resources such as the Appreciative Inquiry commons (http://appreciativeinquiry.case.edu/).

"Appreciative Inquiry is the study and exploration of what gives life to human systems when they are at their best. It is an organization development methodology based on the assumption that inquiry into and dialogue about strengths, successes, values, hopes and dreams is itself transformational.
It is founded on the following set of beliefs about human nature and human organizing:

- People individually and collectively have unique gifts, skills and contributions to bring to life.
- Organizations are human social systems, sources of unlimited relational capacity, created and lived in language.
- The images we hold of the future are socially created and, once articulated, serve to guide individual and collective actions.

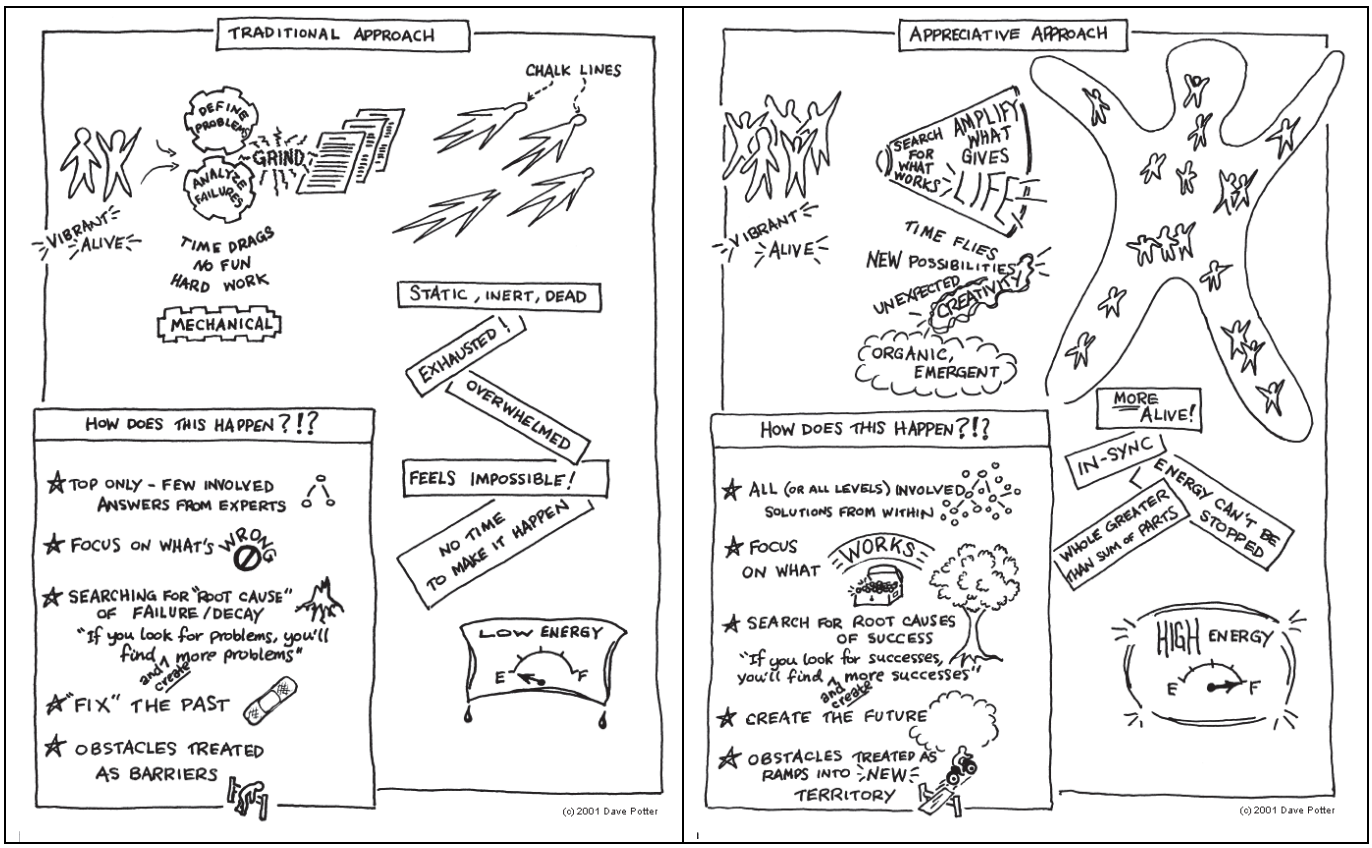

Figure 2.1 : Traditional Approach vs. Appreciative approach
Source: Potter, 2001, Appreciative Inquiry Commons - http://appreciativeinquiry.case.edu/practice/toolsModelsPPTsDetail.cfm?coid=845
The current citation has been approved by the copyright holder.

Through human communication (inquiry and dialogue) people can shift their attention and action away from problem analysis to lift up worthy ideals and productive possibilities for the future. In short, Appreciative Inquiry suggests that human organizing and change, at its best, is a relational process of inquiry, grounded in affirmation and appreciation." (Whitney and Trosten-Bloom, 2003, Corporation for Positive Change)

Explicit attention to the definition of both Appreciation and Inquiry help to orient to the important differences in this approach (from Cooperider and Whitney, 2007):
Appreciation *has to do with recognition, with valuing and with gratitude. The word "appreciate" is a verb that carries a double meaning. It refers to both the act of recognition and the act of enhancing value. Definitions include:*

- To recognize the best in people and the world around us.
- To perceive those things which give life, health, vitality and excellence to living human systems.
- To affirm past and present strengths, successes, assets and potentials.
- To increase in value (e.g., the investment has appreciated in value).

Inquiry *refers to the acts of exploration and discovery. It implies a quest for new possibilities, being in a state of unknowing, wonder and a willingness to learn. It implies an openness to change. The verb "inquire" means:*

- To ask questions.
- To study.
- To search, explore, delve into or investigate.

Inquiry is a learning process for organizations as well as for individuals. Seldom do we search, explore or study what we already know with certainty. We ask questions about and query into areas unfamiliar to us. The act of inquiry requires sincere curiosity and openness to new possibilities, new directions and new understandings. We cannot have "all the answers," "know what is right," or "be certain" when we are engaged in inquiry. The spirit of inquiry is the spirit of learning. (Whitney and Trosten-Bloom, 2003)

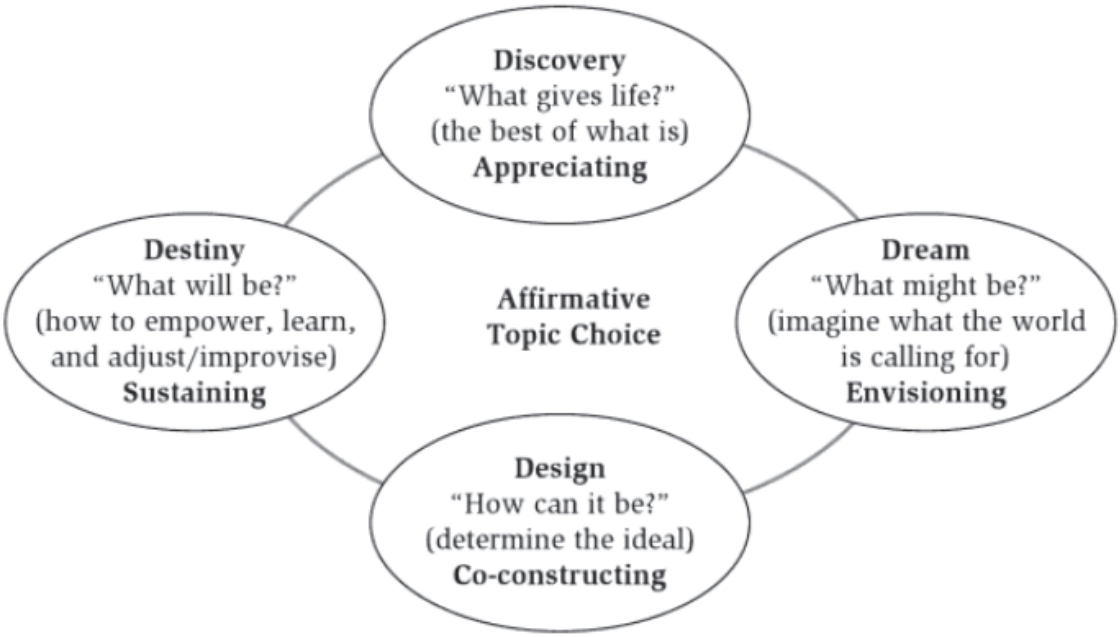

Figure 2.2 : Magruder Watkins, J., Stavros, J.M. Practicing Organization Development: A Guide for Leading Change, Chapter 7 Appreciative Inquiry: OD in the Post-Modern Age, 2009, page 171, Figure 7.2, 2009. This material is reproduced with permission of John Wiley & Sons, Inc.

EXAMPLES AND CONNECTIONS:

The 'Uncommon commonalities' exercise (Keystone Activity 1) has been found to be a very useful orientation to the 'appreciative' thinking behind this module. Some of the thinking around Appreciative and asset-based approaches should also have been introduced in Section 1. Targeted reflective journal questions [Transversal Activities] can be very helpful in encouraging students of ecohealth to explore and reflect on the difference between appreciative approaches and traditional problem-oriented approaches.

Sessions and activities on *Appreciative Inquiry* can be usefully complemented with sessions on Reflection and Critique which help students to discuss and go beyond the idea that appreciative

approaches are 'all positive'. Students should be encouraged to experience how critique and reflective practice complement almost all efforts that traverse the complex relationships of participation and research.

ACTIVITIES:

Where possible, this activity should have been preceded by the Keystone Activity: Uncommon Commonalities.

Activity 1: Appreciative Inquiry exercise "Think back to a time…."

TOTAL TIME: 50-90 minutes (depending on class size)

This is an important exercise to start with since it will help to develop the appropriate group stance and attitude essential for the approach. Otherwise the deeply engrained desire to analyze what is wrong will carry into the rest of the work.

STEP 1: Set-up. (5 minutes)
Have the students pick a partner for a pairs exercise (or go through the group "numbering off").

STEP 2: (15 minutes)
Ask the students to briefly tell their partner about the **most successful/satisfying day in their research, project or learning career**. The partner is then asked to explore the reasons why this was so ("the roots of success"). They are allowed 5 minutes for this exercise and then switch roles for a further 5 minutes. Ensure each student is prepared to go back to the class to describe their partner's success.

STEP 3: (15-20 minutes)
Each pair reports back.

STEP 4: (10-20 minutes)
Facilitator presents the four-D cycle (see below) and asks the class to reflect on how this might have enriched their analysis of how to understand the factors for success.

Four "Ds"

1. Discovery – asking positive questions, seeking what works, what empowers, what gives life to our community or group, when have we felt particularly energized
2. Dream – visioning of what could be, where we want to go
3. Design – making an action plan based on what we can do, and making personal commitments
4. Delivery – start taking actions now

Step 5: optional (20 minutes)
A full class activity can take any relevant or current issue and be facilitated through a general exercise to brainstorm through the 4 Ds.

At the close of this activity, emphasise the opportunities in other activities and/or field exercises to apply this approach (see activities below).

Activity 2: Appreciative/Asset-based Planning for group fieldwork.

This activity is most usefully deployed to reinforce the lessons from previous activity, and to apply them in the context of planning for community interaction. The following questions are designed to encourage relating to, and engaging in, fieldwork in an appreciative way, rather than the traditional approach to problem identification and problem-solving.

Ask the students to work in groups or individually to discuss:

- What assets do you have in your group to orient yourselves to and conduct the days' tasks?
- Make a list of group assets in relation to 'head', 'hands' and 'heart'.
- What resources are available?
- What 'roles' are available to your team in designing this discussion?
- Who should do what? and when? as the day progresses?
- When does your responsibility for the afternoon discussion begin and end?
- How do these questions relate to the reflective questions of What? So what? Now What?
- How does reflecting on your own group assets contribute to your understanding of assets in the community you are about to interact with or visit?

A valuable resource for this activity can be the Asset-based Community Development work of McKnight & Kretzman (1996) that offers a practical and applied approach to identifying and mapping community assets.

SPECIFIC READING:

Berwick D. Education and debate: A primer on leading the improvement of systems. *BMJ,* 1996; 312:619-622.

Brown, V. (2008) *Leonardo's Vision: A guide to collective thinking and action,* Sense Publishers, Rotterdam, The Netherlands.

Brown, V.A. (2010). *Collective Inquiry and Its Wicked Problems*. In Tackling Wicked Problems: Through the Trandisciplinary Imagination. edited by V. A. Brown, J. A. Harris and J. Russel: Earthscan

Cooperrider, D.L., and D. Whitney. 2007. Appreciative Inquiry: A Positive Revolution in Change. In*: The Change Handbook: The Definitive Resource on Today's Best Methods for Engaging Whole Systems*, edited by P. Holman, T. Devane and S. Cady: BK Publishers.

Glouberman, S. and B. Zimmerman (2002). *Complicated and Complex Systems: What Would Successful Reform of Medicare Look Like?* Discussion Paper Number 8. Commission on the Future of Healthcare in Canada.

Kirkness V, and Barnhardt R (1991). First Nations and higher education: The four R's - respect, relevance, reciprocity, and responsibility. Journal of American Indian Education. 30:1-15.

McKnight, J.L., and J.P. Kretzmann. (1996). *Mapping Community Capacity*. Evanston, IL: Institute for Policy Research, Northwestern University

Potter, D. 2001. Appreciative & Traditional Models. Appreciative Inquiry Commons: Available online at: http://appreciativeinquiry.case.edu/practice/toolsModelsPPTsDetail.cfm?coid=845.

Watkins, J., and Stavros J. 2009. Appreciative inquiry: OD in the Post-Modern Age. In Practicing organization development: A guide for leading change, 3rd, , edited by W. Rothwell, J. Stavros, R. Sullivan and A. Sullivan. San Francisco, CA Jossey-Bass.

Whitney, D., and Trosten-Bloom A. 2003. *The Power of Appreciative Inquiry: A Practical Guide to Positive Change.* San Francisco: Berrett-Koehler.

SECTION 3: CRITICAL PERSPECTIVES AND REFLECTIVE PRACTICE

DESCRIPTION

This session will explore the role of the researcher/practitioner in participatory learning and action, and builds directly from the orientation and activities described in Section/Section 1. The session draws heavily on concepts of reflexivity and reflective practice, as well as the personal experiences of session participants, to highlight and constructively approach some frequently-occurring challenges in participatory practice. Space should be made to apply the themes to ongoing research and action projects.

LEARNING OBJECTIVES:

- To practice critical thinking and reflection with regard to one's view of the world, choice of conceptual frameworks, roles, methods and actions.
- To reflect upon elements of one's ethical practice such as respect, reciprocity, relevance and responsibility (see Kirkness and Barnhardt, 1991).
- To engage with critical theory in a way that is constructive and meaningful for students working on individual research and action projects.

KEY QUESTIONS:

- How can multi-stakeholder participation address complex ecosystem-health challenges in equitable and effective ways?
- What pre-established ways of looking at the world are inherent in our disciplinary, professional, class, gender, racial and national identities?
- How can biases and assumptions be identified and addressed in positive and constructive ways?

KEY CONTENT

While participation is sometimes endorsed as an unqualified good, the goals of true, equitable or effective participation are often elusive, with both unforeseen obstacles(Cooke and Kothari 2001) and unintended consequences, despite good intentions (De Leeuw et al, in press). Sometimes allegedly participatory processes can in fact reproduce or deepen inequities. Examples of this range from when community meetings are dominated by powerful individuals whose opinions are then taken to be representative of the 'community', thus marginalizing certain voices; or when claims to overcome difference and distance may actually retrench extractive and colonializing research relations (De Leeuw et al, in press). Participation is sometimes used as a way of facilitating acceptance of top-down priority-setting while maintaining a sense of community ownership, especially in institutionalized forms of participatory practice (the World Bank has been criticized in this respect). Furthermore, since participatory research often crosses lines of power and privilege (i.e. Northern researchers interacting with peasants in Southern countries, or even with communities within Northern countries), there remains a strong risk that prevalent assumptions about the way the world works – e.g. class-, gender-, or race-based assumptions (Heron, 2007) – will influence how a participatory project unfolds (Kapoor, 2005). De Leeuw et al (in press) also highlight that framing of particular participatory methods as "best practices" runs the risk of closing down the necessity for ongoing critique regarding power differentials that are so often intrinsic to researcher/participant relationships.

Response to these possibilities include growing attention to approaches, practices and orientations that can foster a more nuanced, and less naive approach, and a healthy critique of the grand goals of participatory research and participatory learning and action. One approach is to explicitly recognize pitfalls experienced in other participatory projects, and design research accordingly (e.g. Klassen et al., 2008). Processes to formally and methodically guide reflection on the part of researchers and practitioners (e.g. Boutilier and Mason, 2007) can help to guide productive identification of researcher positionality, as can critical theoretical perspectives - feminist, Marxist and postcolonial theories, for example (see 'Reflexive Journal Club' activity below). De Leeuw et al (in press) also contemplate the role of friendship, unfolding outside the context of participatory, community-based research projects, as a space within which to develop and articulate a more critical and nuanced understanding of ongoing tensions intrinsic to participatory and community-based research.

In one such analysis Kapoor (2005), suggests the following approaches to participatory international development projects, with relevance to participatory learning and action more generally:

- Publicize the ways in which our participation can be self-serving.
- Link community-scale projects on topics like health and the environment with changes to the economic and political structures that often constrain the results that can be obtained at the community level.
- Link participatory research and learning processes with broader democratic social movements to make society (and not just a single research project) participatory.
- Be aware that truly empowered communities or individuals might 'hijack' or 'control' how a particular participatory process may unfold, but that this could ultimately represent success. A key challenge in engaging with critical perspectives on participation – or on research more generally – is to do so constructively and in a non-paralyzing manner (see also Appreciative Inquiry Session 2).

Examples and connections

Examples: The Classen et al. (2008) paper demonstrates a project in Honduras that is informed by critical perspectives and incorporates them into the methodology – although it is not explicitly reflexive, it could be the basis for a couple of good discussion questions. Cooke and Kothari (2001) provide numerous critical perspectives on participation, complete with examples, in *Participation: The new tyranny?* (Cooke and Kothari, 2001). Another possibility is that students and teachers explicitly reflect on their own experiences with participation – since it is almost certain that students will have been troubled by inconsistencies in projects (research, volunteer, etc.) they have been involved with in the past. This activity may be linked with, or build on the activity 'Stories behind the stories' described above.

Connections: Since the themes of critical perspectives and reflexiveness are 'cross-cutting' (i.e. they are relevant to every possible dimension of an ecohealth project, whether it is related to trandisciplinarity, complexity, scale, gender, watershed management, etc.), connections can be made between this section and any other module.

One suggestion is that facilitators/teachers observe the group and the progress of the course, and draw on the specific course context to explore issues from this module in a situated manner. Designing reflective journal questions, field work and case-studies that link with the particulars of class discussions can provide students the opportunity to explore these themes further. Scheduling this session to follow the activities of Session 2 on Appreciative Inquiry can provide a valuable opportunity to explore the important idea that Appreciative approaches are not 'all positive' but, rather, are complemented by critique and reflections that help to gain a more nuanced understanding of participation and research relationships.

Making connections with the Gender Module can stimulate valuable discussion around particular ways of looking at the world, power, privilege, etc. The section in this module on collaborating with indigenous communities (below) has clear relevance as well. Finally, the forthcoming module on policy/political ecology/political thought will have clear resonance with this section, in that it will provide a deeper exploration of the power structures that tend to divide 'researchers' from 'participants', and structure the way different actors in an ecohealth collaboration perceive the world and their place in it.

ACTIVITIES:

STEP ONE: Discussion (35 minutes)

Facilitate a "journal club"-type discussion of the required reading (Kapoor, 2005), guided by the following questions:

- What does the article say? (i.e. quick summary as a reminder and clarification of any confusing terminology, etc.)
- What is the justification the author makes for his claims? Is his reasoning sound? How does the article's methodology relate to the disciplinary backgrounds present among the group of students?
- What reactions does the article provoke, intellectually or emotionally?
- What relevance do the themes raised in the article have to ecohealth research?

STEP TWO: Overview activity and break into *groups of 3* (5 minutes)
You could introduce the next part of the activity by linking the themes from the article with your own experiences in trying to link participatory research and action.

STEP THREE: Small group discussion (35 minutes)
Ask groups to relate the themes discussed in the article with their individual research projects and/or personal experience. The overarching questions to guide their discussion are "now what?", or "how to?" move forward in a constructive way from the critical perspectives raised in the reading.

- Laptops or flipchart paper can be used to record key points so that they can report back in plenary.

STEP FOUR: Plenary discussion (20 minutes)
Groups share key points raised during the small group work. Of course, in keeping with the theme of "hijacking participatory development" discussed in the article, the session structure will be flexible.

SPECIFIC READING:

Boutilier, Marie & Mason, Robin (2007) The reflexive practitioner in health promotion: From reflection to reflexivity. In Michel O'Neill, Ann Pederson, Sophie Dupere, Irving Rootman (eds.) *Health promotion in Canada: Critical perspectives*. Toronto, Canadian Scholars' Press: 301-316.

Classen L, Humphries S, Fitzsimmons J, and Kaaria S (2008). Opening Participatory Spaces for the Most Marginal: Learning from Collective Action in the Honduran Hillsides. *World Development* 36:2402–2420

Kapoor, I (2005) Participatory Development, Complicity and Desire. *Third World Quarterly 26*(8): 1203-1220.

OTHER WORK CITED:

Cooke and Kothari (2001). *Participation: The new tyranny?* Zed Books, London.

de Leeuw, S., Cameron E. S. and Greenwood M. L. (in press). "Participatory, Community-Based Research, Indigenous Geographies, and the Spaces of Friendship: Sites of Critical Engagement." *Canadian Geographer / Le Géographe Canadien.*

Heron, B (2007). *Desire for development : whiteness, gender, and the helping imperative*. Wilfred Laurier University Press, Waterloo ON.

Kirkness V, and Barnhardt R (1991). First Nations and higher education: The four R's - respect, relevance, reciprocity, and responsibility. *Journal of American Indian Education.* 30:1-15.

SESSION/SECTION 4: COLLABORATING WITH INDIGENOUS COMMUNITIES AND THE TRADITION OF CIRCLE WORK

DESCRIPTION:

This session explores the complexities of collaboration with Indigenous communities. It invites participants to consider their own positionalities and their relationality to Aboriginal peoples in Canada and Indigenous communities globally. Participants are introduced to circle work (Graveline, 1998), an Aboriginal tradition that may be used for collective dialogue and conflict resolution. Space should be made to apply themes emerging from the reading and discussion to ongoing research and action projects.

LEARNING OBJECTIVES

- To develop an increased awareness and understanding of the complexities of historic and contemporary: a) socio-ecological realities of Indigenous peoples; b) relationships amongst Euro-western and Indigenous peoples; c) ongoing socio-ecological colonization and Indigenous resistance movements.
- To examine one's own identity and positionality in relation to Indigenous communities.
- To describe the experience of engagement in an Anishnaabe cultural practice of circle work.

KEY QUESTIONS

- Why are intercultural alliances important in an ecohealth context and what challenges exist in establishing collaborative relationships with Indigenous communities?
- How are our personal positionalities and worldviews implicated in the process of building intercultural collaborative relationships?
- In what ways do historic and contemporary Eurocentrism and systems of colonization influence collaboration with Indigenous communities?
- How might we incorporate other cultural ways of knowing in ecoheath practice, and do so in ways that don't lead to intellectual appropriation that mainly benefits non-indigenous researchers?

KEY CONTENT

Towards Intercultural Collaboration: Addressing Eurocentrism

Susan Dion (2009) posits that one of the explanations for the prevalence of ongoing ignorance, racism, and Eurocentrism is the fact that many non-Aboriginal peoples position themselves as "perfect strangers" to Aboriginal peoples: a position of unapologetic ignorance where non-Aboriginal peoples (mistakenly) believe that Aboriginal peoples have nothing to do with them. To the contrary, all Canadians live on traditional Aboriginal territories in relation to Aboriginal peoples and have been influenced by them and their cultures. Dion's perfect stranger phenomenon describes how many non-Aboriginal Canadians fail to recognize, or choose to ignore, this positionality. Those who claim the perfect stranger stance often do so because they are aware of the pitfalls of reproducing inaccurate stereotypes, yet are fearful about making cultural mistakes, offending Aboriginal peoples, or challenging the status quo.

Yet, while White Euro-Canadian researchers and other mainstream ecohealth professionals do need to be aware of the pervasiveness of Eurocentrism, it is equally important for us not to retreat from the colonial problem since "Eurocentrism is a consciousness in which all of us have been marinated" (Battiste, 2000, p. 124). Joanne Tompkins (2002) made a significant contribution to the discourse about respectful intercultural collaboration as she worked with rural educators from Eastern Canada, studying their processes of "learning to see what they can't" (p.1). Her research found that this process involves intrapersonal and interpersonal work in an atmosphere of trust and openness. In this setting participants learned to name power and privilege, listen to voices that are typically silenced, and build relationships through a process that requires taking risks and positioning oneself as a continual learner. Similarly, Root (2010) found that decolonizing for White people is a complex process that involves learning to recognize and confront personal and systemic Eurocentrism and White privilege, experiencing Aboriginal culture and pedagogies, building positive relationships with Aboriginal peoples and non-Aboriginal peers, and spending time on the land.

Complexities of Intercultural Collaboration and Alliances

A number of internationally respected Indigenous scholars do suggest that there is a role for non-Indigenous people in the process of seeking justice for Indigenous peoples. For example, Maori scholar Graham Smith (2009) calls for collaboration amongst all contributors whose work is respectful of Aboriginal knowledges and Russel Bishop (2005), also Maori, argues that an alternative to thinking of insiders and outsiders would be to address the concerns of Indigenous peoples by involving all those whose work operationalizes self-determination for Indigenous peoples. Furthermore, Leanne Simpson (2010) states that alliances, partnerships, and solidarities have long been (and will continue to be) a tool of Indigenous movements for justice.

Intercultural collaboration that attempts to navigate and understand the interconnected perspectives of Aboriginal and non-Aboriginal peoples is no doubt fraught with tension and poses significant ethical dilemmas for ecohealth researchers and practitioners. Celia Haig-Brown (in Fitznor, Haig-Brown, & Moses, 2000) describes the challenge she faces as a White researcher:

> As a white woman I continually question the possibility of working respectfully … Ever conscious of the risk of merely "colonizing better," I ponder the possibilities of decolonizing: the interstices of appropriation and learning, of reciprocity and exploitation. (p. 76)

Similarly, Alison Jones (2008) ponders whether her White/settler enthusiasm for collaboration might be "an unwitting imperialist demand – and thereby in danger of strengthening the very impulses it seeks to combat" (p, 471). Yet rather than rejecting collaboration she calls for critical rethinking of Indigenous- non-Indigenous collaboration, suggesting a more "unsettled relationship that is based on learning (about difference) from the Other, rather than learning about the other" (p, 471). Such complexities may be part of the reason why Simpson (2010) argues that it is important to consider the nature of collaborative relationships, various roles and responsibilities, so as to be able to avoid tensions and misunderstandings.

In her seminal 2002 book, 'Becoming an Ally', Anne Bishop defines ally as "a member of an oppressor group that works to end that form of oppression which gives him or her privilege" (p. 12). She argues that potential allies need to understand both the systemic and personal nature of oppression. She states that the process of becoming an ally involves becoming conscious of the interrelatedness of all oppressions as well as healing from personal experiences of oppression and from feelings of guilt associated with inherited legacies of oppression.

Very recently, a number of scholars have begun to expand discourses specifically about Indigenous-non-Indigenous alliances. Examples include Jen Margaret (2010) who examined the experiences of North American non-Indigenous people working as allies; Margaret Kovach (2010) who explored the integration of Indigenous knowledge-friendly pedagogies by non-Aboriginal educators; and Lynne Davies (2010), whose recent book *Alliances* provides an extensive collection of articles by Indigenous and non-Indigenous authors that attempt to re-envision Indigenous-non-Indigenous relationships. More studies are underway, including Greg Lowan's (2011) doctoral work, which explores the concept of "ecological metissage" and seeks to understand historic and contemporary examples of positive intercultural collaboration between Indigenous and non-Indigenous peoples.

Jen Margaret's study (2010) explored the experiences of 18 North American individuals who were "working as allies supporting the struggles of Indigenous peoples and/or undertaking anti-racism work". Her participants worked in a variety of contexts including university Indigenous studies programs, as well as church, community, and human rights organizations. Margaret found that the process of building alliances is a complex task and posits that, "Being an ally is a practice and a process - not an identity. It is an ongoing practice that is learned and developed through experience". She states that alliances are relationship-based and contextual. A key finding of her study is that non-Indigenous allies need to recognize and understand the dominant White colonial mindset. This is congruent with Root's (2010) findings that learning to recognize increasingly more subtle examples of Eurocentrism is a significant component of building respectful intercultural relationships. Similarly to Tompkins and Dion (personal communication) and Root (2010), Margeret suggests that Indigenous and non-Indigenous peoples need to work through decolonizing processes both together and separately. This is echoed by De Leeuw et al's proposal on the value of friendship, external to collaborative and research relationships, as a "space for grappling with the ethical, political, intellectual dimensions of participatory, community-based research, especially as it gains prominence… as a means of conducting research with Indigenous Peoples (in press).

It can be challenging to figure out when to work together and when to work separately. Graveline (1998) distinguishes the different purposes of working at times together and at other times separately: "While homogeneity may encourage self-disclosure, heterogeneity in the group allows the experience of difference necessary to challenge hegemony". These findings seem to indicate that critical self-awareness and reflexivity are important traits of potential allies.

Kovach (2010), a respected Aboriginal scholar studied non-Indigenous faculty who are working as allies in a university setting by integrating "Indigenous knowledge friendly pedagogy" in their classes. Her participants were 11 non-Indigenous faculty members from the University of Saskatchewan. She examined their motivations for including Indigenous knowledges in their courses as well as the personal and systemic challenges they faced. She explored the ways that these faculty members were

able to assist both Indigenous students and non-Indigenous students to learn about Indigenous ways of knowing and what, if any, assistance or support they felt they might need in order to do this. Kovach found that mentorship by Elders or cultural advisors as well as through relational co-teaching experiences with Aboriginal faculty was an important avenue of learning for the non-Indigenous participants. Her participants indicated that their processes of adopting IK-friendly pedagogy involved learning about Aboriginal issues, taking responsibility to learn about Aboriginal cultural traditions and gather resources, and actively engaging with Aboriginal peoples.

The studies of Margaret and Kovach help to conceptualize what it means to be a non-Indigenous ally to Indigenous peoples and to identify challenges and pitfalls of this endeavor. For the most part, individuals in their studies seemed to be working in respectful relationships that had been fostered over time. Yet having an intention of becoming an ally does not necessarily ensure respect (Gorski, 2008). Attempts at alliances can sometimes unintentionally perpetuate colonial relationships since coalitions or alliances exist within a wider society that is dominated by Eurocentrism and on-going colonialism. Those from the dominant culture who strive to be allies may be unaware of ways in which they interact with their Indigenous colleagues that disregard Indigenous values, traditions, and social norms (Davies and Shpuniarsky, 2010). Davies found that relationship building requires extended time in which respect and trust are fostered. She writes that respect needs to be exemplified through daily interactions such as by:

> following opening protocols when entering a community; participating in opening ceremonies and prayers at the beginning of a meeting; thanking and recognizing the Nation in whose territory the meeting takes place; remembering to provide an honorarium to an Elder who has been asked to participate in a meeting; and observing local protocols of interaction…

Furthermore, Davies and Shpuniarsky found that as well as collaboration, allied relationship building also involves respecting difference, understanding privilege, learning about historic Aboriginal-non-Aboriginal relationships and acknowledging colonial legacies.

EXAMPLES AND CONNECTIONS

As in the sections above, the teaching team is strongly encouraged to identify examples from their own experiences to help demonstrate or explore key themes that could be raised in the context of this topic. It is not expected that 'answers' be provided to these complex issues. Given the potential sensitivity and concerns around these issues, there is benefit in anticipating and considering responses to the questions below in advance of facilitating a discussion with the students.

- How can a given academic/graduate student can "work to end that form of oppression which gives him or her privilege"?
- What can ecohealth approaches contribute to going beyond cultural sensitivity and respect for indigenous knowledge, to actually challenging the political and economic power structures that marginalize indigenous people, and privilege the kinds of people who end up in academia?
- How can academics meaningfully challenge those power structures that they have benefitted from and are part of, but which perpetuate the issues and injustices that are under 'inquiry'?

- Does pursuing a graduate degree, and career in academia or the public sector in Canada, inevitably imply support for the power structures that marginalize indigenous people?

Exploring questions like those above could be linked to the previous section on critical perspectives, for example Kapoor's (2005) suggestion that participatory development be linked to broader democratic social movements, and De Leeuw et al's proposal of cultivating friendships and peers with whom is possible to actively engage in challenging, questioning and exploring these kinds of tensions.

Activity: *Circle Work for Community Building (by Kaaren Dannenmann)**

NOTE: *For the purposes of the Ecoheath course, after the first introductory circle, subsequent circles might continue to discuss reactions to readings, talk about participants previous experiences collaborating with Indigenous communities, or to talk about participants' own identities and/or relationality with Aboriginal peoples. Circle work takes time and is most meaningful when not rushed. In this context, with a group of 15-20 people, two or three rounds of circle work could take an hour or two depending on the amount of sharing that takes place.*

Dannemann writes that:

> Circle work is an important tool for group meetings, an important way of communicating so that consensus may be achieved. In a circle, there is no one who is more important or less important than others, everyone is equal. If someone joins the circle, the circle is merely shifted to make room for another.
>
> I like to begin circle work by holding a sage, sweetgrass, or cedar ceremony, explain its purpose, and allow everyone to participate if they choose to do so. This ceremonial time is a time of preparation for the work ahead, a time for prayer. I usually pray for an open mind and an open heart, for the ability to articulate well, to speak, to hear, and see in a good way. In order to avoid cultural misrepresentation or appropriation, those people who are unfamiliar with sage, sweetgrass, or cedar ceremonies could invite a local Elder or other Aboriginal community member to lead such an opening ceremony. This invitation should be preceded with an offering of tobacco. Additionally, you may find your own way of inviting open minds and hearts and wishing for an atmosphere where everyone is able to speak, listen, and participate in a good way.
>
> It may be conducive to start with an exercise at this point where the facilitator/teacher/leader sits in the middle of the circle and has everyone draw him, giving the group 5 - 10 minutes. Then, the drawings are taped on a wall or on a table and everyone can look at them and share comments and chuckles. Some people are kind. Others can be more realistic and catch those parts and angles that are not very flattering! It can be explained that the lesson is that while none of the pictures are the same, they all represent one thing, and each drawing represents the subject according to each person's perspective and talent. And NONE of them is wrong. It is all about having had a different perspective. Our opinions, beliefs and views are like that - they are different because we all have had different life experiences in different places at

different times. The group is then asked to remember this exercise while circle work is being done.

How circle work is conducted has to be explained. A "talking" rock or stick is used, and only the person who is holding the rock or stick can talk. The others listen carefully and respectfully. There can be no commenting or cross-talking or side-talking. People are asked to try not to formulate what they are going to say but to just listen, to have faith that when the time comes for them to talk, when the rock reaches them, they will say what has to be said. The rock will travel around the circle in the clockwise direction when on Anishinaabe Land, but counter-clockwise when they are on Haudenosaunee Land. In this way, everyone gets to hold the rock, gets a chance to speak, to be heard. Everyone is encouraged to participate, but no one is forced to, the stone can be passed onto the next person. The participants are encouraged to speak from their own experiences, to share their feelings so that people won't be judging or trashing anyone else or anyone else's views. At this time, it is a good idea to do a fast exercise by writing on a flip chart all the different feelings we may have. We usually fill the whole sheet quite easily.

The first Circle is for everyone to introduce themselves and sharing what they are feeling at that moment. This is simple, and everyone starts to understand how it works. At the end of the first circle, I usually give some examples of how Circle Work has worked for me. One example I like to use is the time I asked for a family meeting to present a plan I had for a short project. We used a circle to conduct the meeting. After a sage ceremony and a prayer, I began the circle by outlining my plan and then passing the rock to the person on my left. I listened carefully as everyone described their concerns and suggestions. By the time the rock came back to me, the plan was unidentifiable as having been my plan, but I was perfectly happy with the new plan.

The way that it evolved had everyone's participation, and in the end, everyone was happy and excited about it. We were all of one mind. We had reached consensus. This is the magic and the wonder and the promise of Circle Work.

SPECIFIC READING:

Davies, L. and Shpuniarsky, H. (2010). The Spirit of Relationships: What we have learned about Indigenous-non-Indigenous alliances and coalitions. In L. Davies (Ed.), *Alliances: Re/Envisioning Indigenous-non-Indigenous Relationships* (pp. 334-348). Toronto: University of Toronto Press.

Margaret, J. (2010). Working as Allies: Winston Churchill fellowship report. Retrieved 01/04/2011 from: http://awea.org.nz/sites/default/files/Jen%20Margaret%20-%20Working%20as%20allies%202010.pdf

Bishop, A. (2002). *Becoming an ally*. (2nd Ed.). Toronto: Fernwood

OTHER WORK CITED:

Battiste, M. (2000). *Reclaiming Indigenous Voice and Vision*. Vancouver: University of British Columbia Press.

Bishop, R. (2005). Chapter 5: Kaupapa Maori Approach. In N. Denzin and Y. Lincoln (Eds.), *The Sage Handbook of Qualitative Research* Third Edition (pp. 109-138). Thousand Oaks: Sage.

de Leeuw, S., Cameron E. S. and Greenwood M. L. (in press). "Participatory, Community-Based Research, Indigenous Geographies, and the Spaces of Friendship: Sites of Critical Engagement." *Canadian Geographer / Le Géographe Canadien.*

Davies, L. (2010). Introduction. In L. Davies (Ed.), *Alliances: Re/envisioning Indigenous-non-Indigenous relationship*s (pp 1-12). Toronto: University of Toronto Press.

Dion, S. (2009). *Braiding Histories: Learning from Aboriginal peoples' experiences and perspectives.* Vancouver: UBC Press.

Fitznor, L., Haig-Brown, C. and Moses, L. (2000). *Editorial: (De)colonizing academe: Knowing our relations.* Canadian Journal of Native Education, 24(2), 75-81.

Gorski, P. (2008). *Good intentions are not enough: a decolonizing intercultural education*. Intercultural Education, 19(6), 515-525.

Graveline, F.J. (1998). *Circle works: Transforming eurocentric consciousness*. Halifax: Fernwood.
Jones, A. and Jenkins, K. (2008). Rethinking Collaboration: Working the Indigene-colonizer hyphen. In K.

Denzin, Y. Lincoln, and L. Smith (Eds.), *Handbook of Critical and Indigenous Methodologies*, (pp. 471-486). Thousand Oaks: Sage Publications.

Kovach, M. (2010). *Toward an IK-friendly pedagogy in mainstream classrooms*. University of Saskatchewan. Retrieved on 18/07/2010 from:
http://www.usask.ca/education/Aboriginal/downloads/ik-friendly-pedagogy.pdf

Lowan, G. (2011). Ecological Metissage: Exploring the third space in outdoor and environmental education. Pathways: *Journal of Outdoor Educators of Ontario*, 23(2), p 10-15.

Root, E. (2010) This land is our land? This Land is your land: The decolonizing journeys of White outdoor environmental educators. *Canadian Journal of Environmental Education*, 13.

Simpson, L. (2010). First Words. In L. Davies (Ed.), *Alliances: Re/Envisioning Indigenous-non-Indigenous Relationships* (pp. xiii-xiv). Toronto: University of Toronto Press.

Smith, G. (2009). *The Future of Indigenous Knowledge.* Professional Development Seminar: American Educational Research Association Annual Meeting, San Diego, California (April 17).

Tompkins, J. (2002). Learning to see what they can't: Decolonizing perspectives on Indigenous education. *McGill Journal of Education,* 37(3), 405-4

SESSION/SECTION 5:
MOVING FROM KNOWLEDGE TO ACTION: "SO WHAT?", " NOW WHAT?" AND THE IMPLICATIONS OF RESEARCH AT DIFFERENT LEVELS OF THE SOCIAL-ECOLOGICAL SYSTEM

DESCRIPTION

In this session students are challenged to consider ecohealth research in terms of how it is contributing to the broader goals and to re-position their work back into its socio-ecological context. Whereas earlier sessions raised questions of the "what?", " why?", and "how?" of participation in relation to research, this session offers students of ecohealth new ways to consider the questions "so what?" and "now what?"

The session challenges students to concisely communicate the importance of their research in the context of social-ecological systems. Since focus on participatory processes often creates a 'social bias', the emphasis in this session is to position and contextualise student's ecohealth research at an ecosystem level. By attempting to link their research with other ecosystem level processes, students will be able to see how their work might be adapted or expanded to consider implications and relevance at different ecosystem levels. For example, students might consider how their particular research issue related to the 'big picture' ecosystem level processes and social-ecological systems, or to consider whether there may be merit in future phases of work moving from a social and/or ecological context to a laboratory setting to obtain mechanistic information that might later become relevant to applied contexts.

LEARNING OBJECTIVES:

At the end of the session, the student will be able to:

- Explore the relevance and implications of graduate research across different ecosystem levels.
- Communicate effectively and concisely answers to the questions: "who cares?" "so what?" and "now what?" in the context of these different scales.
- Examine the implications of your work in terms of different forms of scholarship (especially the scholarship of integration, application and engagement).
- Discuss ways in which research projects may not incorporate all principles of ecosystem approaches to health simultaneously in order to be considered 'ecosystem approaches to health'.
- Explain why the health and resilience of social-ecological systems extends beyond the health of the human species and domesticated species upon which we are directly dependant.

KEY QUESTIONS:

- What species are affected by the different ecosystem levels that your project influences?
- How do humans interact with this species, directly or indirectly?
- How does this influence your answer to the question – so what? And who cares? And now what?
- What tools can be used to 'zoom-in' and 'zoom-out' on you research?
- How can you communicate key aspects of your research succinctly?

KEY CONTENT AND CONCEPTS

By moving to consider the questions "so what?" and "now what?", this session explores themes raised by Charron (2012) in relation to 'putting ecohealth principles into practice':

> *"The preceding principles form the basis for implementing research using ecosystem approaches to health. They are couched in an understanding that humans, and our social and economic systems, are embedded within ecosystems, and that these coupled social-ecological systems behave as complex systems. To achieve positive and sustainable changes in people's health through better interaction with ecosystems, a variety of actors and processes are needed in research.*" (Charron, 2012)

With this in mind this session - and activity below - makes an explicit turn toward the 'ecological' as a way of challenging the 'social bias' and orientation that tends to dominate when we focus on participatory processes.

Note: The design of the session was informed by alumni feedback on previous CoPEH-Canada ecohealth courses. Alumni raised the concern that it is too easy to 'lose sight of the ecosystem' in ecohealth work, and that consideration of 'participation' and 'knowledge to action' in ecohealth work can – and should - explicitly engage with 'involvement' of and implications for non-human species.

To foster this ecological orientation, one of the required readings is a chapter from an Environmental Health text that seeks to introduce basic ideas of biological organisation and ecological hierarchies to readers who may not be familiar with these ideas (Parkes and Weinstein 2004).

> *The ecological hierarchy refers to interacting organisational levels that range from molecules and cells, to individual organisms, populations of individuals of a single species, communities of many interacting populations, as well as whole ecosystems. Such hierarchies are characteristic of all living systems. They are not only essential to the study of ecology but, when considering human ecology, are also familiar to our understanding of health. Whereas doctors and other healthcare professionals are used to considering the systemic interactions between cells, organs, and the health of individuals, it falls to public health research and practice to understand and respond to the determinants of health at the level of communities and populations (Rose 1985). However while ecosystems are a fundamental aspect of the ecological hierarchy, the role of ecosystems in the relation to the health of populations and communities (and associated social systems) has often been neglected in our understanding of the 'big picture' of health... A systems approach to the ecological hierarchy is based by the premise that "the findings at one level aid in the study of another level, but never completely explain the phenomena occurring at that level" (Odum 1971, p5), leading to the concept of emergent properties, complex systems and a view of science which tends toward synthesis rather than reduction (Bertalanffy 1968; Simon 1974). Systemic concepts and systems thinking are widely represented by the expression that 'the whole is more than the sum of its parts'.* (Parkes and Weinstein 2004).

The idea of encouraging reflection on the social process and context of participation through consideration of ecological hierarchies and systems-thinking, re-iterates how interrelated the principles of ecohealth are. This approach also highlights the practical and ethical implications that arise when zooming in and zooming out on any study to gain new and different perspectives. Charron embeds this kind of thinking into a schematic used to describe the different stages of ecohealth research; 'understanding systems relationships' as part of knowledge development, and the challenge of 'scaling up and out' in the process of systematization.

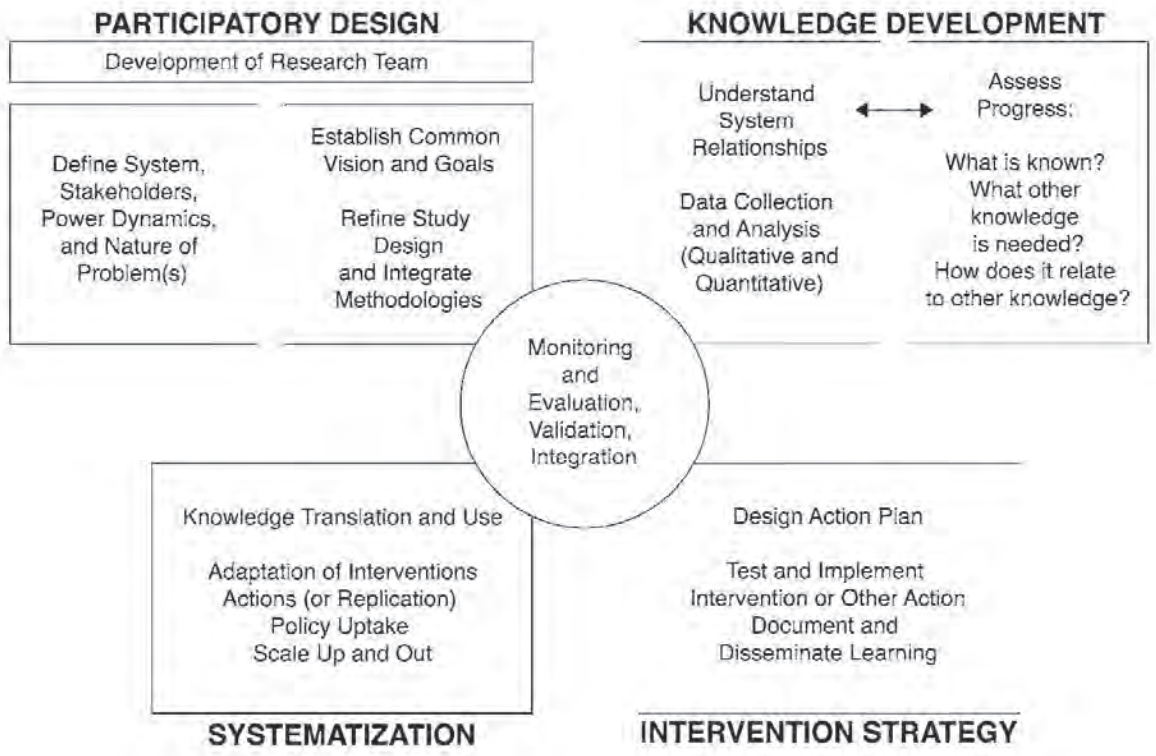

Fig. 1.1 Research process using an ecosystem approach to health – the case studies in this book illustrate how research generally proceeds through four main phases, allowing for back and forth among them, and over a number of iterations. Ecohealth research could be initiated in any quadrant, but tends to start in the *top left* with a participatory design phase

Figure 5.1: With kind permission from Springer Science+Business Media: Charron, D. Ecohealth Research in Practice: Innovative Applications of an Ecosystem Approach to Health, Chapter 1: Ecohealth: Origins & Approach, 2012, page 21, Figure 1.1, 2012 IDRC.

The activity below challenges students to think of participation and research in a way that explicitly considers scale and nested hierarchies – noting the potential to zoom in and out on almost any topic, and recognising relevance from the cellular level to the global. The different phases of the activity offer some new ways to explore the idea of inclusion and exclusion through transdisciplinary and participatory design, knowledge development, systematization and intervention and/or action.

EXAMPLES AND CONNECTIONS

This session connects with the defining health session in the Health Module that engages with different aspects of social-ecological systems by including multiple species, considering non-use species, and biotic/abiotic aspects of (social-) ecological system in the definition of health. Considering both "who cares" beyond humans and the larger systems connections engages notions of reciprocity and interrelatedness taken up in other modules [Health, Complexity, Social Networks, Gender]. The elements of communication in the activity below could be usefully linked with related activities around communication of research.

Activity:

The session would be enhanced by having done prior readings (e.g. Parkes 2004, Woollard 2006, Kidd 2007).

STEP 1: Introduce activity and model task. (5 minutes)
Introduce the objectives of this session, and succinctly communicate the main ideas and objectives of your research as an example to be discussed by the group, and to model the task to be completed in small groups.

STEP 2: Plenary discussion (10 minutes)
As a group, brainstorm the "so what" and "who cares" of the research presented, with explicit attention to different levels of the ecological hierarchy and non-human species. Make links with the Parkes and Weinstein, 2004 reference. After the example is explored, create an opening for the group to ask questions related to the purpose of the exercise and to discuss the core concepts – including *ecological hierarchy*.

Note: *In the pilot of this work at the 2011 ecohealth summer course, this involved discussion of how cellular level laboratory research might relate to different levels of the social-ecological system.*
STEP 3: *(5 minutes)*

STEP 3: Group formation (5 minutes)
Ask students to locate the 2 people with whom they have had the least amount of contact during the course, to form groups of 3.

STEP 4: *(20 minutes)*
Each member of the group take turns succinctly presenting their research. The other 2 group members listen and offer suggestions as to how the themes presented can be adapted or expanded to consider 'smaller picture' or 'bigger picture' aspects of their work at different levels of the ecosystem.

STEP 5: Plenary debrief (10 minutes)
Revisit the purpose of the activity. Ask people to keep in mind how they might scale their research from one level of biological organization to another, either up or down in terms of complexity (i.e. different levels of biological organization). Questions to discuss collectively:

- What types of words are useful when talking to a broad audience having varying experience in the area that you are studying?
- Has communicating your research in basic terms helped you to link your research with the 'bigger picture'?
- Was it easy for you to concisely communicate your main research objectives?
- Could you distil your research into a newspaper style headline to be read by a general audience?
- What do these lessons mean in terms of valuing different forms of scholarship (e.g. Scholarship of integration, application and engagement)?

SPECIFIC READING:

Required pre-reading:
Charron, D., F (2012). "Ecohealth: Origins & Approach" In. Charron D (ed) *Ecohealth Research in Practice: Innovative Applications of an Ecosystem Approach to Health*. Springer, New York, NY, USA / International Development Research Centre, Ottawa, Canada.

Parkes M and Weinstein P (2004). "An Ecosystems Approach". Chapter 3 In Cromar N, Cameron S, Fallowfield H. *Environmental Health in Australia and New Zealand*. Oxford University Press.

Woollard, R.F. (2006). Caring for a common future: medical schools' social accountability. *Medical Education* 40:301-313.

REFERENCES CITED:

Bertalanffy, L. V. (1968). *General Systems Theory*, George Braziller.

Kidd KA, Blanchfield PJ, Mills KH, Palace VP, Evans RE, Lazorchak JM, Flick RW (2007). Collapse of a fish population after exposure to a synthetic estrogen. *Proc Natl Acad Sci U S A.* 2007 May 22;104(21):8897-901.

Odum, E. (1971). *Fundamentals of Ecology*. Philadelphia, W.B. Saunders Company Philadelphia.

Parkes, M.W., and P. Horwitz.(2009). Water, Ecology and Health: Exploring ecosystems as a 'settings' for promoting health and sustainability. Health Promotion International 24 (1):94-102.

USING AND DEVELOPING AN ECOSYSTEM APPROACHES TO HEALTH CASE STUDY IN YOUR TEACHING

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Reviewed by: Vi Nguyen and Lindsay Beck

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INTRODUCTION

DESCRIPTION:

Case studies are carefully constructed learning scenarios that enable students to grapple with key educational content on their own and in groups. A case study can be used in ecohealth teaching as a catalyst for the introduction of concepts and methods, since it provides the opportunity for students to practice these collaboratively.

In teaching with case studies the emphasis is on the learning process within which skills are developed, rather than the acquisition of knowledge and the attainment of subject matter expertise. The case study is an opportunity to practice techniques, exercise skills, and bring knowledge in relation to concrete problems and action. It stresses the importance of transdisciplinarity to ecohealth research projects, by providing a space for transdisciplinarity to emerge during collaborative work on an ecohealth problem.

The purpose is to provide a manageable and realistic problem, embedded within a complex system that will introduce the students to the ecosystem approach to health and require them to grapple with the principles of the approach and to explore and utilize key concepts and methods.

LEARNING OBJECTIVES

During case study tasks and activities, students will:

- Be able to analyze concrete problems.
- Integrate multiple knowledges including ecosystem, social, and community.
- Apply course material.
- Grapple with seeing an issue from multiple perspectives.
- Practice trandisciplinarity.
- Link knowledge to action

Kinds of case studies:

Closed

In closed case studies the problem is clearly defined, and students work through how to respond. Closed case studies tend to be simpler and more discrete components of the curriculum. They are easier to teach with because the path of learning may be more fully anticipated, as the case is less dynamic.

Open

In open case studies the problem is poorly defined, and students work through defining the problem. In this case, students need to determine which features and perspectives to take into account in order to define the problem and will often have to redefine the problem as new perspectives and information surfaces. Teaching with open case studies involves a high degree of uncertainty, the learning paths cannot be fully anticipated, and the case is very dynamic.

Key components:

Since your case study is meant to provide students with an opportunity to practice ecohealth research, you should include several different kinds of activities:

- Research
- Field work
- Hands on activities
- Meeting with people outside the classroom
- Interaction with community
- Group work
- Qualitative and quantitative analysis
- Reflection

Try to include individual components that have their own focus, even though they are part of the case study issue. The component tasks should have their own objectives which address specific ecohealth knowledge and skills. For instance, if you would like participants to conduct a stakeholder meeting, the design of this meeting could be one of their tasks, and it can have its own learning objectives related to ecohealth, even though it is part of the participation and research component of the case study.

BUILDING A CASE STUDY – A STEP BY STEP PROCESS

STEP 1: Know your participants

Knowing your participants (i.e. students) allows you to factor their capacities and prior skills into the design of your case. In order to engage them you need to have an issue that speaks to them. The following are suggestions of factors to consider about your participants:

- Languages – primary and other, comfort levels, spoken and written
- Disciplinary backgrounds
- Ecohealth research experiences
- Learning objectives
- Where they live or have lived

NOTE: *you may be able to collect this information through the course application process, by asking for a bio sketch or through assignments i.e. a journaling exercise.*

STEP 2: Picking a case

When picking your ecohealth case there are some factors to keep in mind:

- **Community contacts** – You will be able to develop a far richer case study learning experiences if you already have some contacts in the community. The insight they will provide and the advice they will give will help you to construct a very believable case scenario and an in depth simulation of an ecohealth research project.
- **Defined area of study** – Picking a case that is geographically defined with clear affects on human and other biological communities will provide for a more workable scenario.

- **Existing research** – If you can find a case where there is already existing research, this will greatly help you in developing your case scenario and in providing research materials for your students to use.
- **Complexity** – You want a case that is complex, and will call upon students to have to grapple with a problem that they cannot reduce to pre-existing knowledge domains and where they cannot just apply a simple solution.
- **Recognition of a problem** – Picking a case where there is already recognition that there is a problem will help you to get your students thinking about the issue. If there are already policy issues in place (such as remedial action plans) to address the issue, these can be used as part of your critical analysis.
- **Clearly related to health** – Picking a case that is clearly a health issue will help your students to get to work more quickly than one where it may not yet be clear.
- **Relevance to students** – When picking your case, consider who you are teaching to and how they will be able to assess the case.

STEP 3: Define the Problem

This is a delicate and important part of designing a case study. You want a problem that is ill-structured enough that it will allow students to further develop the problem through processes of exploration and discovery. At the same time you want your problem to be clear enough that it will be accessible to students so they can begin their work.

STEP 4: Incorporate Reflective Activities

- **Developmental:** You could ask the same question at 3 different times throughout the course so that students can see how their thinking changes and develops. It could be something as simple as: What is the issue?
- **Task debrief:** Take time to speak with the students about the learning process. Expose to them the purpose of the task design and what aptitudes and skills they were intended to learn. Ask them to reflect upon what skills they think they got out of it. (This is also a good time to gain feedback on how adequate your learning design was - you may wish to make adjustments next time.)
- **Reflective follow-up to community consultation process:** If your case involves a community consultation, it is important to build in some kind of reflective component. This could be a reflective writing assignment or a group discussion. Some examples of questions you could ask students to reflect on are:
    - Who was missing? How did their absence change the discussion?
    - Who spoke, who didn't?
    - What other kinds of consultation would you need to have if you were doing a larger project?

EMBEDDING A CASE STUDY IN A COURSE CURRICULUM

Embedding an extensive case study within a course can provide a way for students to work with and test the knowledge and skills that they are learning in the course. When embedding a case study into a course, the case should be broken into several steps, which will work towards a final project or presentation. Many of these steps can have tasks associated with them.

Step	Description	Tasks and Objectives
1. Introduce the case study place.	This could be a film, images, or guest lecturer which introduces the people and the place that the case study connects with.	Gain a sense of place.
2. Introduce case scenario or narrative and clearly articulate the case study work and expectations.	Outline the ecohealth issue(s), and introduce some of the various stakeholders which the case study will explore and address. State the tasks, time, supports and resources with which students will accomplish the tasks.	Confront a complex ecohealth issue.
3. Site visit. (If possible.)	Plan this so that students can get multiple perspectives on the place in question, both from socio-economic and cultural perspectives, but also from geographical perspectives.	**TASK:** Have students take photographs during the site visit that they can later use in constructing a ***Rich Picture Map.***

Step	Description	Tasks and Objectives
4. Site visit debrief (1/2 hour)	Facilitate discussion about the site visit where participants are able to reflect on their perceptions and experiences, share questions, and develop a deeper understanding of the place.	Reflective activity
5. Assign groups. (You could do this as part of step 2. If you want students to experience the place independent of any group task, then you would wait.)	These are the groups that the students will work in to develop their final presentation. When constructing groups you should consider language of choice, gender and discipline.	
6. Prepare students to facilitate community engagement. **NOTE: Try to find ways to make this a two-way process, so that students are also involved in the community context and events.**	Since the case study aims to give students a simulated ecohealth research experience, it is good where possible to prepare students for facilitating community engagement.	This could be done by providing sessions on conducting stakeholder meetings, focus groups and other forms of consultation.
7. Students prepare for conducting a community consultation.	Students will need to come together as a large group to decide how they will facilitate their time with community members.	Students practice building consensus, planning in large groups and collective action.

Step	Description	Tasks and Objectives
8. Community consultation	Students meet with members of the community in order to enhance their understanding of the case issue. This could be a stakeholder meeting or a community discussion.	Students practice communicating with multiple members of a community and conducting careful and respectful inquiries into complex issues with the people involved.
9. Case Study Presentations	Students present their work in groups.	
10. Final Debrief	Ask students to discuss (in small or large groups): - What worked and why? - What didn't work and why? - How did you do it? - How would you do it differently at other time? - How did your perceptions change at different stages	Students learn by reflecting on the learning process. Instructors gain valuable feedback about how to conduct future case studies.

PRE-COURSE PLANNING:

Step 1. Compile resource materials:
Depending on the length of your course, the case study could run from anywhere from 1 week to several months. This length of time will impact the extent to which students will be able to conduct research.

When you have several weeks or months to facilitate student learning with a case study, it is important to set up the issue by providing some initial information, and then to provide time and support for students to conduct their own research and discover what is missing.

In shorter case studies (1 – 2 weeks) it is a good idea to compile some research materials for them to work with so that they can develop a more in-depth understanding of the issue in a short period of time. You can make these materials available on a class computer, on a USB stick, on a CD or DVD, or in paper package. Some materials useful to include are:

- Maps of different scales
- Research studies which have been done on the issue in question (or a closely related issue).
- Associations and organizations related to the issue and any materials that they have produced. For instance, a naturalist association might have materials on environmental issues related to your case scenario, or a community group may have materials on a health issue.
- Government policy related to the issue along with any government studies that have been conducted.

STEP 2. Connect with community partners:
In order to provide a full experience for students, case studies work best when there are real opportunities to connect with members of the community. Since this is a learning experience and not an official research project, it is important that the community members that you plan to involve are aware of this. You need to discuss with them:

- The main idea of ecohealth, the purpose of the course, and who the students are.
- The learning scenario and tasks which the students will be working on and the kinds of things the students will be interested in learning from them.
- Who else will be involved – it is important that your community partners know who else is included, as there may be existing tensions or they may have suggestions for the involvement of others.
- The mode of interaction that they will have with students and with each other.
- Make sure that this is a learning project and not a research project, and address any uncertainty surrounding their engagement with the students.
- What their interests, concerns, hopes and curiosities are in being involved in this learning exercise. Be sure to communicate these with your students so that they understand the affective landscape in which they will be intervening.

STEP 3. Plan your site visit:
The site visit is an important aspect of the case study, so it is important that you have planned the visit carefully. You want students to gain a multi-faceted and varied perspective of the place in which the ecohealth case study is based. When you speak

with the community members, you should ask them for input into what they think would be good places to visit or things to see.

NOTE: Always remember that the community is composed of a many different kinds of people with different kinds and degrees of power. It is important that you consult different kinds of community members, not just community leaders.

STEP 4. Include multiple perspectives on health:

- **Animal and plant** – Try to find ways to illustrate to the students how the issue is affecting plant and animal life in a concrete way. This range from looking at mutated fish to visiting gardens.
- **Industry** – Show the side of the issue from the local industry and economic perspective.
- **Labour** – Try to find ways to incorporate the perspective of the labour forces which is often not the same as that of industry.
- **Multicultural** – Make sure you see the site from multiple cultural vantage points.
- **Gender** – Try to find ways of looking at the issue while considering gender.
- **Multiple disciplines** – You could invite researchers from different disciplines who have worked on the issue to participate in parts of your site visit and to give some perspective.

FACILITATING THE CASE STUDY LEARNING PROCESS

Groups may be formed/designed in various ways, such as:

- Create transdisciplinary groups
- Create groups based on gender, discipline or language
- Create groups around ecohealth pillar or principles
- Create groups with different learning objectives
- Later, groups can be mixed up to make for holistic presentations (so that there are a variety of view-points, skills and experiences coming together).
- Look for logical places to recombine groups during the case study process. It could work to recombine groups at the stage of the case study where participants are developing policies, recommendations or action plans.

Transdisciplinarity:
Design groups, when possible, to allow for a mix of disciplines to help foster transdisciplinarity. Transdisciplinarity is a primary feature of ecohealth research

projects, and an important aspect of using case studies in teaching ecohealth, is the opportunity to approximate, as much as possible, the process and functions of actual ecohealth research projects.

Multilingualism:
When teaching courses with participants whose language of choice is different, try to enable people to work in the language of their choice. Keep in mind that this is NOT always their first language, as sometimes they would like the opportunity to practice a second or third language. The important thing is to enable people to work, where possible, in the language in which they are most comfortable.

Pedagogical Heritage:

Experiential Learning (John Dewey): The work of the educator is to arrange for and organize certain kinds of student experience. This includes paying attention both the physical environment in which student learning is going to occur, but also the inter-subjective environment, which includes individual work, group work, discussion and time for reflection. The way you schedule your course or workshop is a key component of organizing the conditions of experience. When you are designing your curriculum, consider how you can influence the experience of learners by setting up an environment which interacts with the capacities and needs of those taught in a way which will enable worthwhile experiences.

Problem based learning: Problem based learning is a kind of experiential learning where students work together to solve problems and reflect upon their learning experiences. The teacher facilitates learning by providing students with a problem, and supports them through the process of working through it. Some advantages of problem-based learning are that it helps students to develop a flexible and extensive base of knowledge, and build skills in integrating ideas, methods and information from multiple domains. "A good problem affords feedback that allows students to evaluate the effectiveness of their knowledge, reasoning, and learning strategies. The problems should also promote conjecture and argumentation. Problem solutions should be complex enough to require many interrelated pieces and should motivate the students' need to know and learn" (Hmelo-Silver, 2004).

Collaborative Learning: “Collaborative learning produces intellectual synergy of many minds coming to bear on a problem, and the social stimulation of mutual engagement in a common endeavour. This mutual exploration, meaning-making, and feedback often leads to better understanding on the part of students, and to the creation of new understandings for all of us” (Smith & MacGregor, p.2).

EXAMPLES OF ECOHEALTH CASE STUDY ASSIGNMENTS:

- Ask students to develop an ecohealth research proposal to address the ecohealth issue defined in the case scenario.
- Ask students to conduct a critical assessment of an intervention (with eco-bio-social impacts) from an ecohealth perspective. As part of this students can develop the criteria by which the intervention will be judged. If there is not time, you will need to provide some criteria.
- Ask students to examine an ecohealth issue and develop a proposal for an intervention.
- Ask students to develop a research plan with the aim of impacting policy.

OTHER WORKS CITED:

Hmelo-Silver CE. (2004). Problem Based Learning - What and How do Students Learn?" Educational Psychology Review, 16, 235-266.

Smith B, MacGregor, J. (1992). What Is Collaborative Learning? Collaborative Learning: A Sourcebook for Higher Education, Goodsell A, Maher M, Tinto V, Smith BL, and MacGregor J (Eds.), Pennsylvania: National Center on Postsecondary Teaching, Learning and Assessment Pennsylvania State University.

APPENDIX I

EXAMPLE OF AN ECOHEALTH CASE STUDY SCENARIO:

HAMILTON HARBOUR CASE STUDY:

This case study was part of the 2009 CoPEH-Canada Ecosystem Approaches to Health Short course, held at the University of Guelph.

Background to Hamilton Harbour:

Hamilton, a city of approximately 700,000, sits on the edge of the Niagara Escarpment in Southern Ontario, Canada. The city surrounds *Hamilton Harbour*, once one of the most beautiful and productive natural wetlands and fresh water fisheries in the country. Hamilton is a major shipping centre and supports the largest concentration of heavy industry in Canada. Hamilton is the "base" of the Canadian steel industry that is the major employer and historically the economic driver in the city. The steel industry has been the "life blood" of Hamilton and Hamiltonians still proudly refer to their city as "Steel town".

The extensive industrial growth and development over the many years has exerted a toll on Hamilton Harbour. The harbour reflects its conditions (a small, shallow water body with a long retention time), a high volume of sewage treatment plant discharges, large scale industrial activities and extensive land use changes. The water and sediments are contaminated by metals, pesticides, PCBs and PAHs. The shoreline has been radically transformed with 75 percent of wetlands eliminated and 25 percent of the original shoreline filled in. The water quality of the harbour continues to be characterized by poor water clarity, low oxygen levels, high nutrient levels and high bacterial levels resulting from a combination of soil erosion in the watershed, industrial particulate discharges, partial treatment of urban sewage, urban runoff and combined sewer overflows. Significant remedial action has greatly improved the conditions of the harbour over the past 15 years but it is still classified as a Great Lakes Superfund site.

Hamilton is a city of contrasts; on one hand an incredibly beautiful setting and yet one suffering significant environmental degradation. It is a vibrant community with burgeoning arts and cultural activities, areas that exude wealth, beautiful homes and estate properties and yet has other areas that reflect significant socioeconomic hardships. Approximately 20% of Hamilton's population lies financially below the poverty line. Hamilton is the end destination for a significant population of new immigrants seeking to make a new life in Canada. The city struggles with water and air quality, employment and land use issues and the effects of these on individual and community health.

The recent economic downturn has led to temporary closure of the two key industrial giants in the steel industry (US Steel and ArcelorMittal Dofasco). These closures, the uncertain future of steel, and the spin-off effects on other light industry associated with steel is having negative effects on the economy and employment.

Problem/Scenario:

US Steel is a wholly-owned subsidiary in the US Steel Canada group that employs approximately 2200 people at the 445-hectare production complex at the western end of Lake Ontario. This plant produces 2 million tons of semi-finished steel annually. Due to the economy, production at the plant was stopped early in 2009 and the plant "temporarily" closed.

In the event that the steel plant closure becomes permanent, *the impacts of this closure on "health" must be assessed and a plan developed to decide what should be done* with this 445 hectare (1,100 acre) property.

Students will work in interdisciplinary groups to tackle this problem using an ecosystem approach. At the end of the eleven day course, they will prepare and deliver a presentation outlining a **suggested plan or plans of action**.

Learning Activities:

Mapping

- Rich picture mapping (see *Transversal Activities*)
- Conceptual mapping (see *Transversal Activities*)

Unfolding the data cycle

- Presentation of initial problem.
- Listen to overview of Hamilton from "expert" and view historical film.
- One day visit to multiple sites surrounding Hamilton Harbour to get a sense of place.
- Collect information from site visits and review reference information provided.
- Develop initial problem list (list of issues or concerns).
- Develop a list of stakeholders.
- Develop, plan and execute a stakeholders meeting (being cognizant of power, equity).
- Design questions, engage and consult with stakeholders.

- Collect additional data from the stakeholders meeting by following up with individuals, or digging deeper into the reference material.
- Utilize stakeholder information to develop and adjust the stakeholder list and redefine the issues.
- Refine and clarify the problem based on new information collected.
- Develop action plan to move forward.

Reflective Points:

Throughout the course there are several things that participants can be asked to reflect on, either in groups or individually in reflective journals [Transversal Activities]:

- Research process
- Power dynamics in group work and at stakeholder meetings.
- Connections between power dynamics and Hamilton Harbour case.
- The problem of their role as researchers – to what extent are they participants in the research?
    - What is their connection to the fish in Hamilton Harbour?

Timeline of Case Study Activities:

Day 2

a. Introductory overview of Hamilton Harbour through a lecture and a documentary film ("The Bay and Its People"). This will provide some history of Hamilton Harbour including the development, success, and subsequent downfall of the industry. As well as the contaminant issues and effects on human and harbour health, and a broader picture of Hamilton and her successes.

b. Introduction to "problem/scenario", learning task, and the process of how the case study will unfold

Day 3 (all day):
Visit to Hamilton Harbour

- Bus trip to key sites around Hamilton Harbour
- 4 local experts travel join us for the bus tour to provide insight and answer questions. The purpose of the tour is for the students to get a "sense of the place" and begin gathering data pertinent to the problem. Students will be working independently at this point. They will not be assigned to groups until the next day.

Logistics:
Participants are given an aerial map of the region and a disposable camera. They will update and annotate their map as they go and take pictures of things that they find pleasing, disturbing or of interest. These will be used later within their specific groups to develop *rich picture maps*. Each rich picture map will be different, and will thus provide an opportunity later in the course for discussion about values and differences.

Specific areas targeted during the tour include:

1. Panoramic view of city and environs from a high level lookout point
2. Heritage Arts and Cultural Centre
3. Steel industry and the steel production footprint
4. Selected neighbourhoods to reflect socioeconomic differences
5. Areas of harbour where remediation actions have occurred and areas that are still toxic wasteland
6. Water and sewage treatment facilities
7. Downtown working areas of Hamilton
8. Royal Botanical Gardens
9. Carp fish barrier and Project Paradise
10. North Hamilton Community Centre

Day 4:

a. Students will be divided into 4 groups and an instructor(s) will be assigned to these groups to act as resource facilitators. Each group will focus on the problem from the perspective of a particular pillar of the ecosystem approach. They will have access to research data and reference information about the harbour supplemented by what they have seen and learned during the harbour visit.

b. A facilitated discussion on what was seen, and the scope of the task they have been given. Each group will initially work independently to identify issues and process and then groups will work together. They will be asked to self-organize and create a working plan that will: develop an initial stakeholder list; decide how to run a stakeholder meeting; decide what information they want from the stakeholders.

c. Fish necropsy session at the Ontario Veterinary College. Fish (carp, bullheads) have been collected. These fish are part of ongoing health surveillance activities specifically looking for skin and liver cancer, gonadal changes associated with

chemical contamination of water and toxic loads in tissues. The session will link water health, fish health and human health.

Day 5:

a. Hours available for final preparations for the Stakeholders meeting.

b. Stakeholder's meeting in Hamilton (2hrs). Approximately 15 stakeholders will take part. These folks range from the President of Steel Workers Union, to a local physician, representative from city planning, First Nations representative, local NGO (Environment Hamilton), and several neighbourhood group representatives.

Day 7:

a. Unscheduled time in the morning (available for group work to complete rich picture maps, if students choose).
b. Rich maps completed and posted by 11:00 am.
c. Presentation and discussion of maps will act as the catalyst and entry point for a session on values and attitudes.

Day 10:

a. Student Hamilton Harbour presentations and discussion with invited guests.

b. Hamilton Harbour "wrap up" session:
   - What did we learn?
   - What worked, what didn't?

TRANSVERSAL ACTIVITIES

Authors: CoPEH-Canada Team

CONNECTS WITH:
All Modules

TABLE OF CONTENTS:

INTRODUCTION

Transversal activities are an important component of ecohealth courses. They are activities that last for several days and provide an opportunity for participants to return to them at several different moments, bringing new things that they have learned and making adjustments to what they had previously known (or thought they knew). The transversal activities presented here can be used as activities for all of the modules in this teaching manual.

PEDAGOGICAL SIGNIFICANCE:

- Transform student – teacher relations by fostering alternative modes of engagement, feedback and conversation.
- Foster transdisciplinarity by providing a space for participants to make connections between elements of the course which could not have been predicted.
- Act as a device for the creation of experiential continuity throughout the course.
- Break down linear thinking by encouraging multiple forms of expression.

THE POSTER

The poster exercise is a transversal activity that evolves throughout the course. It is designed to get participants thinking about how their learning in the course informs their research or practice. The poster helps integrate knowledge by giving participants a concrete point of focus. It also facilitates exchanges of references, methods and ideas amongst course participants (students, instructor, and guests) by providing an accessible platform to share projects. By providing a common template with wide categories, participants from any discipline can describe their projects, enabling participants to access one another's work from multiple disciplines.

Participants are asked to consider their posters as a way of presenting their projects to others. As the course evolves, they are invited to augment/adapt/change their poster with new ideas, references, methods as sessions spark ideas and as the comments of others are incorporated. Participants use small post-it notes in order to offer comments to the projects of others. It is important for instructors to give feedback and make themselves available for discussion.

THE POSTER ACTIVITY IS DESIGNED TO:

- Enable participants to share their work with others (especially those from other disciplines)
- Provide a way for participants to contribute to the projects of others and gain feedback on their own work.
- Act as a point of focus to think critically about our projects in the context of ecohealth research or practice.
- Foster dialogue amongst course participants.

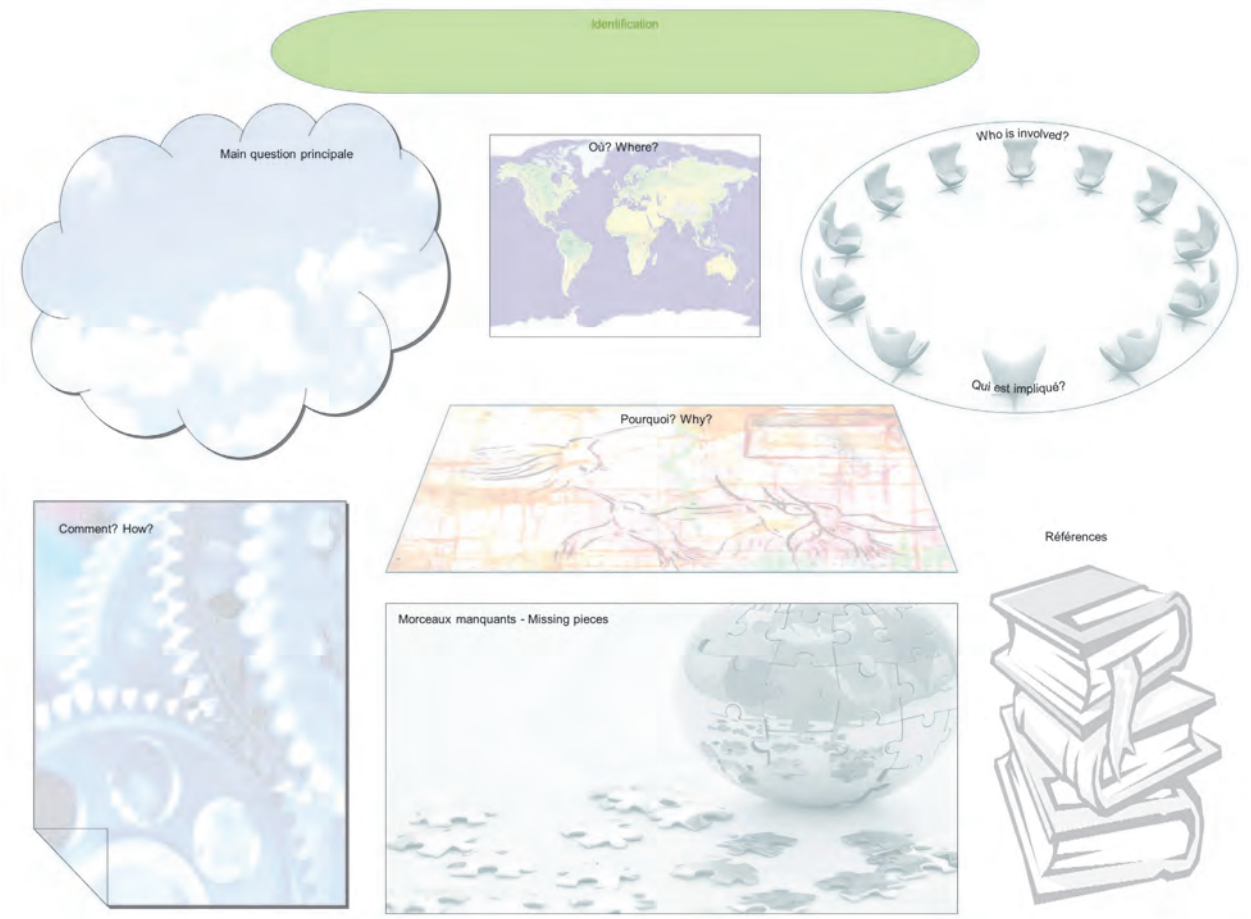

Figure 1. Poster Template

KEY QUESTIONS:

- How is my project being informed by the course content and exchanges with other members of the course?
- What can I share with others to help them with their projects and reflections?

DIRECTIONS:

At the beginning of the course, participants are given a plasticized erasable "blank" poster board to use in presenting their project with the following categories:

- Project Title
- Main question/Question principale?
- Where?/Où?
- Who is involved?/Qui est impliqué?
- How?/Comment?
- Why?/Pourquoi?
- Missing Pieces/Morceaux manquants
- References/Références

Note: *Many of the key questions or discussion questions provided in the different modules of this teaching manual are useful to students and make good questions to place in relation to the individual projects. Instructors can used these to provoke discussions.*

EXAMPLES OF QUESTIONS OR COMMENTS:

- How is your health defined in your project?
- How is gender treated?
- What are the boundaries of your system? Does it matter?
- At what scale are you working?

Poster Activities:

STEP 1.
Provide time on the first day for participants to create their poster and schedule time for participants to visit one another`s posters.

STEP 2.
Initial first few days (or weeks) – Have students go back to their posters to integrate lessons learned in a day. A focus can be given to students.

- for example – How is health defined? What are the power relationships in your project? What actors have you missed?

STEP 3.
After students are more comfortable with the poster exercise (2nd week) – Create 'disturbance' or 'discomfort' by imposing some constraints on their projects, or posing a hypothetical problem, for example:

- What if your funding is cut?
- What if a group of actors decided to quit the project?
- What if there is a natural disaster in your study region?

STEP 4.
Wrap-up activity – the object of this activity is to discuss how the individual projects have changed during the course. For example:

- "speed-discussion" in triad with iterations: Have students pair up and ask one instructor to join each pair to form a triad. Each student then gets a limited time to have a discussion on how his or her project has evolved. After the limited time is up, the discussion changes to the 2nd students

project. After this first round, ask student to find a new partner, instructors join a new pair, and repeat.
    - A good time limit is between 5 and 10 min per student.
    - A good number of iterations: 2 or 3 rounds.
- A wrap-up group discussion is also useful at the end of the 'speed-discussion' where this exercise can be debriefed.

Interactivity and Integration:

The poster activity is highly interactive and integrated with other sessions. For instance:

- Concept mapping [Complexity Module]: When doing a concept map, it is helpful to give students time to go back to their posters. Concept maps can also be hung with the posters as this encourages connections between them.
- Where are health and the ecosystem?: This activity has students thinking about how they define and frame health and ecosystem in their project. By giving students time to return to their posters, they can further develop their research question and modes of approach.
- Power and equity: Identifying power relationship in one's project can help make gender and equity issues more evident.

MATERIALS AND RESOURCES:

- Laminated erasable posters
- Poster board and material to hang posters (people around to help students)
- Erasable markers (different colors, fine point) and erasers (rubbing alcohol can be used)
- Post-it notes (different colors)

LOGISTICS:

Pre-course:

- Email poster template to course participants so that they can begin to think about ways of presenting their project.
- Have posters printed and laminated.
- Determine where in the classroom and how the posters will be hung. A place in the main classroom makes it easy for participants to work on their own posters, or browse the others during breaks.
- Schedule time at the beginning of your course to introduce poster activity and for participants to create and hang their poster.
- Schedule other time for poster work throughout the course. This time should be divided in structured and non-structured activities.
- Schedule time for instructors to look at posters.
- Plan an interactive wrap-up activity.

Rich Picture Map

This activity is designed to:

- Foster attention to place.
- Facilitate collaborative work.
- Enable the construction of a complex visual narrative.
- Promote systematic reflection on group learning.

A rich picture map is a collection of images composed in a way that tells a multi-layered, complex, visual narrative of an issue, through the lens of a theme within a specific context. The map is collaboratively constructed in small groups and is a multi-part activity. Students are arranged in groups according to one of the core ecohealth principles. They will work together in groups to visually explore this theme.

Note: *This activity can be embedded as a task within the large case study, or it can stand on its own.*

Step 1: Image Collection

Students are asked to take pictures of a particular context during a specified time period. For instance, during the Guelph course, students were asked to take pictures during the tour of Hamilton Harbour, which consisted of visits throughout the day to several very different locations. During the Montreal course, students were asked to take pictures of garbage they saw on the street during a walk from the University to Mont Royal (a large park covering the mountain in the centre of the city).
The process of capturing images during this activity, encourages purposeful ***attention to place***. The selection of images to express and/or represent aspects of the context of the case emphasizes the importance of developing a sense of place when doing ecohealth research. The composition of images promotes an understanding of the ***multi-perspectival, complex nature of ecohealth problems***.

Step 2: Visual Composition

Students work in groups to select images and compose their map. This aspect of the activity consists in cropping, juxtaposition, framing, contrast, backgrounding and foregrounding, along with in depth discussion and reflection on the ecohealth principle and the problem they are working with. The activity serves both as an illustration of the effects of visual framing on the construction of perception, and also as a prompt for collaborative thinking.

This activity can be connected with the [Case Study], in which case it promotes collaborative thinking about an in-depth problem.

LOGISTICS:

1. Students are instructed to take pictures and submit them for developing
2. Course facilitators develop images and return them to students
3. Student work in groups to construct their map
4. Groups present their maps, explaining key features that express and/or represent the problem through the lens of the theme, and inviting others to explore them.

MATERIALS:

- cameras (disposable or digital)
- scissors, markers, glue, tape
- paper
- cardboard or bristol board
- play dough
- popsicle sticks
- toothpicks

REFLECTIVE JOURNALS:

This activity is reflective process that runs throughout the course and involves writing daily journal entries in response to specific questions or prompts, and engaging in on-going small-group discussions to share and extend the ideas that are explored through journaling.

THE REFLECTIVE JOURNAL ACTIVITY IS DESIGNED TO:

- Facilitate students' understanding, meaning making, and application of ecohealth concepts (the "what, so what, and now what" of ecohealth) in relation to both the case study and their own projects.
- Support the exploration of the core conceptual, theoretical, methodological, and practical knowledges advanced during the course.
- Prompt the expansion of students' previous experience and knowledge as they delve in to new terrain.
- Provide a space where students can think through their own research ideas, the case study, and broad ecohealth questions.

DIRECTIONS:

- On the first day of the course students are given a blank notebook for their reflective journaling practice.
- At the end of most days, instructors will assign a reflective question and students will be asked to produce a reflective response (various forms of writing and/or visual expressions such as drawing, collage, or painting).
- The question will be discussed the following day in class, either in small groups or in plenary.
- At least twice during a 10 day course instructors could provide feedback on the journals. Students hand them in and instructors use sticky notes to make comments, or ask further questions.

MATERIALS:

- Unlined notebooks
- Sticky notes

LOGISTICS AND PREPARATION:

- Themes for reflective questions should be designed in advance of the course, and the specific questions developed during the day so that they pick up on the themes which emerge.
- Attention should be paid to the sequence of the questions throughout the days. The following is one way to approach the development of a series of questions for reflection:
  - WHAT…? (Observations and descriptions);
  - WHAT IF…? (Reflections on meaning, change processes and future scenarios);
  - SO WHAT…? (Interpretations, what does all this mean?);

- NOW WHAT…? (Decisions, next steps, action)

- Where possible the ongoing reflective journal exercise should be accompanied by scheduled time for collective discussion of journals and reflections. This creates space for open discussion among the group around issues of interest, themes for follow-up, unanswered questions or points that need to be clarified;

IDEAS FOR JOURNAL WRITING:

- Keep track of "Aha!" moments as well as conflict and confusion.
- Take on the role of devil's advocate challenging everyone's assumptions including the author's-or ask a peer to play that role in relation to your assumptions/work.
- Refine, explain and defend a viewpoint that you disagree with (i.e., take a different position).
- Bring in a newspaper or magazine article that fits with the theme of the day's readings and write about how they are related/connected.
- Choose two images from the day's excursions, one that you can imagine as a black and white photograph and one that you can imagine as a colour photographs…sketch these moments and explain your choice of image. How did these moments add to your understanding of the complexity of ecohealth?
- Imagine you were able to interview the author of a particular paper or a community member from the case study. Write a list of questions that you would like to ask them.
- Try free writing or free writing in questions only.
- Try poetry or song writing to capture the essence of an elusive or complex concept.
- Consider head/heart/hands…what do you think about an issue, what is your emotional response to the issue, and how is your body reacting to the issue?
- Journal entries might also include responses to and critiques of assigned readings, class discussions, and community-based experiences. Entries should be varied and could include both written and artistic elements.