Ecohealth Trainer Manual
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Veterinarians without Borders/Vétérinaires sans Frontières-Canada (VWB/VSF)

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Ecohealth represents a new way of understanding and improving health as an outcome of complex relationships among changing social and ecological forces. Yet, as is apparent from this manual, Ecohealth practitioners draw on many conventional investigative techniques, skill sets, and scholarly disciplines. What, then, makes Ecohealth different from conventional research and practise? In brief, what is different is how we see the world, and therefore how we interpret and use the information we have.

Those who work in fields such as health and agriculture are already accustomed to integrating information across disciplines. Agronomists draw on biology, sociology, economics, soil science, and chemistry, as well as their many sub-disciplines. People in health sciences (including those focusing on disease ecology and medicine) draw on various disciplines such as chemistry, biology, and psychology. Manfred Max-Neef (2005) has referred to this mixing of disciplines as pragmatic interdisciplinarity. In such cases, we are trying to answer the question: What can we do? From a technical viewpoint, systems approaches have become core to our ability to achieve this kind of interdisciplinarity.

Policy makers, politicians, and social planners must further integrate information from across these broader fields to make normative decisions about agriculture, health, and environmental management. At this level, we are seeking to answer the question: What do we (collectively) want to do? It is here that questions of equity, power, and gender emerge as important, and techniques related to participatory action research are relevant.

Ecohealth takes this process of integration to a deeper level. In Ecohealth, we draw on the disciplines and the various pragmatic forms of integration and ask the question, of ourselves, our partners
and our politicians: What should we do, or, to phrase it somewhat differently, why do we want to do something in a particular way? This kind of integrated understanding, which transcends disciplines, is rooted in values, ethics, and philosophy. There are different ways to produce food or deliver medical care, but many of them reflect different underlying values and understandings of the world.

It is not simply a matter of bringing together the right team of experts and stakeholders; unless Ecohealth practitioners can articulate and commit to a particular set of values, many disputes will arise that appear to be about facts and techniques, but are really about different ways of knowing – local, traditional, intuitive, expert, and empirical – and different visions of the world. It is no accident that Valerie Brown titled her guide to collective thinking and action “Leonardo’s Vision,” and why she argues that we should begin the process by asking “What should be?” before we move on to the more practical and technical questions of “What is” and “What could be?” and “What can be?”

This idea is similar to what economist Schumpeter called a “pre-analytic vision,” that is, an understanding of the world that forms the basis for all subsequent study and analysis (see Daly, 1993 for a discussion of this by an ecologically minded economist). If this is not clearly articulated or is based on values with which we do not agree, no amount of analysis will enable us to “fix” the problematic situations we are facing. Furthermore, no amount of analysis or study can lead us to this vision. We (and here arises the first challenge – who are “we”?) must make some decisions. What kind of a world do we wish to live in? What are we trying to achieve? Unfortunately, scholars, practitioners and the people we work with rarely articulate their vision, or brush it aside by saying “it goes without saying.”

For scholars, practitioners, and trainers in Ecohealth, being able to articulate that pre-analytic vision, and to refer back to it throughout the courses and research projects, is essential. We need to be able to ask, repeatedly: How does this activity (teaching module, research)
contribute to this vision? What might such a visionary statement include?

The vision of Ecohealth – since it is, after all, concerned with health – is one of sustainable health. If we “unpack” this vision, we can see that mutual respect for each person (hence “all people”) now and in future generations, is inherent. Some might argue that we must explicitly extend this respect to “all life” not just people; others will argue that the health of people, if it is to be sustainable, is dependent on the ability of other species being able to achieve their genetic potential, within the complex ecological webs of the biosphere. In this view, the explicit extension is unnecessary. Nevertheless, the linking of the two words “sustainable” and “health” is important. According to the Network for Ecosystem Sustainability and Health (NESH, 2012), 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.” Also, since the original discussions about sustainable development were rooted in concerns about ecological sustainability, the word “sustainable” provides an explicit link to ecology – the “eco” part of Ecohealth. Some would prefer “well-being” to “health”; others will argue that the WHO definitions of health already include “physical, mental, and social well-being, and not merely the absence of disease or infirmity” (WHO, 1948) and that they reflect a situation in which all people can realize their aspirations, satisfy their needs, and adapt to changing circumstances (WHO, 1986). Still others, recognizing the challenges of rapid and widespread global climate, economic, social, and environmental change, emphasize “resilience,” as in a recent report of the United Nations Secretary-General’s High Level Panel on Global Sustainability, entitled “Resilient People, Resilient Planet: a Future Worth Choosing.”

The point here is not to argue about the specifics of language, but to recognize that all the activities of Ecohealth, insofar as they are Ecohealth, must somehow relate back to broad ideas of health and sustainability, and that these are predicated on an underlying
understanding of the world as a complex social-ecological system, with people embedded in it. What Dominique Charron of Canada’s International Development Research Centre has called the principles of Ecohealth, and which have informed the structure and content of this manual, are rooted in this vision: systems thinking, transdisciplinarity, participation, sustainability, gender and social equity, and linking knowledge to action.

This is our “what should be,” our “pre-analytic vision,” the motivation for our work. As Ecohealth trainers, researchers, and practitioners, as users of this manual, together with course participants, we should be repeatedly asking ourselves: How does the work we are doing relate to this vision?

**READINGS**


Editors’ Note

This training manual, and the Field Building Leadership Initiative (FBLI) of which it is one component, are part of a global initiative to build capacity in ecosystem approaches to health. Although several books and journals provide materials for students about Ecohealth, the FBLI Ecohealth Trainer Manual is intended primarily for lecturers, teachers, trainers, and facilitators. The focus here is on how to teach Ecohealth, providing teachers and trainers with a starting point from which to explore, improvise, adapt, and develop diverse educational Ecohealth learning experiences for and with their students.

Ecohealth globally is based on the same general principles and is grounded in the same pre-analytic vision (see Preface). However, the actual applications and techniques, growing out of local experiences, often differ from region to region, rooted as they are in different cultural and ecological contexts. Thus, complementary training materials are being created in Canada, Latin America, and West Africa, led by Communities of Practice in Ecohealth in each of those regions. As editors, we have attempted to explicitly link the initiatives in Asia with others globally, while enabling the regionally based authors to remain true to their own experiences.

In keeping with the participatory, transdisciplinary, and systemic nature of Ecohealth, these training manuals are works in progress, open to new insights and evidence, as we work together to better understand – and more effectively promote – the health of people and the planet we share with all other life. Details of how these ongoing revisions and updates will be handled are currently being worked out.

David Waltner-Toews and Pierre Horwitz, Executive editors
Preface: The Field Building Leadership Initiative (FBLI)

The FBLI is a 5-year initiative launched in October 2011 to build the field of Ecohealth in Southeast Asia. Its long-term vision is to build a well-established field of Ecohealth that is sustainable, rooted in local experiences, influential in global processes that drive environmental and health policy and practice, and supported by a strong community of practice. This initiative includes research, capacity building, knowledge translation, and networking in China, Indonesia, Thailand, and Vietnam. Underpinning the emergence and consolidation of the Ecohealth field in Southeast Asia is the need for capacity building for research, teaching, and policy influence. Thus, the FBLI complements other regional initiatives such as BECA (Building Ecohealth Capacity in Asia), which has focused on research and policy, and the EcoZD project of the International Livestock Research Institute, which is focused on ecosystem approaches to better management of zoonotic emerging infectious diseases.

Although the Ecohealth Trainer Manual can be used as a stand-alone resource, it is best embedded within an institutional framework where participants (teachers, trainers, students, researchers) are encouraged to experiment and adapt Ecohealth teaching and practice to the geographical and intellectual contexts of Southeast Asia.

VWB/VSF-Canada has been privileged to work with numerous partners and contributors to help facilitate the development of this manual and we hope that it will continue to serve over time. The FBLI was originally set up because its members believed that Ecohealth research and development can contribute to more sustainable agricultural practices and livelihoods, and lead to healthier populations and environments. We hope that this spirit of endeavour and optimism will continue as Ecohealth communities emerge and develop.

Sonia Fèvre, Manual Coordinator, VWB/VSF-Canada
INTRODUCTION TO THE FBLI EC OHEALTH TRAINER MANUAL

Background

The FBLI Trainer Manual has been developed as an iterative, collaborative process between the FBLI core members, authors and contributors, end-users, and other stakeholders. Existing Ecohealth materials were consulted and needs assessments carried out to tailor the structure, content, and approach of this manual to respond to the perceived needs of audiences in Southeast Asia. These needs will change over time and we anticipate that users will adapt and update these materials to allow them to continue to be effective.

The initiative has tried to incorporate stakeholders in the development of these materials. Significant progress was made to improve the quality and relevance of these materials at the FBLI Trainer Manual Review Writeshop convened on 29-31 March 2012, at the Ramada Riverside Hotel, Bangkok. The Pilot FBLI Trainer Manual version 1.0 distributed at the Training of the Trainers’ workshop in Bangkok on 30 June 2012 will be taught, disseminated, and tested by teachers and lecturers in Southeast Asia. The results of this pilot phase will allow the FBLI and active trainers to revise and eventually publish the manual for wider dissemination.

Purpose and Scope of the Manual

This manual is intended to act as a starting point and guide for teachers and trainers to design and deliver courses in Ecohealth. It aims to bring together critical thinking from different regions and disciplines to build the field of Ecohealth.

The development of the manual is an experimental and evolving project and is breaking new ground by attempting to bring together recent thinking in Ecohealth teaching to develop a stand-alone course
in Ecohealth. It is not, however, the only resource available, and other teachers, innovators, and researchers have developed a range of other tools and courses related to Ecohealth and One Health in the region. It is hoped that users of this manual will refer to the range of other available resources to build their repertoire of teaching tools and approaches.

In light of its many possible applications, the manual has been structured to allow trainers different levels of engagement. At the most basic level, the courses allow students to gain an awareness of Ecohealth as an emerging field; at a deeper level, trainers can encourage students to process these ideas and apply them in their study and research; and finally, students can be encouraged to develop Ecohealth frameworks for research using these ideas critically. More detail on using the manual is provided in the section “How to use this manual.” We emphasize that teaching Ecohealth in isolation can only have a limited impact and, ideally, students should have opportunities to practise what they have learned, to take risks, and to build their skills.

Given the breadth of the field, we could not possibly address all relevant topics and issues in this manual. The module topics were developed based on the perceived priority needs of the primary target audience and for Ecohealth field building in Southeast Asia. The recent publications *Ecohealth Research in Practice: Innovative Applications of an Ecosystem Approach to Health* (Charron, 2011), and *Ecohealth: A Primer* (Waltner-Toews, 2011) serve as companion texts to this manual and the ideas and definitions around Ecohealth cross-reference these texts. Manual authors recognize that other definitions and approaches to the field exist and it will be the role of the trainers to make informed judgements about their sources and epistemological positions, and how they relate to the pre-analytic vision and principles of Ecohealth.
Manual Aims

Each manual chapter, or module, addresses specific issues and themes of Ecohealth and has specific aims and learning objectives. Overall, the aim of the manual is to provide the educational foundation and depth to allow future trainers to:

- Be able to design a course on Ecohealth for their particular target audience, and
- Know how best to use further resources for teaching and learning in Ecohealth.
Trainer Competencies

It is expected that trainers who use this manual to design courses in Ecohealth will have an understanding of, and commitment to, the fundamental vision and principles of Ecohealth. They would also have experience teaching or lecturing in their own subject areas.

To successfully deliver Ecohealth courses based on the modules proposed here, trainers need to have a common set of competencies about teaching Ecohealth. Competencies refer to the applied skills and knowledge that people require to successfully perform in their role. The competencies described here can refer to the collective attributes of a group of trainers if they are delivering an Ecohealth course together, or their individual attributes if they are teaching on their own.

To successfully teach the course outlined in this manual, a trainer (or collectively, the group of trainers) needs to be able to:

1. Explain the vision, concept, and principles of Ecohealth and why they are important for research and practice.
2. Design and facilitate the delivery of the Ecohealth course as a whole while engaging experts from other fields.
3. Model Ecohealth principles in their teaching in ways that reflect openness to new ideas and experiences, collegial and collaborative attitudes, and humility in the face of uncertainty.
4. Deliver Module 2: Introduction to Ecohealth and at least one other module.
5. Show a commitment to, and experience in, the application of adult learning principles and learning by doing.
Student Competencies

The attributes, skills, and knowledge expected of students who complete a course based on this manual will vary depending on the depth and breadth covered by the trainer and their intentions in delivering the course.

It is intended that at minimum all students who complete an Ecohealth course based on these resources should achieve the following competencies:

1. Explain the concept and principles of Ecohealth and why they are important for his/her own area of work and to other areas of work.

6. Formulate problem statements that are amenable to an Ecohealth approach.

7. Determine where, and how, Ecohealth principles can be used to reconsider research and interventions already undertaken.

8. Apply Ecohealth principles to the analysis or planning of new research and interventions, including being able to identify the skill sets and knowledge bases needed to address specific questions.

More generally, students may be able to:

- Have the capacity to reflect on the values and assumptions they bring to their research, as well as the assumptions underlying other research approaches.

- Understand the place of Ecohealth in the broader landscape of research and policy questions, as well as the relationship of research to policy and action.

- Be inspired by a shared vision of how Ecohealth can help make research more responsive and grounded to “real-world” problems.

- Understand the strengths, limitations, and implications of different research methods, and when, and how, to mix those methods in the service of stronger transdisciplinarity.

- Develop basic capacities to think in terms of systems, use
systemic concepts to bridge disciplinary, organizational, and governance boundaries, and engage in inter-/transdisciplinary collaboration for achieving health outcomes.

- Develop a greater understanding of the socio-political, cultural, ethical, and historical dimensions and meanings of health.
- Respect and learn to work with people from different perspectives and worldviews (including other disciplines)
- Be able to critically review the emerging literature on Ecohealth
- Improve their ability to work across disciplines and sectors, including the ability to develop conceptual frameworks and research questions that facilitate such collaboration

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**Manual Users and Audience**

This manual is intended as a resource for lecturers, teachers, and trainers who want to integrate Ecohealth principles into their teaching, or run courses specifically in Ecohealth.

Expected users of this manual include trainers who might be responsible for:

- Integrating lectures or classes about Ecohealth into another course program.
- Designing and/or delivering stand-alone Ecohealth short courses.
- Designing and/or delivering Ecohealth graduate courses.

*This is a manual for trainers*, providing guidance on learning and teaching principles, objectives, and activities on a number of topics of critical importance to Ecohealth. These topics, or modules, are divided into sections: much of the text is directed at trainers, providing
background, objectives, and information about teaching the subject. In addition, specific sections are written as instructions for students followed by handouts for students. These can be modified and adapted according to trainers’ needs. Each teacher using this manual will be expected to adapt, add and research these topics to provide suitable examples for their learners.

How to Use this Manual

The course outlined in this manual can be used to design a comprehensive course on Ecohealth, to be adapted to local conditions and case studies. Alternatively, individual modules, or sections from different modules, can be used to design classes on Ecohealth or integrated into other courses. Please refer to the Creative Commons license agreement for dissemination of materials.

Based on the experience of authors and other Ecohealth teachers, we recommend that courses on Ecohealth are most successful when delivered by a team of teachers/trainers who, while perhaps differing in perspectives and experience, nevertheless share a common vision and are able to collaborate in the planning and design of the overall course, as well as being able to co-teach some of the classes. Co-teaching can be most effective when trainers have different and complementary backgrounds and approach Ecohealth teaching with critical thinking and open minds. Module 1: Approaches to Designing and Teaching Ecohealth Courses discusses some of this in more detail. The level of experience of the trainer, context, and other factors will determine to what extent the trainer uses interactive, learner-centred approaches to engage students and encourage self-discovery, and to what extent more traditional, teacher-led classes are appropriate.

Much Ecohealth education uses problem-based learning, and field visits and case studies are an important part of this approach. It is valuable for any course in Ecohealth that runs for more than a few days to integrate a field visit to allow more practical learning and engagement with non-academic stakeholders. A field visit can also
provide material for a cross-cutting case study that can be integrated across modules.

In addition to this Introduction, the manual consists of the following modules:

1. Approaches to Designing and Teaching Ecohealth Courses
2. Introduction to Ecohealth
3. Participatory Research
5. Collaboration and Transdisciplinarity
6. Disease Ecology
7. Agriculture and Health

The following “mini-modules” will be added at a later date:

8. Equity
9. Sustainability
10. Knowledge to Action

*Module 1: Approaches to Designing and Teaching Ecohealth Courses,* differs from the other modules in that it is intended as a background reference for trainers and is not intended to be taught directly to students. However, it does contain suggestions and examples of how activities in other modules can be designed, and trainers can refer to it as they design and plan their courses.

Modules 2 to 10 are all topics that the trainer can teach directly to students. The modules reflect different scales of transdisciplinarity and integration, as identified in the Preface.
## Module Outline

Each module is structured according to the following outline:

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<tr>
<td><strong>Module aims</strong></td>
<td>Explains the scope of the module and what can be achieved in teaching it.</td>
</tr>
<tr>
<td><strong>Why is this topic important?</strong></td>
<td>Explains why this topic is part of the Ecohealth course.</td>
</tr>
<tr>
<td><strong>Key concepts</strong></td>
<td>Provides themes for students to reflect on during the course.</td>
</tr>
<tr>
<td><strong>Guiding questions</strong></td>
<td>Provides questions for students to explore during the course.</td>
</tr>
<tr>
<td><strong>Basic student learning objectives</strong></td>
<td>Learning objectives for students engaging with this topic for the first time or who come from very different disciplinary backgrounds. These objectives are specific to each topic and will reinforce the competencies students should develop over a full course.</td>
</tr>
<tr>
<td><strong>Advanced student learning objectives</strong></td>
<td>Learning objectives for students with pre-existing experience in this topic who seek to reach a more advanced level of learning and ability.</td>
</tr>
<tr>
<td><strong>Practical notes</strong></td>
<td>Provide preparatory information for the trainer to be able to effectively deliver the module.</td>
</tr>
<tr>
<td><strong>Links to modules</strong></td>
<td>Shows links between topics and activities to help build coherence and integrated thinking.</td>
</tr>
<tr>
<td><strong>Background information</strong></td>
<td>Provides information that may help the trainer understand the topic in more depth and become more familiar with relevant literature.</td>
</tr>
</tbody>
</table>
Activities | The core of the module, includes instructions for the trainer and handouts for students.
---|---
Sample timetable | Provides an outline of how the activities fit together.
Evaluation | Suggestions for student assessment and evaluation.
Terminology | Glossary of terms used in the module.
Key references | Essential references for trainers and students.
Additional references | References for further, in depth, engagement and references made throughout module.

Companion Texts

The manual is designed to provide guidance to trainers, but cannot serve as a complete textbook on Ecohealth. Numerous books, articles, and free online resources are available to complement this resource.

Two Companion Texts have been chosen to complement the material in this manual. All trainers should be very familiar with these texts and they can be used as resources: as background on Ecohealth, its history, approach, and methods, and as a source of case studies. They are available free online and will be referred to often in the manual:


2. Ecohealth: A Primer. David Waltner-Toews (2011). Veterinarians without Borders/ Vétérinaires sans Frontières – Canada. Available at:
   https://www.vetswithoutborders.ca/images/pdfs/EcoHealth_APrimer_VWBVSF.pdf
Duration of Course

The minimum time needed for each module is stated in the module section. Overall, it is estimated that a minimum of 5 days is needed to cover the core essentials but it could be extended to a longer, more in-depth course. Each module can also be split into sections and could be taught over a series of classes.

Practical Notes

To deliver many of the activities described in this manual, particularly the ones that include small group work and interactive activities, the trainer requires the following:

- A training room that can accommodate 25 to 30 people and can allow small group work, with chairs and tables easily moved.
- An overhead projector.
- Flipcharts, white paper, and marker pens.
- Handouts of case study materials and presentations.
Guiding Questions

In addition to the Guiding Questions included in each module, the following questions provide advanced trainers and students with cross-cutting questions to consider throughout the Ecohealth course:

1. What are the implications of defining health in different ways? For example, is health about doing good (if so, for whom?), or about empowering people (what if they decide to do things with which we might disagree, like build big shopping malls and drive big cars?)? What if health is defined as preventing disease? Who decides this? Which diseases are prioritized? How can these questions be decided? Is there a fair way?

2. How can we manage the different agendas of scientists (who are looking for generalizable knowledge) and local communities (who want improvements in their lives)?

3. How do Ecohealth workers and scholars interact with people in positions of authority (government, financial) and differences in power and opinion? For example, what if a few people own all the land, or the factories, or run the government? What if women are not allowed to do certain kinds of work?

4. What are the ethical implications of drawing systems boundaries in different ways? For example, if we draw a boundary around a community, how do we deal with people, resources, animals, etc., that come and go (migratory workers, animals, etc.) and their influences on the other places they dwell?

5. What are the implications of cross-scale dynamics? For example, a healthy population requires an appropriate birth rate (to bring in new genetics) and a death rate (to make room for the young). This seems easy for plants and animals. Can it apply to people? Can “health for all” mean
suffering for some? If so, in what ways can Ecohealth benefit from inputs from cultural and religious ceremonies?

6. In general, how can we deal with internal contradictions, tensions, and conflicts? For example, for homeless people displaced from the countryside, occupying lands along a river in a city are a solution to their problems. For others who already live in the area, these “squatters” create problems of sewage and overcrowding.

7. How can Ecohealth researchers negotiate situations where participation allows room for opposition to develop, or has raised exaggerated expectations in the community? How can researchers determine who in a community is a legitimate representative?

Assessment and Evaluation

Some suggestions for assessment are included in each module. Due to the varied nature of how trainers will deliver Ecohealth courses, there is no one prescribed set of evaluation tools. However, as with any course, evaluation can be helpful to assess student learning and determine what further learning needs they may have. It would be especially interesting to track student learning and recall over time, for example by assessing their learning and competencies during, immediately after, and sometime after the course.

A variety of evaluation instruments for teaching courses and projects have been, and are being, developed in different parts of the world. These include various combinations of such approaches as outcome mapping, quantitative and qualitative surveys, most significant change techniques, and conventional examinations. Trainers using this manual can play an important role in developing standards and methods of evaluation.

Evaluation of the trainer and the course by students is also recommended, to provide trainers with feedback on the structure, format, content, and delivery style of their teaching. Sharing feedback
on student preferences around Ecohealth course structure, format, content, and delivery style would also be valuable for the wider Ecohealth teaching community.

Acknowledgements and Authorship

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THANKS TO THE FOLLOWING AUTHORS:

Suzanne McCullagh, lead author, *Module 1: Approaches to Designing and Teaching Ecohealth Courses.*

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Bob Williams and Hung Nguyen, co-authors, *Module 5: Collaboration and Transdisciplinarity.*


Fang Jing, lead author and Edi Basuno, co-author, *Module 7: Agriculture and Health.*

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Thanks also to CoPEH-Canada for sharing their draft versions of the Ecosystem Approaches to Health Teaching Manual, 2011, during the preparation and writing phase of the FBLI manual. The CoPEH-Canada manual is the result of four years of collective teaching experience designing and facilitating and delivering a Short Course in Ecosystem Approaches to Health for graduate students and professionals, and was a collaborative project among core researchers, adjunct Ecohealth researchers from across Canada, and course alumni within CoPEH-Canada.
MODULE 1

Approaches to designing and teaching Ecohealth courses
Module 1 – Approaches to Designing and Teaching Ecohealth Courses

Reference Module for Trainers

Introduction

This module is meant to help trainers teach Ecohealth, by guiding them in the design and delivery of their own Ecohealth courses. Good Ecohealth courses are designed and taught in ways that facilitate collaborative learning among participants (ideally from different disciplines). To design and teach Ecohealth, trainers need to understand how adults learn, and to learn strategies for facilitating that learning. In particular, trainers need to appreciate how the subject of Ecohealth demands collaborative, and participatory teaching and learning approaches. This module will look at some basic principles in adult learning and the importance of learning by doing: embodying Ecohealth principles in the teaching of Ecohealth.¹

The rationale is that Ecohealth aims to build capacity in participatory, collaborative and transdisciplinary research, meaning students and researchers need to develop skills such as working together, drawing different kinds of knowledge and “expertise” from different people, and involving different types of stakeholders in the research and learning process. It follows that Ecohealth educational experiences should be taught and designed in ways which will provide opportunities to develop these skills through practice. Trainers will develop understandings along these lines.

¹ It is not, however, meant to be a comprehensive resource for adult education per se. Trainers are referred to other comprehensive resources, such as ILRI’s recent publication of Pedagogy and Adult Training.
Module Aims

This module aims to:

- Provide trainers with an opportunity to explore core features of adult learning as they pertain to Ecohealth.
- Develop an understanding of how to design and deliver Ecohealth teaching materials.

Key Concepts

- Participation
- Collaborative and cooperative learning
- Transdisciplinarity
- Feedback and evaluation
- Experience and experiential learning
- Discussion and dialogue
- Reflective practice
- Active learning
- Debrief and review
Guiding Questions

1. Why is it important to integrate participant feedback into your course design, and how might you do so?
2. How can you facilitate transdisciplinarity during your course?
3. Why are reflective practices an important feature of Ecohealth education, and how can you build them into your courses?
4. What does Ecohealth have in common with adult learning, and why?
5. What skills are called for when teaching Ecohealth?
6. How would you approach the design of an Ecohealth course?
7. Who might you involve in the delivery of an Ecohealth course? Why?
8. How can you incorporate the capacities and experiences of your course participants into the curriculum of an Ecohealth course? Why is it important to find ways of doing so?

Basic Learning Objectives

Trainers will be able to:

- Understand core principles and basic ideas in adult learning.
- Recognize shared features of Ecohealth and adult learning – participation, equity, collaboration, systems thinking, sustainability, action.
- Learn and practice how to facilitate collaborative learning and participatory curriculum design in Ecohealth.
- Learn and practise how to design an Ecohealth course.
- Reflect upon and develop strategies for how to build evaluation and assessment into an Ecohealth course.
Advanced Learning Objectives

Trainers will be able to:

- Understand why Ecohealth and adult learning have the shared features of participation, equity, collaboration, systems thinking, sustainability, and action.
- Think of the place of learning (or classroom) as an ecosystem and why this may help to develop the approach to Ecohealth course design and delivery.
- Involve members of the community in Ecohealth courses.
- Design a complex case study and build it into your Ecohealth course.

Activities

1. Introduction to Adult Learning

CHARACTERISTICS OF THE ADULT LEARNER

- Adults are voluntary learners.
- Adults have accumulated a foundation of life experiences and knowledge that may include work-related activities, family responsibilities, and previous education.
- Adult learners are practical and may not be interested in knowledge for its own sake. They may prefer to focus on aspects of a lesson that will be most useful to them in their own work or life.
- Adults learn better and remember what they learned when they HEAR information, SEE demonstrations and illustrations, DISCUSS information and ideas, and DO or practice techniques.
- Adult learners learn best when teaching is learner-centred, meaning that they are given opportunities to work with the material on their own terms through discussion and practical activities.
• Adult learners are any adults who take an active responsibility for their learning processes. Mature, upper-year university students will have more of the characteristics of adult learners than young, first or second-year university students. Ideally, education should strive to help learners gain autonomy and responsibility for their learning and thus become adult learners.

**REFLECTION**

• Consider the differences between teacher versus trainer, and student versus participant, by making a list of all the distinctions you can think of.
• How does thinking about adult learning help you understand the difference?
• How can you be more learner-centered in your teaching? (Hint: what are the characteristics of the learners?)
• Where and when can you provide your course participants with the opportunities to be able to see, listen, talk and do all the key features that you are teaching? (Hint: think of the experiences of the participants...)

**ADULT LEARNING THEORY**

Becoming aware of and reflecting on the following core theories related to adult learning will help to develop a learner-centred teaching practice appropriate to adult learners. Keep in mind that it is probably not possible to incorporate all of these theories into your teaching practice, and it is important to consider the points above to judge which theories will help you the most in your teaching practice, and the degree to which you will be able to work with them.

I. EXPERIENTIAL LEARNING

• The work of the educator is to arrange for and organize certain kinds of student experience. This includes paying attention both to the physical environment in which 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 and organize the place of learning is a key component of organizing the conditions of participant experience. When you are designing your curriculum, consider how you can influence the experience of learners by setting up an environment that interacts with the capacities and needs of those taught in a way that will enable worthwhile experiences.

- *Active learning* and *learning by doing* can be considered as aspects of experiential learning that focus on the experience of the learner. Encourage the facilitator (and curriculum developer) to design learning situations that enable learners to have experiences that contribute to their learning development.

![Figure 1-1: David Kolb's model of experiential learning](http://www.infed.org/biblio/b-explrn.htm)
• When designing your curriculum, you can use the above diagram (Fig. 1-1) to help you provide the opportunities for meaningful experiences for learners. First, consider both any relevant experience that your students will have had, and the actual experience that they will have when they are introduced to the material. Second, provide learners with time for reflecting on those experiences, either individually or in groups. Third, build in moments where the reflections are synthesized or generalized. This can be done through plenary discussions or debriefing after group reflections. Fourth, provide opportunities for learners to practice what they have learned by applying it. Fifth, wherever possible, repeat these cycles!

II. COLLABORATIVE LEARNING

• Collaborative learning, sometimes called cooperative learning, stresses high levels of learner participation. It is a core feature of problem-based learning, where learners work collaboratively to solve a problem. This can be achieved by designing and delivering curriculum in a way that both enables learners to collaborate with one another and with the facilitator in generating content to be learned. Some methods for facilitating collaborative learning include making ample time for groups to reframe questions (e.g., come up with Ecohealth problem statements) or problem solving, and incorporating ways that the skills and experiences of participants can be shared. Analysis of case studies provides ample opportunity for collaborative learning and developing problem statements.

III. DIALOGUE IN LEARNING

• Paulo Freire drew attention to the importance of dialogue as part of the learning process. He encouraged teachers to consider themselves as learners, and learners as teachers. By questioning the role of the teacher as the one with the knowledge, and the learner as the one without knowledge,
Freire stressed that we are all learner-teachers and can learn from one another. Learner-centred teaching, where the learner is the key agent in the learning process, grows out of these considerations.

IV. CONSTRUCTIVISM

- Constructivist learning theory encourages us to see the learner as actively constructing knowledge from their experiences through assessment, questioning, and exploring how new experiences connect with their prior knowledge. Through the process of reflection learners may change their previous beliefs, ideas, and frameworks or reinterpret their experiences so that it will fit with what they previously knew. This theory stresses the significance of the learner as an active participant in their own individual learning and in the learning of others (social learning, also discussed in Module 5: Collaboration and Transdisciplinarity). Knowledge is not what the teacher has and the learner lacks, but is instead what teacher-learners collaboratively construct through reflection, dialogue, and sharing skills and experiences.

2. Shared Features of Ecohealth and Adult Learning

Ecohealth and adult learning theory share some important goals and features. Both recognize power relationships in society and aim at social change. Participation, transdisciplinarity, equity, sustainability and an orientation towards action are shared by both Ecohealth and adult learning. This is a key reason why Ecohealth should be taught in a way that it consistent with adult learning theory and practice. The best way to instil Ecohealth principles in your students is to model them in your teaching. As you develop your Ecohealth teaching practice, reflect and experiment with ways you can incorporate Ecohealth principles into your teaching practice.
REFLECTION

Once you have developed your Ecohealth course content, take time to brainstorm with your peers the ways your approach to teaching the principles of Ecohealth could reflect those same principles. See Manual Introduction and Module 2: Introduction to Ecohealth to familiarize yourself with these strategies. For example:

- How can teaching the principle of participation be done in a way that is participatory and models the Ecohealth principle?
- Which principles are easiest to model in your teaching?
- Which is the most challenging?
- Why is it important to model the Ecohealth principles in your teaching? Are there some cases where this might not work?

3. Phases of Ecohealth Course Design

ASSESSING THE NEEDS OF PARTICIPANTS

A core feature of good instructional design is to know the needs of your participants so that the instruction you design and deliver is appropriate to them.

In Ecohealth teaching it is especially important because Ecohealth requires researchers to collaborate with many different people, including researchers from other disciplines, multiple members of local communities, policy-makers, etc. In order for you to develop an instructional design that will help to develop the transdisciplinary and collaborative skills of your participants, it will be helpful for you to know what skills, knowledge, and experience they bring with them. This will enable you to mobilize their capacities as part of the course, and to provide opportunities for participants to teach from their previous experiences. You may want to encourage transdisciplinary collaboration by designing groups with participants from a mix of disciplines. Sometimes groups can be designed according to skill or
personality sets, although this can be more challenging. Knowing the expectations of the learners is also important, as is knowing the needs of the organization, if there is one, that contracted you to do the training, so you can deliver training that is appropriate to their expectations.

**METHODS**

You can ask participants to do a one- or two-page survey before the course that will seek information on:

- Ecohealth-related experiences
- interests in Ecohealth
- expectations from this course
- relevance of the course to broader learning, work, and life goals
- potential application of learning from this course
- their skill set
- how they usually participate in group situations

If you are not able to do a pre-course assessment, you could incorporate this into your introductory session, by asking participants:

- why are you taking this course?
- what are you hoping to learn?
- what relevant knowledge, skills, and experience are you bringing with you?
- what skills can you offer in teamwork?

**CHALLENGES**

This assessment step creates more planning for the course designer and instructor. Doing the assessment will create an expectation that it will have some effect on the course. If you do take the time to do an assessment, then it is important that you actually use it. This will require you to analyze the results and find ways to incorporate them into your instruction.
INSTRUCTIONAL DESIGN OF THE COURSE

KEY CONSIDERATIONS

- Who are the participants? What are their capacities and their needs?
- Do your participants come from different disciplines and institutions or the same discipline?
- How can you mobilize the capacities of your participants during your course? How can you enable them to share their experiences and learn from one another?
- What elements of Ecohealth will you be delivering?
- What order of content will best facilitate learning?
- How long do you have?
- What is the layout of the learning space?
- Who will facilitate the course? One instructor? A transdisciplinary team? One or two instructors with guest speakers?
- Are you able to build field visits or field work into your course?
- What kinds of hands-on activities are possible?

COURSE DEVELOPMENT STEPS

1. Develop learning objectives [see sample course learning objectives].

2. Determine course length and content and begin a preliminary draft of the schedule. Make sure to include ample time for informal discussions and for participants to get exercise or a change of scenery, and to reflect quietly if need be.

3. Select a location. Ideally you will have:
   - A room with lots of room for moving around
   - Tables that can be moved into different formations
   - Walls for attaching posters
• Outdoor space nearby so that participants can get fresh air, or if the weather is good some sessions or discussion might be held outdoors.
• Refreshment space (for drinks or snacks), if appropriate.

4. Decide who will be included in the teaching process.

5. Decide if you will bring in members of the community, policy makers, or experts from different disciplines.

6. Decide whether you will organize a field visit. If yes, determine whether you can develop a case study or learning scenario where the visit has direct relevance.

7. Develop the case study or learning scenarios that will be part of your course. (See Module 4: Using and Developing an Ecosystem Approaches to Health Case Study in your Teaching.

8. Design participant questionnaire [See “Pre- and post-course evaluation”] and send it to participants.

9. Analyze the capacities of your participants based on the results of your pre-course questionnaire and make appropriate adjustments in your course design. Keep in mind that you are looking for ways to incorporate their prior knowledge and experience so that they can contribute to the delivery of some of the course content. You also want to ensure that your course is responsive to their learning needs.

10. Analyze the order of sessions and activities in your course schedule.

• Are the sessions ordered so they logically build on one another? Will participants be able to bring their learning and experience from previous sessions to later sessions? Can you build in exercises that will help create this kind of continuity?

11. Develop reflective questions for different moments in your course that will help participants to think about their experiences and develop their learning. Build in time for these moments! Nothing constrains reflection more than being rushed from one thing to the next.
12. Develop feedback questions and determine when and how you will conduct in-course feedback. [See “In-course feedback”].

13. Reflect on your capacities as a facilitator and your goals in teaching this course. What do you bring? What skills do you hope to develop or strengthen?

4. Facilitation and Delivery of the Course

INTERACTIVE CONTENT
What facts are essential to communicate to participants and what concepts and tools can they explore together through group work and dialogue? In the delivery of content, try to make it as interactive as possible. For example, if you are teaching how to visualize complex systems, try building the system map with the students rather than showing them maps and diagrams on PowerPoint. Their ability to understand and retain the concepts will be much greater if you construct it on the spot through dialogue.

ASKING QUESTIONS
The effective use of questions is one of the most important skills needed by trainers. By asking questions, the trainer helps the trainees to think for themselves and stimulates a process of discovery. If trainees think about a problem and come up with answers themselves, they are much more likely to remember the information than if they were just given the same information by the trainer. Open questions are those questions that start with words what, when, how, where, who, and why. These types of questions encourage people to think and analyze because there is not necessarily a predetermined answer. Some open questions are: What are the causes of poor growth in animals? How can the existing health services be improved?

SKILLS OF AN ECOHEALTH FACILITATOR
- Curious about multiple perspectives on issues.
- Open to learning new terminology and approaches.
• Able to teach in more than one style, to co-teach, or collaborate in curriculum design and facilitation.

• Flexible in teaching – able to adapt the style of teaching and the curriculum of the course to meet the circumstances they encounter.

• Comfort with higher levels of uncertainty (higher than is normally encountered).

**CHALLENGE**

Some content is best delivered in a traditional lecture (or supervisory) format and yet it is important to make sure that there is space for participants to question, elaborate, and work with any knowledge that is given to them. Although Ecohealth is an approach and not a discipline, it has principles and core features that need to be learned. As an approach it is not closed to further evaluation, refinement, and elaboration through dialogue, but neither is it entirely open to any kind of revision. In teaching Ecohealth, it is important to be continually cognizant of this tension between established knowledge (stable, constant) and constructive growth and development (flexible, dynamic).

**COMPONENTS OF ECOHEALTH INSTRUCTION**

• Transdisciplinary teamwork and problem solving

• Case study and field work

• Collaboration and community involvement

• Reflection and debriefing

• Team teaching

• Feedback, evaluation, and assessment

• Group work and discussion

### 5. Evaluation and Assessment

If there is time, this section can be delivered as an interactive lecture, and participants can be asked to develop (individually or in groups)
some evaluation and assessment materials for the course. If there is not time, then this section can be used for instructors to read and use in developing evaluation and assessment components of their courses.

**PRE- AND POST-COURSE ASSESSMENT OF PARTICIPANT’S CAPACITY**

Questionnaire

As part of your pre-course questionnaire, try to ask some questions that will assess participants’ level of Ecohealth knowledge and awareness. At the end of the course re-ask some of the same questions to gauge the degree of learning achieved.

**IN-COURSE EVALUATION**

I. EVALUATION OF PARTICIPANT PERFORMANCE

- How (and if) you evaluate participant performance in an Ecohealth course will depend on the context and institutional arrangements. Some potential areas for evaluation are:
  - presentations
  - written proposals
  - written lesson plans
  - case study reports
  - participation
  - nature of collaboration

- You may also want to include student self-assessment as part of your evaluation strategy. Students are asked to assess their own performance on each of the assigned tasks. This can promote higher levels of self-reflection in learners, and give the opportunity for teachers and students to dialogue about performance, expectations, and evaluations. You may decide that student self-assessment does not need to be shared with the trainer but used by the students as an opportunity to reflect, or that students could discuss in pairs.

- Another approach worth considering is to have multiple potential assignments and allow students to select the ones they will include for evaluation in their “learning portfolios.”
This enables a high level of learner self-determination and ownership over their learning.

- Whatever you decide, it is very important to make your expectations clear about how participants will be evaluated, and wherever possible to provide students with a marking rubric as soon as you assign the work.

II. PARTICIPANT FEEDBACK

- Verbal Feedback
  At the end of each day it is a good idea to spend some time (from 15 minutes to an hour) debriefing the activities of the day. This is a great time to gather some feedback on how the course is working for the participants and any constructive changes or suggestions that might help to improve it. It is important to facilitate a realistic conversation about possible adjustments—some changes could already be in effect the next day, while others would have to be implemented in future courses. If trainers are not fully comfortable facilitating a discussion about course changes, then an option is to obtain individual feedback in writing.

- Written Feedback
  During the course you can ask participants to provide brief feedback on what is working and what is not to this point in the course. You might also ask them to identify the moments when they have been engaged and moments when they have not felt engaged. This brief feedback can give you insight into your teaching and the course curriculum. In many cases it may be possible to make minor adjustments that can improve the rest of the course.

CHALLENGES

You do not want to raise participant expectations if you cannot meet them, but enabling participants to actively modify elements of how the course is structured and delivered can be a very engaging exercise, and can be beneficial for all involved. The important thing is
to balance your capacity to facilitate both the conversation and the course with participants’ ideas and expectations.

Trainers should keep good records of participant feedback for their own reflections.

III. FACILITATOR SELF-ASSESSMENT:

- Did participants see it? (photos, real life examples)
- Did they hear it? (explanation, description)
- Did they talk about it? (learner-centered discussions)
- Did they do it? (practice technique, hold animal, use equipment, etc.)

POST-COURSE EVALUATION

Develop a short or long course evaluation survey for participants to complete after the course. If short, ask them to do it during the week after the course, after they have had a few days to reflect. If the evaluation survey is longer, you may want to wait a month. You might also consider following up with participants three months, 1 year, and (where possible) 5 years after the course. In seeking to conduct an evaluation you are often trying to probe:

- When they were most engaged.
- When the setting was conducive to learning.
- Whether the instructors facilitated learning.
- What they learned.
- What they used in their work following the course.
- How the course may have affected them in other ways: new ideas, new contacts, etc.
- What worked and what did not.
- Ideas for improvement.

ACTIVITY

Review the Ecohealth course or parts of the course (e.g., focus on one module section) in this manual as an example and reflect on its
methods, effectiveness (objectives, lesson plans). How would participants improve on this and integrate this into their own courses. How would participants modify this manual to suit their context—country, institution, student needs, etc.

PEER FEEDBACK AND SUPPORT
Many educators find gaining feedback from their peers helpful in developing their capacities. This can be done in an informal way simply by asking for constructive feedback on your course design (or your facilitation) from someone you consider a peer.

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http://intranet.umanitoba.ca/academic_support/uts/media/collaborative.pdf

Encyclopaedia of Informal Education (Online articles on many aspects of adult and collaborative learning): http://www.infed.org/index.htm


Appendix II: Using and Developing an Ecosystem Approaches to Health Case Study in your Teaching

*Suzanne McCullagh, Lead author*
MODULE 2

Introduction to Ecohealth
MODULE 2 – INTRODUCTION TO ECOHEALTH

Synopsis

This module helps students discover the underlying ideas, concepts, and philosophies that define Ecohealth approaches. Ecohealth is an evolving concept. It is not a distinct discipline like epidemiology or ecology or microbiology with its own set of defining theories and methods. In some instances, Ecohealth has been interpreted as singular – that there is an ecosystem approach to health. In other instances, while the general ecosystem orientation to health issues may be singular, the approaches used to apply that orientation are multiple. Hence, some speak of ecosystem approaches to health. The terms Ecohealth, ecosystem health and/or ecosystem approaches to health are not consistently used across disciplines, perspectives, or agencies. In teaching this material, trainers need to convey this openness, while emphasizing the underlying vision, principles, and concepts that bridge many of the different perspectives on Ecohealth. Ecohealth takes theory and methods developed for a variety of disciplines and combines them in a way to deal with health issues from the perspective of socio-ecological systems. The objective of this module is to provide a common foundation of key concepts for this perspective. This introductory module should be delivered near the beginning of the course.

Overall teaching goals of the module

1. To provide students with an introduction to the main principles and underlying concepts of Ecohealth, including:
   
   • The need to see health as the product of a web of social and ecological interactions over time.
   
   • The importance of considering the experience, information and values of different disciplines, different communities and different people.
     
     ○ Introducing concepts such as interdisciplinarity and participation.
   
   • The fact that health risks and benefits are not experienced equally across social groups or even across species.
Introducing concepts of social and gender equity and conservation.

- Ecohealth is dedicated to effecting positive change.
  - Including the concept of knowledge to action.

- Subsequent modules will expand on these concepts and principles. This module aims to make students familiar with these ideas and to begin to understand why they are part of Ecohealth approaches.

2. To help students understand the types of issues or situations for which an Ecohealth approach has advantages and disadvantages.

Conceptual Map

Progress of module learning goals

- Appreciate the need for multiple perspectives
- Recognize issues suited to an ecohealth approach
- Discover the underlying philosophical and conceptual underpinnings of ecohealth
- Develop an individual and group conception of ecohealth
- Apply their understandings to formulate an ecohealth problem statement for specific examples
Module Aims

This module suggests a set of activities that will allow learners to develop, together with fellow participants, a defensible conception of Ecohealth. The activities will provide trainers with a detailed outline for organizing a class that can be customized to local conditions. The module has been organized to illustrate some adult teaching methods that can help new trainers develop Ecohealth teaching skills.

This module has two main goals. The first goal is to provide students with a shared understanding of the core concepts and principles of Ecohealth. The aim is to provide a common language and basis to support the remainder of the course. The second goal is to demonstrate how Ecohealth approaches can be applied in a way that is relevant to the learners. The aim is to help students gain a personal understanding of how to frame a situation from an Ecohealth perspective, and the advantages of this approach.

Students often quickly embrace the concepts of Ecohealth but remain frustrated until they understand why and how it can be used. This module will emphasize self-discovery of core Ecohealth concepts and principles by taking advantage of the experiences of the teachers and learners in dealing with local issues. By using cases or situations with which the students already have some familiarity, the trainer will not need a prolonged introduction to case studies and students will be more focused on the Ecohealth concepts and principles. This should give students a better opportunity to apply and reflect on Ecohealth ideas in situations for which they have some background knowledge and to see connections between Ecohealth and locally important issues.

The principal goal of this module is to introduce students to the shared concepts, principles, and philosophies that bind Ecohealth together as an approach. Two ways to meet this goal are:

1. One way is to present students with a summary of the foundation concepts and principles in the form of a lecture, discussion, or other form of presentation. The teacher is then responsible for summarizing the current literature and presenting this information. The principles and concepts can be illustrated by case studies or embellished by discussion with the students. This approach is focused mainly on transmitting factual content to
ensure the students have been exposed equally to some key pieces of information or definitions to help them develop the foundational understanding (which includes terminology) needed to progress through subsequent modules. This form of teaching suits less experienced teachers and students who will have less opportunity to have more prolonged and interactive discussion. Teachers can refer to the references given throughout the modules to extract the content to transmit, using module-specific learning goals to identify the important issues.

2. A second option is to develop activities to help students discover the core concepts and principles through interactive teaching and discussion. The teacher’s role is as facilitator and guide to help students consolidate their observations and insights along core Ecohealth themes. The goal is less about transmission of a set of concepts than having students develop an understanding of the principles: some of the reasons and needs for the concepts. The teacher must be proficient in Ecohealth ideas and experienced in interactive teaching. The risk in this approach is that all students may not discover the same concepts and this can be a problem if the concepts and principles cannot be further reinforced through subsequent learning opportunities. This risk can be reduced by having teacher-led summaries to ensure equivalent exposure of students to an overview of key ideas. This approach allows the teacher to model Ecohealth principles (e.g., dialogue, participation, using multiple perspectives) and provides a foundation for students to focus less on factual details and more on discovery of an approach to learning, research and practice.

This module has been developed to support a teaching style focused on the learner and on self-discovery. Research in education has shown that students can learn more effectively when actively involved in the learning process. For teachers wishing to use the first, more lecture-based style, the table below summarizes the module learning goals and teaching foci and offers some suggested ways to meet these goals that can be adapted to different teaching situations.
Why Is This Topic Important?

Ecohealth represents a way to approach complex health issues. It strives to look at multiple perspectives at multiple levels of organization to find ways to protect and promote health through collective action of researchers, regulators, and citizens. An Ecohealth approach thinks about health outcomes as phenomena that arise from the interactions and relationships between social and ecological systems. The approach invests research and management efforts into factors that act as the root causes of illness and health. These are sometimes referred to as “upstream” factors, “causes of causes,” or, more generally, “determinants of health.” If we use the upstream-downstream analogy, then “downstream” factors would be those that deal with treatment and rehabilitation of adverse health outcomes like disease. In the following diagram, upstream factors are located in the “etiologic phase” of a disease, while downstream factors are found in the clinical and post-clinical stages.

This metaphor can be very useful. However, students need to be reminded that, in a complex ecosystem, over time “downstream” factors influence “upstream” factors so the situation is not at all as linear as it initially sounds. The recognition that downstream factors may, over time, affect upstream factors, leads to an understanding of complexity and systems, which are addressed in Module 4: Using Systems Concepts in Ecohealth. Such “unintended” consequences are properties of systems, components, and processes that interact in uncertain and complex ways, and they create complex, messy problems often called “wicked” problems by social planners. In this manual, the terms wicked problems and complex problems will be used interchangeably. Strategies and options to deal with them can be clarified if we have a better understanding of systems concepts, particularly those having to do with interrelationships, perspectives, and boundaries.

Nevertheless, the notion of webs, upstream, and downstream factors is a useful starting place, particularly for those working in public health or environmental planning. The message that the metaphor gives us is one of intervention – to prevent downstream cases, intervention (often the domain of health prevention and health promotion) is directed towards upstream causes. This shifts the formulation of the “problem” away from
a central theme of how to cure the sick (which of course remains important), to something much broader, and ultimately preventative.

**Clinical Course of a Disease: pre- and post-disease stages**


As suggested, understanding this idea of social and ecological interactions that act “upstream” of health outcomes is an important entry into understanding Ecohealth approaches (see diagram). A module dedicated to introducing Ecohealth to students needs to start by helping students see health as a socio-ecological phenomenon informed by a wide suite of facts, values, and perspectives. Once this is understood, and after a deeper introduction to systems thinking, students can be asked how treatment and rehabilitation (downstream factors) influence health outcomes, both negatively and positively, often in unintended ways.
Key Concepts

KEY CONCEPT FOR THIS MODULE
Health is determined by a variety of social and ecological factors that are interacting, interdependent, and interrelated. (Such a set of complex relationships makes up a system.)

KEY PRINCIPLES TO EMPHASIZE IN THIS MODULE

1. By looking at the interactions and relationships within this system, new insights can be gained into how to protect and promote health by influencing root social and ecological causes of health outcomes (upstream factors).

2. Ecohealth provides a way of thinking about health from a systems perspective; by taking a systems view, students can also consider how addressing root causes can have unintended consequences.

3. Resolving health problems or protecting health capacity, as well as anticipating unintended consequences, requires multiple disciplines and perspectives (including community) working together.

4. Ecohealth has an emphasis on knowledge-to-action.
Guiding Questions

1. What are some of the different definitions of health, and what perspectives influence these different definitions?
2. How do dominant ideologies influence societal approaches to health?
3. In an Ecohealth approach, why is there a focus on the determinants of health? How far upstream do we need to go to find them?
4. What are the conceptual links between determinants of health and a socio-ecological system?
5. What kinds of issues are best suited to an Ecohealth approach?
6. Have you encountered situations that might benefit from an Ecohealth approach? If so, how does the Ecohealth approach help you define/frame the problem differently?
7. When we think of socio-ecological relationships, can we be confident that the benefits of an Ecohealth approach will be distributed evenly or equitably? What about the risks?

THIS MODULE IS ORGANIZED AROUND SIX MAIN LEARNING GOALS

1. Understand the value of various perspectives and expertise and gain an appreciation of the importance of engaging others when looking at health issues.
2. Define the “scope of practice” for Ecohealth by examining the nature of issues suited to an Ecohealth approach and recognizing the problem-framing and problem-solving (research-to-action) ethos of Ecohealth.
3. Discover the attributes of the Ecohealth approach, recognizing how the origins of health issues result from the relationships between different groups and variables.
4. Identify the principles of Ecohealth that emerge from the module activities and develop a shared vision of Ecohealth among the learners and instructors from which the rest of the course can be built.
5. Apply general concepts, principles, and approaches discovered in the class so far and apply them to a specific case to start building skills of planning and applying an Ecohealth approach.

6. Identify strategies and options for teaching Ecohealth to adults by reflecting on the teaching approach used in this module.

Basic Student Learning Objectives

After completing this module, the learners will be able to:

1. Describe health issues as the result of a web of inter-connected social and ecological influences.

2. Apply a definition of Ecohealth to describe a suite of interactions relevant to some issue they have worked with or are familiar with.

3. Differentiate the Ecohealth approach from other approaches used to study or manage health issues and explain when or why the Ecohealth approach might be beneficial.

Advanced Student Learning Objectives

Advanced learners will be able to:

1. Adapt generic definitions of Ecohealth to a specific case study, consider who should be part of the research team and how the team members would be engaged to work collaboratively.

2. Critically discuss the definitions and core components of Ecohealth based on past experiences and debate if/how those definitions and attributes should evolve to meet local needs and perspectives.

3. Have informed debates on the settings and situations where an Ecohealth approach is (or is not) likely to provide effective options for dealing with a health issue.
Practical Notes

Ecohealth is not a single discipline or approach but rather a suite of approaches unified by their focus on looking at health as a system of interactions between social and environmental factors influencing health outcomes. There is, therefore, no single right way to do Ecohealth and no single right way to teach it. There are many ways to adapt and apply the theories, methods, and concepts associated with an Ecohealth approach; the specific combination will vary from problem to problem and place to place. This results in the need for learners to contribute their understandings from their own local situations, as well as for Ecohealth teachers to have a good understanding of the unifying principles, concepts, and philosophies of Ecohealth so that they can adapt them to specific teaching needs, audiences, and situations. It is critical, therefore, that Ecohealth teachers have taken sufficient time for self-teaching and experiential learning so that they have a firm understanding of these unifying concepts and can apply and adapt them confidently in a teaching situation. Throughout these modules, references are given to some key texts and papers that can serve as a foundation for this self-learning, but they should not be considered an exhaustive list. Practical experiences and self-directed learning are needed to help teachers mobilize their lessons into teaching insights.

This section requires significant interaction between the learners and instructors, so larger classes may need to be broken into smaller working groups. Ideally groups smaller than 20, but of at least 5 are best for generating ideas and material.

Ideally, some of the students and teachers should have experience in dealing with health issues under field or community conditions (i.e., not just in laboratory or clinical settings). This experience can be theoretical (e.g., graduate students) or practical (e.g., practitioners). Note that health is defined broadly in this module and is conceived of as relating to the well-being of people, animals, or environments. Therefore, many disciplines have insight into health issues (see key references below). For students with no health experience, pre-reading the key references for this module is strongly encouraged.

It is best to have students from a variety of backgrounds in the class (i) to model the collaborative approach of Ecohealth that strives to learn from
and integrate various perspectives and disciplines and (ii) to avoid having a group of students all with similar training and life experiences because this will not expose the students to the core learning goal of the value of integrating multiple perspectives and skills when using an Ecohealth approach.

Some activities, such as a course introduction and “ice-breaking” activities, should precede this module to allow the instructors and learners to become familiar with each other and to feel comfortable having group discussions.

Case Studies

Case studies have an important role in developing student skills and knowledge as well as increasing student motivation and interest in a subject. Learning from practical and tangible examples is a very useful way to help students understand the complexity of Ecohealth.

In the simplest terms, case studies are student-centred activities that demonstrate theoretical concepts in an applied setting. In general, they require a description of the context of the problem (locations, people and/or animals involved, when it occurred, why people were concerned, etc.); identification of the issue to resolve or decision to be made (framing the problem statement); and supporting information ranging from data, websites, site visits, interviews, images, videos, and/or documents.

A good Ecohealth case has several features:

- It provides a “real world” context to help students see how the course material applies outside the classroom and see how data are often ambiguous or not clearly defined in many situations.
- It exposes students to different perspectives (viewpoints from multiple sources) and shows that different people may want different outcomes.
- It shows how an Ecohealth approach will define the problem differently from any one of these other perspectives.
- It reveals how a decision will affect different participants, both positively and negatively.
- It requires some critical thinking and integration of multiple sources of information and perspectives.
Things to consider in selecting a case study for this module:

- Will the case used in this module be used across all modules?
  - Using a shared case across modules allows instructors to cover specific issues in more depth.
  - If a case is shared, for this module, more emphasis can be placed on getting the students familiar with the context of the issue than in examining all relevant Ecohealth principles at once.

- If each module has its own distinct case studies, each case study should be selected to reinforce each other and not seem redundant to students.

- Adult learners learn best when they can see the application of what they are learning; therefore, case studies should be selected to ensure they are relevant to the students.

- Because Ecohealth is a complex topic, the instructors should be well versed in the details of the case studies in order to draw out the higher-level Ecohealth principles.

- Resources and time restrictions will dictate if the case studies involve travel outside of the classroom, inclusion of guests such as stakeholders, and ability for students to collect data on their own. When time and resources are limited for travel and guests, instructors will need to put in significant effort in advance to gather the required information, images, and data to effectively use the case study.

This module has been written on the assumption that there will be a case study used in several modules, allowing the students time to revisit and reflect on the case. Therefore, the emphasis of this case study is to have the students be able to identify and understand the link between the “upstream factors” and what information is required to fully describe the context of the case and the issue. If this assumption cannot be met, instructors are encouraged to replicate the field trip by a rich description of a local case through video, slides, and guests who can provide context on an Ecohealth issue in the classroom.
Links to Other Modules

As an introduction to Ecohealth, this module is ultimately linked to all other modules. It is important to coordinate with teachers of other modules to ensure any overlaps are reinforcing and not redundant, and to make sure there are no critical gaps due to misunderstanding of which modules present which material. Instructors of this first module need to understand which concepts other instructors need introduced and to what level of detail those concepts need to be presented or emphasized. It is assumed that all trainers using this manual will be able to teach this module as well as at least one other module (see Trainer Competencies in Introduction to the Manual).

Introduction to the Manual
Module 1. Approaches to Designing and Teaching Ecohealth Courses
Module 2. Introduction to Ecohealth
Module 3. Participatory Research
Module 5. Collaboration and Transdisciplinarity
Module 6. Disease Ecology
Module 7. Agriculture and Health
Background Information

Teaching the introduction to a course requires some of the best teachers in order to effectively facilitate, integrate, and explain the complexity of Ecohealth in a way that is clear and not confusing. All instructors must be very familiar with the information provided in these two references as a minimum for teaching this module:

- Public Health Agency of Canada website on “What Determines Health.”


Some information on teaching based on case studies can be found in the following websites:

- http://tlt.its.psu.edu/suggestions/cases/index.html

Activities

As this is the introductory module, the instructors should take the time to introduce themselves and their goals for the course and this module.

1. It is valuable to have all the core instructors from other modules present at this introduction as well.

2. Class members can be asked what they hope to gain from the course and to introduce themselves.

These activities might precede this module. See Module 1: Approaches to Designing and Teaching Ecohealth Courses for icebreaker examples.
Activity 1

Learning Goal 1: Understand the value of various perspectives and expertise and gain an appreciation of the value of engaging others when looking at health issues.

Teaching focus
Teaching activities should help students take the general idea that “it is good to work with others” and start to discover tangible examples within their sphere of experience on the breadth and diversity of experience and perspectives that could be brought into Ecohealth problems.

Examples of ways these can be achieved

- Have students share experiences where they have found a multifaceted collaborative approach to be useful.
- Have course instructors describe situations where they have found a multifaceted collaborative approach to be useful.
- Review with students some key case studies and literature on inter- and multidisciplinary research and management.
- Bring a health practitioner, community member and/or other stakeholders to describe how a collaborative effort led to resolution of a health problem.

INSTRUCTIONS

1. Start the course with a round table of introductions. Focus on asking participants to explain their background and what they see as their expertise, and to identify at least one experience where working with someone with a different expertise helped them (personally or professionally).

2. The module on approaches to teaching Ecohealth can provide some guidance on how to help students connect their experiences with Ecohealth as well as with the experiences of other students to show how skills and experiences can be complementary and help to broaden perspectives and capacity to deal with health issues.
**ALTERNATIVE ACTIVITY**

- Have the students pre-read a paper that focuses on the necessity of interdisciplinarity in Ecohealth and ask them to relate the paper to their experiences where similar approaches have or have not worked. Have them talk about what they mean by “worked,” and whether others might have a different view of what “works.”

Sample papers:

- **Connell DJ. 2010.** Sustainable livelihoods and ecosystem health: Exploring methodological relations as a source of synergy. Ecohealth 7(3): 351-360. http://www.springerlink.com/content/t33g3775124172q5/

Activity 2

Learning Goal 2: Define the “scope of practice” for Ecohealth by examining the nature of issues suited to an Ecohealth approach and recognizing the problem-framing and problem-solving (research-to-action) ethos of Ecohealth.

Teaching focus
Help students recognize the characteristics of complex problems and create an understanding of the types of problems and issues for which an Ecohealth approach may or may not be suited.

Examples of ways these can be achieved
- Class brainstorming session in groups on a “messy” health issue (complex or wicked problem) they are familiar with, with teachers facilitating a collaborative framing of the problem and summary of cases to define shared features relevant to Ecohealth.
- Instructors present summaries of published case studies, such as in Charron et al. 2011 and work with the class to find commonalities.
- Assign students well-documented cases before class and ask them to come prepared to summarize the main features of the cases for discussion in class.

INSTRUCTIONS
1. Have the learners come to a blackboard or flip chart and write issues or problems that they think would be suited for Ecohealth (e.g., rural water safety) and next to it write a reason why this might be a good case study.

2. Review with the class the commonalities between the problems and start a list of defining features.
   i. Draw out some of the key features that will later help to define an Ecohealth approach (e.g., it is a complex health issue with multiple perspectives, values, and stakeholders involved, where there may not be an agreement as to what constitutes the “problem”).
   ii. Select a few of the case studies for the next session (the number needed depends on the group size).
ALTERNATIVE ACTIVITY

1. Have ready a series of papers, technical reports or book chapters in which the Ecohealth approach has been applied. These can come from the Manual Companion Texts. Ask the students to read the papers and develop a description of the health issues involved, emphasizing the nature of the setting and context, who was involved, and how the problem was defined.

   i. The instructor should not prejudice the students by directing them to look for key features, but instead, facilitate a review or discussion of the students’ discoveries and thoughts after reading the papers and to help cluster those thoughts into Ecohealth themes.

   ii. Pre-select papers to reflect the diversity of settings in which Ecohealth can be used.

Examples include:


Activity 3

Learning Goal 3: Discover the attributes of the Ecohealth approach, recognizing how the origins of health issues result from the relationships between different groups and variables.

Teaching focus
Help student to recognize the connections between the various drivers and determinants that affect an Ecohealth problem and begin to see relationships between these factors in terms of a connected and interacting system.

Examples of ways these can be achieved

- Instructors provide a lecture on the socio-ecological approach to health issues.

- Group work to have students develop relationship diagrams and maps, such as causal models for locally relevant health issues. Instructors circulate asking probing question to help students see the “upstream drivers.”

- Students are to provide scenarios and asked to examine them in small groups, each group taking a disciplinary perspective. The groups are brought together to examine:
  i) how different are the strengths and weakness of disciplinary approaches, and
  ii) how can combining the information from different perspectives and disciplines reveal some new options for primary prevention or health promotion.

INSTRUCTIONS

1. Begin by selecting two or three case studies developed in the preceding activities that would (i) be suited for this activity and (ii) are relevant to the participants (e.g., reflect local issues). Additionally, try to find commonalities between issues raised in groups in the preceding activity because this would allow you to choose examples for which more learners have experience. Because the goal of this exercise is not to look at the content per se but rather to develop diverse causal webs, it will help if a number of the learners already have some content expertise. Instructors should ensure they have two or three of their own
examples to use in case good examples did not arise in the last activity. They should have ready a background document on the cases and try to select cases that have some local/regional prominence so the class members have some familiarity with the issues.

Introductory information on causal webs can be found at: http://www.vetmed.wsu.edu/courses-jmgay/EpiMod2.htm#The Causal Web Concept


2. Find the “entry point.” In other words, ask the class how/why they got involved in the problem. Note that an entry point can be a clinical case, a request/complaint from a stakeholder, a political inquiry, or similar events that first get someone interested in looking at the issue.

- Write this entry point on a blackboard or a large piece of paper.
- Repeat this for each case study.
- If the examples used are ones provided by the instructor, work with the class to develop a list of hypothetical entry points for each example and select the one most similar to the real entry point.

3. Break the class into groups; one group per example.

- Have each group draw a causal network expanding from this entry point.
- Help by prodding people to look at upstream factors that influence points in their network as well as to look at how different nodes in the network influence or affect each other.
- The instructors will move between the groups, facilitating (but not leading) discussion to encourage the students to discover the various nodes in this network and to find the connections between causal factors.
- Ensure the participants have plenty of space and paper to expand their networks.

4. After the original groups have drawn their network, ask them to describe it to the class.
5. Then, allow the groups to wander between each other’s diagrams, inserting comments with “sticky notes” that will help to expand or contract different relationships and nodes in the networks.

6. During a break ask the group to consider the following:
   - What are the problems related to each of the diagrams and how do they differ (or not) from the entry point?
   - Who has influence on the nodes and relationships diagrammed in each example?
   - Has drawing the causal network caused you to think differently about the nature of the problem you started with?

7. Ask the group to reconvene and discuss the questions.

**ALTERNATIVE ACTIVITY**


1. Ask groups to critically review the case studies. In their critical review, ask the participants to try to differentiate the approach taken in the case studies from other possible disciplinary approaches or methodological approaches to the problem. Can they see how the “problem” is defined differently?

2. Ask the students to describe the different factors studied, the groups involved, the activities undertaken and how these all relate to each other.

3. Ask students to identify a problem in their jurisdiction that would fit the approach illustrated in the case study.
   - Who would be the equivalent groups who took part in the local study?
Activity 4

Learning Goal 4: Identify the concepts and principles of Ecohealth that emerge from the module activities and develop a shared vision of Ecohealth among the learners and instructors on which the rest of the course can be built.

Teaching focus

Link the concepts of an interacting system of variables that affect an Ecohealth problem with the need to use multiple methods, incorporate diverse knowledge and perspectives to develop actionable plans. Identify the principles of Ecohealth that emerge from the module activities and develop a shared vision of Ecohealth among the learners and instructors on which the rest of the course can be built.

Examples of ways these can be achieved

- Instructors can give a summary lecture that draws on standard text books or manuscripts that provide certain authors’ opinions of what defines Ecohealth.
- The class can work as a group(s) to distil the day’s activities and develop their own definition of Ecohealth. Those concepts can be shared and the instructors can identify the core concepts with the students. From the concepts, groups can determine the principles.
- Student homework can be to reflect on the day’s activities and ask how the concepts identified compare to standard definitions or descriptions of Ecohealth provided in assigned readings.
- Students, as a group, draw a diagram or concept map of Ecohealth that does not need to be reviewed or critiqued in class, but can be continually re-visited after other modules so that, by the end of the course, students have a well-developed understanding of Ecohealth.
INSTRUCTIONS

1. Using learnings from activities 1 to 3, work as a large group to extract the common features from the case studies.

2. Seek commonalities in the nature of the study and the scope of people/settings involved in the issues.

3. Facilitate the discussion to help students categorize these commonalities in terms of the core concepts and principles of Ecohealth. For example, systems view, multi- to transdisciplinarity, participation, social factors such as gender and equity, sustainability, and knowledge-to-action.

4. Instructor(s) can next share a history of the origins of Ecohealth and help to bring the day’s activities into a unified vision.

Options for this activity:

Option 1: Instructor(s) can provide a lecture on the origins and evolutions of Ecohealth, resulting finally in an integration of the day’s work demonstrating how the students identified key concepts.


Option 2: Provide summaries of key advances in systems approaches to health issues for the students to read and give feedback to the class summarizing the main aspects of Ecohealth. Introductory papers and websites can be used.

ALTERNATIVE ACTIVITY

1. During the break, the instructor(s) highlight the common themes in the learner networks to draw out the key elements of Ecohealth.

- Instructors guide the students through their review to describe why they selected these key elements and why these elements contribute to the Ecohealth approach.
2. Instructors give a summary lecture to bring together the day’s activities by introducing the origins of Ecohealth and current status and concepts of its practice.

3. Whichever activity is selected, this is a good time to create a poster that can remain up in the classroom. The poster would give a definition of Ecohealth and list its concepts, principles, and approaches. The poster can be re-visited at the end of each day to review if the class’s conception of Ecohealth changes as they progress through the course. At the end of the course, the poster will be finalized through group discussion and by linking to core lessons from previous modules. Students can take copies away with them.

Activity 5

Learning Goal 5: Apply general concepts, principles, and approaches discovered in the class so far and apply them to a specific case to start building skills in planning and applying an Ecohealth approach.

Teaching focus

Help the students take their new theoretical or intellectual understanding of Ecohealth concepts and principles and apply them to a case study to see their practical applications. Demonstrate the concepts and theory discussed in the module to date in an applied setting to help students reinforce the learning outcomes of the previous activities in this module.

Examples of ways these can be achieved

- Students visit the FIELD STUDY site for a course case study and are introduced to the location, stakeholders, and problems and are asked to provide their initial impressions of how concepts and principles developed in this module might apply.

- Instructors give a multimedia presentation on a case study, discussing with the students where or how Ecohealth concepts and principles might be applied.

- Instructors present a series of case vignettes (such as presented in Charron et al., 2011) and highlight how the core concepts and principles identified in class proved to be valuable.
Note to Instructors: This activity is an extension of the last activity and is intended to help the students take the theoretical or intellectual understanding of Ecohealth concepts, principles, and approaches and apply them to a case study to help them see the practical applications. If time is limited and a field trip cannot be organized, the alternative activity listed next may be more efficient. If the introductory module is held over a very short time, precluding the use of a detailed case study, it will be important for instructors to highlight the practical implications of the Ecohealth core concepts when undertaking the previous activities.

INSTRUCTIONS

Before the course begins, the instructors should identify the case studies they wish to explore by field study or field trips. One of the field studies can be introduced at this point.

The students will visit the field site for a course case study.

1. Refer to the appendix Using and Developing an Ecosystem Approaches to Health Case Study in Your Teaching to plan your visit. Consider the ethical implications of a field study, in terms of research ethics and the impact that your visit will have on the system you are studying. Prepare your field visit carefully and consider all aspects of risk management in your planning.

2. Case studies should provide exposure to locally relevant issues. The trainers should be familiar with the key stakeholders and communities involved, including regulatory authorities, and should secure all necessary agreements, ethics approvals, and risk assessments for this to be used as a case study. The case should allow the trainees to see multiple perspectives and should not be restricted to one discipline’s approach to characterizing the case or its management. Practical considerations such as accessibility, how long it takes to travel to the case study site, and trainee safety need also be considered.

3. Students will be introduced to this teaching case study as it exists in the field. The students will be provided with an opportunity to meet with some local stakeholders (preselected and recruited by the instructors to help reflect key local perspectives); see the affected community; meet some community members; and see the local environment. They will be shown (or told) about the entry point for this issue.
4. After this field introduction, the students will be given time to talk among themselves to discuss how they think the Ecohealth approach would apply to this situation.
   - Students meet with the instructors to reflect on their assessment.
   - The students will be tasked with a homework assignment of nominating what they would do in the first 2 weeks if they were responsible for developing an Ecohealth approach to the case study.
   - Encourage the students to work as a group – ideally giving them time in the field at the end of the day to do so.

**ALTERNATIVE ACTIVITY**

The instructors use a multimedia approach to describing in rich detail the field site for the case study.

- Bring some stakeholders and community members to the classroom to allow the students to talk with them and (i) see the problem from multiple perspectives; (ii) see how various disciplines or perspectives affect how the health issue is conceived or how actions are prioritized; and (iii) practice communicating outside their own discipline.

The remaining time is used as above but within the classroom setting.
Activity 6

Learning Goal 6: Identify strategies and options for teaching Ecohealth to adults by reflecting on the teaching approach used in this module.

Note to Instructors: This part of the module is used only in a “training of trainers” session. It is used as an opportunity to critique, develop, and explore teaching methods to best illustrate foundation Ecohealth concepts and principles.

Teaching focus

In a training of trainers setting, instructors and students work as peers to discuss the value and challenges of the various learning activities and to explore alternative ways to meet the learning goals and teaching foci presented to help subsequent trainers adapt the module to future teaching situations.

INSTRUCTIONS

1. As a group, instructors and learners reflect on the day’s activities and discuss the advantages and disadvantages in terms of helping adult learners to understand Ecohealth.

   • This module is designed as a “learning by doing” exercise that will model an approach to Ecohealth. This session allows for critical evaluation of the particular approach.

   • During this evaluation, the instructors can “reveal” the day’s learning goals and ask the learners for teaching alternatives and methods to meet those goals. This can include a discussion of the alternative approaches outlined in the module.

   • Time should be taken to discuss how different approaches to teaching may differ with different types of learners or in a different context.
ALTERNATIVE ACTIVITY

- Instructors provide a brief lecture on the methods for, or approaches to, adult education and identify how these methods and approaches were modelled throughout the day.

- Instructors can use the following as guides for preparing the lecture:
  
  International Livestock Research Institute. Available at: http://mahider.ilri.org/bitstream/handle/10568/5403/TrainersManual_content.pdf?sequence=1

- The class discusses how/if these methods and approaches might be used in different teaching settings and context.
### SAMPLE TIMETABLE FOR MODULE 2 ACTIVITIES

#### INTRODUCTION TO ECOHEALTH

<table>
<thead>
<tr>
<th>Time</th>
<th>Intense short course (1 day)</th>
<th>Longer course (1.25 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30-09:15</td>
<td>Introduce goals and objectives</td>
<td>Introduce goals and objectives</td>
</tr>
<tr>
<td>09:15-09:45</td>
<td>Round table discussion on experiences with collaborative work</td>
<td>Round table discussion on experiences with collaborative work</td>
</tr>
<tr>
<td>09:45-10:00</td>
<td>Pick case studies for causal networks</td>
<td>Pick case studies for causal networks</td>
</tr>
<tr>
<td>10:00-10:30</td>
<td>Draw causal networks</td>
<td>Draw causal networks</td>
</tr>
<tr>
<td>10:30-10:45</td>
<td>Break</td>
<td>Break</td>
</tr>
<tr>
<td>10:45-11:15</td>
<td>Review networks for commonalities</td>
<td>Review networks for commonalities</td>
</tr>
<tr>
<td>11:15-12:00</td>
<td>Link morning activities to the history of Ecohealth activities</td>
<td>Link morning activities to the history of Ecohealth activities</td>
</tr>
<tr>
<td>12:00-12:45</td>
<td>Lunch (including local representatives of the case study)</td>
<td>12:00-12:30 – Travel to field site</td>
</tr>
<tr>
<td>12:45-13:15</td>
<td>Instructors introduce study and describe field setting in terms of (i) the case/issue and (ii) the environments involved</td>
<td>12:30-13:00 – Finish lunch</td>
</tr>
<tr>
<td>13:15-14:15</td>
<td>Meet with and talk with local representatives to develop an understanding of the social environment</td>
<td>13:00-14:45 – Walk around the case study site to explore physical aspects (built and natural environments)</td>
</tr>
<tr>
<td>13:45-14:15</td>
<td>Allow learners to talk with each other and local representatives to develop an outline for a plan to approach the case study</td>
<td>13:45-14:45 – Meet and talk with local representatives to develop an understanding of the social environment</td>
</tr>
<tr>
<td>Time</td>
<td>Activity</td>
<td>Time</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>14:15-14:30</td>
<td>Break</td>
<td>14:45-15:30</td>
</tr>
<tr>
<td>14:30-15:30</td>
<td>Class discussion on (i) the Ecohealth features of the case and (ii) the people who would need to be engaged to understand, study, and manage the issue, and (ii) ideas on first steps towards applying the Ecohealth approach</td>
<td>15:30-16:30</td>
</tr>
<tr>
<td>Day 2:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08:30-09:30</td>
<td>Class discussion on (i) the Ecohealth features of the case and (ii) the people who would need to be engaged to understand, study, and manage the issue, and (iii) ideas on first steps towards applying the Ecohealth approach</td>
<td>09:30-10:30</td>
</tr>
</tbody>
</table>
Evaluation

1. Evaluate pre-existing Ecohealth knowledge.

The morning exercises will allow the instructors to identify the depth, breadth, and diversity of pre-existing understanding of Ecohealth concepts and thus allow them to adjust and refine what is emphasized in the rest of the module and course.

2. Evaluate the development of Ecohealth knowledge and understanding as the class continues and at the end of the class.

The Ecohealth concepts and principles poster developed earlier will be a living document that the class can continue to edit, add to, and refine over the course of the class. Instructors should review the poster at the end of each day to identify any misconceptions, lack of understanding, or missing key concepts or strengths of the class, and adjust the remainder of the course.

3. Ask the students to provide a one-page reflection at the end of this module on the top three challenges they perceive will exist in teaching Ecohealth and how they might deal with those challenges.

4. Trainers can evaluate their teaching success by keeping a notebook that records the activities and teaching approaches they felt worked best each time they offered the course. The characteristics of their target learners should also be recorded for each class. The trainers can periodically find approaches and activities that consistently allow the students to meet their goals. It is really important that instructors, facilitators, and trainers reflect on the success or otherwise of activities of the day, including how individuals have contributed and whether particular group configurations in the class are worth keeping for the next modules.
Terminology

**Concept**
An abstract idea; an idea or mental image that corresponds to some distinct entity or class of entities, or to its essential features.

**Ecological system**
A hierarchically nested area that includes all living organisms (people, plants, animals, and microorganisms), their physical surroundings (e.g., soil, water, air), and the natural cycles that sustain them. Also known as an ecosystem.

**Equity**
The state, quality, or ideal of being just, impartial, and fair.

**Etiology**
The cause or origin of a disease; the study of disease causation.

**Health**
For definitions of health, see Chapter 1 in Charron 2011.

**Participatory (specifically, in research)**
Marked by, requiring, or involving active engagement by those who will be affected by the research, or who are affected by the outcomes being investigated, as well as the researchers, in the design and implementation of the research.

**Principle**
A proposition that serves as the foundation for a system of belief or behaviour or for a chain of reasoning; a general scientific theorem or law that has numerous special applications across a wide field.

**Social system**
The people in a society considered as a system organized by a characteristic pattern of relationships. Social organization based on established patterns of social interaction between different relationships, regulated through accepted norms and shared values.

**System**
A group of interacting, interrelated, or interdependent elements forming a complex whole.

**Transdisciplinary**
A research strategy that crosses many disciplinary boundaries to create a holistic approach. It is also used to signify a unity of knowledge beyond disciplines.
Key References

Public Health Agency of Canada website on “What Determines Health.”


Additional References

Pedagogy and Adult Training. A Trainers Manual. International Livestock Research Institute. Available at:
http://mahider.ilri.org/bitstream/handle/10568/5403/TrainersManual_content.pdf?sequence=1

http://pubs.iied.org/6021IIED.html?k=Pretty

Parkes et al. (2008). Ecohealth and Watersheds: Ecosystem Approaches to Re-Integrate Water Resource Management with Health and Well-Being. Available at:

https://www.vetswithoutborders.ca/images/pdfs/EcoHealth_APrimer_VWBF.pdf
Participatory research
MODULE 3 – PARTICIPATORY RESEARCH

Synopsis

Participatory approaches enable Ecohealth scholars and practitioners to work with stakeholders to understand problematic situations, design strategies, and shape activities in a way that stakeholders are empowered to investigate and resolve the complexities of health-related issues they face. These approaches take into account people’s health and their socio-economic, cultural, and environmental concerns. Participatory methods increase participants’ opportunities to apply their specific knowledge more effectively and collaboratively. Often framed in terms of participatory research, these methods open up the range of possible sources of knowledge beyond a few experts to include the experiences and knowledge of a variety of stakeholders who bring different types of expertise. These methods also link research with action, one of the important principles of Ecohealth. If handled well, they facilitate deeper knowledge, more systemic understanding, and more effective action. Participatory research, in this module, is used to refer to this broad notion that bridges the search for knowledge with action to improve problematic situations. This module introduces students and trainers to some of the important characteristics of participatory approaches.
Module Aims

This module introduces students to concepts of participatory research and why and how participation is central to Ecohealth. Participation is essential to sustainable community development and brings a dimension to Ecohealth that many other research approaches do not include. Participation is about recognizing the role, rights, stakes, and capacities of different groups and making these central to the research questions and the way research is conducted. The module introduces Participatory Rural Appraisal (PRA) and Community-Oriented Participatory Action Research (COPAR) as well-recognized methodologies that can be used for engaging with stakeholders. It shows how PRA approaches allow researchers to investigate, analyze, and evaluate constraints and opportunities, to create sustainable solutions that involve key stakeholders, and enable informed and timely decisions regarding development projects.
The aims of this module are:

- To demonstrate why and how participation and empowerment of community members is important for understanding and managing complex Ecohealth issues.
- To build students’ understanding of how to become facilitators of participatory processes when doing Ecohealth in the field.
- To familiarize students with ways to interact with community members and enable them to take on facilitating roles in the field.
- To encourage students and teachers to reflect on their role in the research process and how they can collaborate with other stakeholders.

**Why Is This Topic Important?**

There are many reasons why participatory approaches to Ecohealth-defined problems are important. Foremost among them are the need for common understandings of the problem by those who are most affected by it, and people learning collectively, eventually becoming able to control their own destiny. Ecohealth seeks to recognize the expertise of a range of different stakeholders, and not just privilege the knowledge and perspectives of “scientific experts,” who may leave and take their knowledge with them. One of Ecohealth’s defining features is its emphasis on knowledge-to-action, which gives stakeholders the capacity to take ownership of the issues that affect them, using research as a way of collective learning – to investigate and address these issues, and work through policy and other means to broaden the impacts of these actions. Participation is key to ensuring that the needs, opportunities, and strategies developed through this process engage stakeholders; the process will thus be meaningful to them, and will increase the likelihood that the process will have sustainable (long-term) impacts. This module helps build understanding among students about how and why they can engage people, how this in itself can be empowering, while recognizing the roles, rights, stakes, and capacities of different groups. This also links to the *Module 9: Sustainability* which highlights the importance of sustainable development and how to build sustainability into research programs.
This pursuit challenges models of expert-driven, well-defined disciplinary approaches in the measurable sciences as the dominant source of solutions to ill-health. Many students new to Ecohealth are trained in these scientific or clinical/medical backgrounds, areas where they are more familiar with collecting and analyzing quantitative data. The lived experiences of stakeholders – like local people – are more perceptual, intuitive, traditional, and emotional, no less important, and sometimes critical to health issues. These are the domains of qualitative analyses – a type of data often considered “soft” and not as reliable as quantitative data. This module will show how using qualitative, participatory approaches provides very different kinds of evidence and interpretations of the reality of situations. It provides some insight into how to analyze data collectively through participatory activities, which has its own challenges and tools.

Key Concepts

- Participatory research is a qualitative research approach that uses different principles, methodologies, and analytical tools than quantitative approaches.

- Participatory methods are a cumulative and flexible set of techniques to enable researchers and students to study and work with communities, bearing in mind the complexity of socio-economic and socio-cultural conditions of the targeted communities.

- Participation is strongly related to empowerment. To empower people to participate, "outsiders" in this case could be students, researchers, or development workers, should also have other skills such as facilitation and communication that create a medium for collective learning, sharing, and discussing issues.

- Ecohealth research should be framed and developed in partnership with other stakeholders whose needs, solutions, and aspirations can help drive the process and sustain it in the future.

- The role of outsiders is to facilitate the development process and build capacity by creating the appropriate environment using the tools and techniques of participatory methods that allow community members to express their needs, problems, and
opportunities. In return the outsiders are able, together with them, to prepare an action plan for the intervention.

- The tools and techniques of participatory method only serve as a medium to help researchers and students to work with community members, but their attitudes are extremely important – a willingness to accept community members as equal partners, a willingness to listen and learn from community members, and to be patient.

Guiding Questions

1. Who has a voice and who doesn’t have a voice in society? Why is this relevant for the concept of participation?

2. What other factors underlie the degrees of participation in a process?

3. Who is more likely, and who is less likely, to participate in a process? Who makes a decision about whether this is a problem, or even part of the problem, in an Ecohealth approach?

4. How can research address issues of participation? Why is qualitative research an approach of choice?

5. How can the formation of an inter- or transdisciplinary team contribute to an appropriate degree of participation?

6. How can participatory processes help address health inequalities that may exist within communities (such as gender, ethnic, socio-economic, age-related, or otherwise).
Basic Student Learning Objectives

After completing this module, the learners will be able to:

1. Understand the principles of participatory approaches, including advantages and disadvantages, and how these methods can be used for research and development activities.

2. Know how to apply participatory methods as a way of finding out about community livelihoods, needs, and aspirations as part of an Ecohealth framework.

3. Learn ways to organize qualitative data and information analysis, and to synthesize and present feedback to key informants and community members.

Advanced Student Learning Objectives

Advanced learners will be able to:

4. Identify opportunities to create collective learning arrangements and be able to target problems from multiple perspectives.

5. Increase the ability and opportunity to use an action research framework to solve problems related to sustainable and community development.

6. Be able to plan interventions using participatory methodologies.

Practical Notes

- Students with a background in community development, social science, geography, agriculture, livestock may already be familiar with some of the concepts in this module. They should be directed to the advanced learning objectives and can be put in groups with students who don’t have this background to share their experience.

- This module can be a stand-alone of teaching materials but it is important to understand the context of Ecohealth research. It is a tool to help students understand the needs of people in the target areas where they will work, how to collect data and information about the interests of the community, and in the analysis and development and implementation of an action plan.
• Beginners in the field of qualitative and participatory approaches would benefit from working with experienced facilitators or instructors to guide them when starting field work.

• This module is only an introduction to participatory approaches. To learn the participatory tools and techniques, students must be exposed to field exercises. If your Ecohealth course allows, participatory tools could be practised during a site visit, and if students are interested in using these techniques further they should be encouraged to get more training and practice. If you include field-based activities in this module, the ideal number of participants per course would be 15. Class size could be increased to 25 participants per course, but it is difficult to arrange for the field work unless there are two or three good facilitators and two or three sites for the field exercise.

• For a field exercise, refer to the appendix on Using and Developing an Ecosystem Approaches to Health Case Study in Your Teaching. It is important to have preliminary visits in the target communities (such as meeting with the local authority and key persons) to arrange suitable times for the exercise. At the same time collecting the secondary information from relevant organizations and local authority. Bring with you flipcharts, markers, pencils, notebooks, tea, sugar, candy, candles, and, if appropriate, a token of appreciation for participants. Materials to be used for ranking and scoring for this exercise, such as dried beans, small stones, sticks, etc., can be found in the community.

Links to Other Modules

*Module 3: Participatory Research, Module 5: Collaboration and Transdisciplinarity, Module 8: Equity and Gender, and Module 9: Sustainability* are very closely related and cross references should be made as appropriate. While delivering these modules, instructors should whenever appropriate link them with the concepts of participation and participatory research to show students how tools of this module are applied.
Background Information

WHAT IS PARTICIPATION?
The World Bank definition (1994) of participation is a process through which stakeholders influence and share control over development initiatives, decisions, and resources that affect them. Participation does not end with going to a meeting and listening to what researchers, development workers, or donors have to say, but is the continuous process of people’s involvement in an intervention or development process. Participation can take different forms, ranging from information sharing and consultation methods to mechanisms for collaboration and empowerment that give stakeholders more influence and control. It is an active process where intended "beneficiaries" engage in the outcomes of the intervention programs and projects and gain personal growth. The beneficiaries can be people who are directly and indirectly affected by the intervention and they could be farmers (better off and poor or disadvantaged), local authorities (such as village head, district offices), local organizations (youth, women, and religious groups), importantly, they should be partners of change.

It is often assumed that talking about participation refers to the act of involving physical, rural communities. However, as discussed in Module 5: Collaboration and Transdisciplinarity, Ecohealth approaches encourage the involvement of a range of stakeholders with different types of knowledge; the challenge of participation is to ensure they are adequately represented in the scoping, planning, analysis, and follow up of Ecohealth projects. It is tempting to talk of communities as cohesive units, but any community consists of different individuals with a wide spectrum of viewpoints, needs, attitudes, and communication styles. Can all of these be represented in a participatory manner? Who chooses who gets represented? Communities can refer to physical, moral, religious, virtual, and other types of collectives, and how these are involved in a process may require different strategies.

When encouraging participation it is extremely important to empower people, allowing them to truly share information about the problems and opportunities of their community. Empowerment and participation are

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3 Module 5: Collaboration and Transdisciplinarity discusses in depth how processes for collaboration can be set up and managed.
closely interrelated. Empowering people enables them to actively contribute to the generation of new knowledge and social change, while participation provides the platform for them to contribute. Empowerment and participation can be with individual, family, community, and nation up to a global level, and they can be economic, social, and political. Participation implies “empowering people to mobilize their own capacities, be social actors, rather than passive subjects, manage the resources, make decisions, and control the activities that affect their lives.” (Cernia, 1985, cited by Anantha, 2005⁴)

Participatory Rural Appraisal (PRA) and Community-Oriented Participatory Action Research (COPAR) both aim to provide the opportunity for communities to understand and react to their own problems and situations, and to allow researchers to support groups in operationalizing actions stemming from locally-owned conclusions. It is a bottom-up approach that serves to empower communities and use the researcher, more as a guide than an external force providing top-down advice. It recognizes that communities themselves have the best knowledge of problems and resources, but that research can serve to explore issues and set local perspectives within broader complex systems processes, therefore identifying underlying drivers or challenges that may have been previously unrecognized. COPAR can also be used to ensure that research is inclusive of types of knowledge (including traditional knowledge) and populations (such as indigenous groups, women, and children) that are often marginalized and omitted from top-down methods.

Participation means different things to different people and to avoid potential conflict, disappointment or ‘burn out’ it is important to clearly state, or agree, on a common definition. (Buchy and Hoverman, 2000).

Participation without the redistribution of power is an empty and frustrating process for the powerless. It allows the power holders to claim that all sides have been considered, but makes it possible for only some of those sides to benefit. In other words, it maintains the status quo. (Arnstein, 1969).

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Participation can stimulate an ongoing learning process, increasing the awareness of collective responsibility within the community. This should be seen as an asset by professional agencies rather than as a threat. (Buchy and Hoverman, 2000).

Although PRA and COPAR can be empowering tools for community involvement, they can be challenging to execute well and require ample skills and preparation. Effective participation means that individuals and communities need to invest their time and resources in activities, and it assumes that they have an interest in seeing research succeed and continue. To ensure that community expectations are managed, researchers need to clearly share, throughout project processes, the goals of each activity, for example, the stage of COPAR and possible outcomes. Community participants themselves should be inclusive, and this means that processes often involve groups of individuals, including marginalized populations, from a variety of cultural, social, economic, and physical backgrounds. Care needs to be taken throughout research processes to ensure that different perspectives are equally considered and that participation is inclusive of different community groups. These processes also demand that the researcher needs to be flexible to timelines and with lines of questioning (semi-structured processes are best), and considerate of community traditions and resources.

### CHECKLIST OF THINGS TO CONSIDER

- How does the process allow for increased time and administration if required?
- Will the process allow disagreement/opposition to develop?
- Will the process raise exaggerated expectations?
- Are there problems of representation and legitimacy?
- Are there strong biases or inaccuracies in the information collected?
- How should trustworthiness be maintained?

Several terms have been used for this participatory approach – Rapid Rural Appraisal (RRA), Participatory Rural Appraisal (PRA), and Participatory Learning and Action (PLA). An important theme in these approaches is that being prepared to listen and learn from local people
allows the generation of knowledge. Sometimes people or groups may not want to participate, because of historical grievances, lack of understanding, lack of confidence, or other reasons. These complexities must be considered and appropriate facilitators encouraged to take a leadership role. Whose agenda is your research trying to promote?

### ATTITUDES REQUIRED FOR RESEARCHERS WHEN PRACTISING PARTICIPATORY APPROACHES

1. Participation
2. Respect for community members
3. Interest in what people know, say, show, and do
4. Patience, not rushing or interrupting
5. Listening, not lecturing
6. Humility
7. Empowering community members to express, share, enhance, and explore their knowledge.

Effective participation relies on respecting a number of key principles, such as those identified by Egger and Majeres (1998), cited by Anantha, 2005:

- **Inclusion** – of all people, or representatives of all groups who will be affected by the results of a decision or a process, such as a development project.

- **Equal partnership** – recognizing that every person has skill, ability, and initiative and has equal right to participate in the process regardless of their status.

- **Transparency** – all participants must help to create a climate conducive to open communication and building dialogue.

- **Sharing power** – authority and power must be balanced evenly between all stakeholders to avoid the domination of one party.

- **Sharing responsibility** – similarly, all stakeholders have equal responsibility for decisions that are made, and each should have clear responsibilities within each process.

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• **Empowerment** – participants with special skills should be encouraged to take responsibility for tasks within their specialty, but should also encourage others to be involved to promote mutual learning and empowerment.

• **Cooperation** – cooperation is very important; sharing everybody’s strengths reduces everybody’s weaknesses.

Triangulation is commonly used in PRA and is a way of verifying the validity of qualitative data by using different tools to collect information on the same topics. Qualitative techniques that can be used include interviewing and discussing with people, field observation, and structured group activities. Groups are stronger when they are interdisciplinary and involve both outsiders (researchers) and insiders (beneficiaries), giving equal opportunity for participation of men and women while collecting data, sometimes interviewing men and women separately.

![Triangulation Diagram](image)

Figure 1. Triangulation.
Community-Oriented Participatory Action Research (COPAR)

INTRODUCTION TO COPAR

A type of Participatory Action Research (PAR), COPAR is one methodology that can be used to apply the principles of Ecohealth to health challenges. The method recognizes that there is a need to understand levels of health in a holistic manner, grounding community research in understandings of not only natural, but also social and cultural resources, ecosystems, social systems, governance and power, and public health. For Ecohealth, the approach adds value to other PAR tools, such as a PRA, as it frames research within a community setting to support the Ecohealth field’s understanding of health as a concept that exists within links of social and physical environments, and between individuals, families, neighbourhoods, communities, and ecosystems.

PAR approaches, including COPAR, are useful for understanding complex relationships between human and environmental systems. Used in fields of health, environment, and development research, PAR approaches are useful and appropriate when the development of a collaborative relationship between researchers and targeted communities can be undertaken (see Parkes and Panelli, 2001 for more detailed information on the academic foundations of PAR). PAR approaches extend beyond PRA approaches by grounding all decision-making processes in the communities themselves, letting local actors guide both research activities as well as action planning. PAR methods have two core components – action, for doing or achieving goals, and participation, with the involvement of targeted research populations being fundamental to research processes.
Introduced in academic literature as a research method that generates knowledge and processes of change as well as empowering involved communities, COPAR is “characterized by the involvement of a participatory research community in identifying and addressing a situation (or problem) through cycles of action and research” (Panelli, 2002). COPAR can be used for Ecohealth research and learning for three main purposes:

- **Knowledge generation** (examining linkages between ecosystems, social systems, human health, and governance/power structures).
- **Understanding change processes** (learning about systems and challenges/influences/opportunities as they develop and are influenced by other community factors).
- **Empowering communities** (helping communities to identify issues and plan actions).

**UNDERSTANDING COPAR**

COPAR projects place the community at the centre of research agendas in both theory and practice. As with Ecohealth, the community is seen as the arena for research and as the hub for investigation. Undertaking COPAR leads researchers into cycles of participatory research, reflection, and then action, which can be limited or extended, depending on the problems assessed and the possible length of project cycles.

<table>
<thead>
<tr>
<th>Phases</th>
<th>Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initiations</strong></td>
<td>• Meeting a community.</td>
</tr>
<tr>
<td></td>
<td>• Enabling community members to articulate problems, the contexts in which they arise, and the ways in which different issues in the community interact.</td>
</tr>
<tr>
<td></td>
<td>• Seeking understanding through partnerships.</td>
</tr>
<tr>
<td><strong>Developing a partnership</strong></td>
<td>• Recognizing the “players.”</td>
</tr>
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<td></td>
<td>• Establishing representation forms.</td>
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<td></td>
<td>• Forming core research and reference groups.</td>
</tr>
<tr>
<td></td>
<td>Reflection* Identifying community concerns and/or issues.</td>
</tr>
</tbody>
</table>
Research design

- Explicitly deliberating over and designing inquiry processes.

Conducting investigations

- Seeking answers and completing fieldwork and research.

Reflection and further planning

- Analyzing data and reflecting on findings with a view to decide on and implementing new actions (review and reflect, participate and plan, research and undertake more actions.)

Table 1: General COPAR phases and processes (adapted from Parkes and Panelli, 2001).

Based on the phases and processes outlined in Table 1, COPAR can then be summarized and applied throughout the four general stages of action shown in Figure 1, from research initiation, building of partnerships, collaborative initiatives, and through to further planning and future phases of research (again, see Parkes and Panelli, 2001; after Panelli, 2001, for more detailed discussions of COPAR stages). The initiation phase consists of first scoping issues and information, then preparing for the partnership. In practice, it is important to reflect on who leads the initiation process and how this may influence the outcomes. The phase in practice often centres on discussions on a key issue or problem that the community has already highlighted. The second phase of COPAR consists of building partnerships through developing relationships, mobilizing existing resources, and starting and continuing dialogues. This phase is when communities and researchers develop a work plan and build a stronger understanding of community issues. COPAR’s third phase is formed of collaborative initiatives, where specific investigations are undertaken and plans are developed and shared, which in practice means completing fieldwork and research. The fourth phase involves further planning of future phases of participation and action, and evaluation of overall COPAR activities.
The principles of COPAR, demonstrated in Figure 2, reflect the diverse contexts within which the approach can be used (e.g., for development, health, resource management, systems-based research). The approach is undertaken in a community context, with multiple stakeholders. COPAR relies on knowledge exchanges and the use of existing resources in a way that is equitable and sustainable. Its cycles of research, reflection, and action rely on participation and the development of partnerships that are fostered over time and strengthened through the consideration of feedback, and problem solving and planning processes that are evaluated and reassessed. COPAR can present a variety of outcome types, from conceptual and social to structural and practical, depending on the project.

TOOLS FOR COPAR: PARTICIPATORY VULNERABILITY AND CAPACITY ASSESSMENTS (VCAs)

WHAT ARE PARTICIPATORY VCAs?

Participatory vulnerability and capacity assessments (VCAs) are community participatory processes that can be adapted to research needs to identify risks and capacity levels of individuals, households, and communities. Stemming from development work and often used in
disaster management, VCAs can examine physical, social, economic, and political factors to identify immediate and root levels of vulnerability and to identify ways that communities can manage current and future changes in their systems. A number of organizations have developed training packages on VCAs; those drawn upon throughout this section include Oxfam’s Participatory Capacity and Vulnerability Analysis (PCVA) training package (2009) and the International Federation of Red Cross and Red Crescent Societies (IFRC’s) VCA training modules (2004), with terminology being used according to the United Nation’s 2004 International Strategy for Disaster Reduction (ISDR).

**Vulnerability, in VCAs, is defined as a condition that reduces people’s ability to prepare for, withstand, or respond to negative changes in their systems. It is determined by physical, social, economic, and environmental factors. Capacity is defined as the resistance of a system potentially exposed to negative changes to be able to reach and maintain an acceptable level of functioning and structure. Capacity is measured relating to resilience levels, with research identifying how people cope and survive daily and during times of crisis by assessing resources that are used to prepare, prevent, and reduce risk levels.**

VCAs focus on finding ways to empower communities by having the end goal of raising community capacity levels. VCAs can be undertaken in a top-down manner, but are generally designed (and are most effective and representative) to be participatory, and in a way that stimulates discussion around the assessments and planning from findings with community members and key stakeholders.

**HOW CAN VCAs BE USED FOR ECOHEALTH?**

VCAs are useful in assessing the vulnerability and capacity levels of health of community members and their environment. Their broad consideration of the systems that communities function within suits well the cyclical and compounded risks that can influence health. We can use health as an indicator of the wellbeing of community settings, where a setting considered “healthy” would be one with a high level of resilience and capacity and low levels of vulnerability. Identifying the definitions of healthy communities can also be part of the process. VCAs are undertaken in two stages -- first an assessment, using a variety of tools depending on the research setting, and then action planning, where
assessment findings are operationalized into activities to build capacity and reduce vulnerability.

VCAs can be used for three general outcomes relating to Ecohealth:

- To understand the interdependence, at a community level, of animal, human and ecosystem health.
- To build interdisciplinary models that integrate health and sustainability, that can be used to increase community resilience.
- To collect information that can be used in future COPAR initiatives as baseline data.

The information presented in this section is meant to serve as an introduction to VCAs, as a type of COPAR methodology. Detailed information on planning and undertaking VCAs is available in Oxfam’s 2009 PCVA training pack and IFRC’s 2006 VCA training modules. Although aimed at assessing disaster risk, these resources include worksheets and templates for assessment methodologies that can be adapted for projects focusing on Ecohealth and related resources, or that can be used directly with a health impact being considered as a disaster itself (e.g., an outbreak of SARS).

WHAT ARE THE STAGES OF VCAs?

The first stage of a VCA, the assessment stage, examines three categories of community resources:

- Physical/material (including bio-physical, built resources, and economic resources).
- Social/organizational (including governance structures, justice and rights).
- Motivational/attitudinal (including culture).

Examples of these resources are illustrated in Table 2. Each type of resource has a direct or indirect influence on other resources, including levels of health.
### Categories of Analysis

<table>
<thead>
<tr>
<th>Physical / Material</th>
<th>Social / Organizational</th>
<th>Motivational / Attitudinal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location and type of housing/building materials</td>
<td>Family structures (weak/strong)</td>
<td>Attitude towards change, awareness</td>
</tr>
<tr>
<td>Land, water, animals, capital, other means of production (access and control)</td>
<td>Leadership qualities and structures</td>
<td>Sense of ability to affect their world</td>
</tr>
<tr>
<td>Infrastructure and services</td>
<td>Legislation, administrative structures and institutional arrangements</td>
<td>Initiative</td>
</tr>
<tr>
<td>Human capital</td>
<td>Decision-making structures and participation levels</td>
<td>Faith, determination</td>
</tr>
<tr>
<td>Environment factors</td>
<td>Divisions and conflicts</td>
<td>Religious beliefs, ideology</td>
</tr>
<tr>
<td></td>
<td>Degree of justice, equality, access</td>
<td>Dependent/independent (self-reliant)</td>
</tr>
<tr>
<td></td>
<td>Community organizations</td>
<td>Cohesiveness, unity, solidarity, cooperation</td>
</tr>
<tr>
<td></td>
<td>Isolation or connectedness</td>
<td>Orientation towards past, present, future</td>
</tr>
</tbody>
</table>

Table 2: VCA categories of analysis (content adapted from Turvill and De Dios, 2009; IFRC, 2006).

To conduct VCA assessments, a variety of tools and information sources can be used. Baseline data on resource levels can be found in existing community data and historical profiles. New sources of information can be found through semi-structured interviews and focus group discussions with communities, which also contributes to raising community awareness about potential risks and increases community ownership over developed projects. Assessments can also include tools of direct observation, transect walks, and mapping. Information on how to undertake these assessments and templates for these activities are available in Oxfam’s PCVA training pack and IFRC’s VCA resource modules. Table 3 presents a VCA analysis matrix that can be used to organize and assess research findings relating to the categories of analysis presented in Table 2.
<table>
<thead>
<tr>
<th>VCA ANALYSIS MATRIX</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical / Material</strong></td>
</tr>
<tr>
<td><strong>VULNERABILITY</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>CAPACITY</strong></td>
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</tr>
</tbody>
</table>

Table 3. VCA findings analysis matrix.

The second stage of VCAs involves action planning based on assessment findings. Action planning can design project activities around four areas of capacity building:

- **Elements at risk:** Protect/raise capacity of elements at risk.
- **Root causes:** Work to include root causes of risk in planning and development activities to mitigate/prevent their effects.
- **Dynamic pressures:** Release pressures on communities through capacity building and empowerment.
- **Existing negative pressures and “unhealthy” conditions:** Identify ways to manage pressures and raise health of community resources (natural and human systems).
This Module provides guidelines for the participatory methods that can be used for different types of intervention in the community. However it does not provide a comprehensive overview and additional training and practice is recommended for those who will be actively using participatory methodologies. The module does require instructors to refer to other documents that provide detailed step-by-step practical instructions on how to use specific participatory tools: please refer to module references.

Activities

**Activity 1**

**Learning Goal 1:** Understand the principles of qualitative and participatory approaches including their advantages and disadvantages, and how these approaches can be used for research and development activities.

**INSTRUCTIONS**

1. Provide an introduction to the module and its objectives. If participants are not familiar with each other, run an interactive activity to introduce themselves and their backgrounds, including any experience they may have with participatory approaches. This exercise could model a PRA activity. It could simple buzz groups, or could include making a Venn diagram of the linkages between participants, drawing a resource map of the training area and people and resources in it, or drawing a social map of people’s backgrounds/disciplines. Refer also to Module 1.

2. Facilitators can refer to the Background Information section of this module to present the definition of participatory methods, their principles and relevance for research and development work by cross-referencing to topics covered in Module 2. At this time the trainer need not describe participatory methods in detail, instead encourage participants to discover the meaning of participation throughout the module. Participants should be frequently reminded about the importance their
attitude and behaviour plays in allowing successful participatory processes. Refer to the Handout “Participation K Borin” for an example of a presentation.

3. Engage the class in small group discussions or a class brainstorm about what qualitative research means and how it differs from quantitative research – see Handout P1, for example. (Refer to Newman and Benz, 1998; Fife Council, 2002; Creswell, 2003).

4. Two tables can be prepared:
   i. The first table is labelled “Examples of qualitative (column 1) and quantitative (column 2) approaches.” Consider surveys / questionnaires, biometric data collection, direct observation, consultation meetings, etc.
   ii. The second table is labelled “Characteristics, advantages and disadvantages of qualitative and quantitative approaches.” Consider issues like sample size, depth of understanding, power dynamics (who controls the questions and the research method), stage of research, etc.

5. The Handout “About Participatory Rural Appraisal (PRA)” can be distributed to participants if considered necessary.

ALTERNATIVE ACTIVITY

(if students have experience working with communities)

Some important questions to ask students in the class: which tools or techniques have you used in development and research work with communities? What has been the reaction from community when the project started and ended? What types of villagers benefited from your project? What were the opinions, comments, suggestions, and recommendations of villagers about the result of your project? Do you expect that the villagers could use the result of your project in the future?

Sample papers:

• Mason Shannon, McNulty Judiann, and Aubel Judi. Participation for Empowerment. 

• Axner Marya, Edited by Bill Berkowitz and Phil Rabinowitz. Developing facilitation skill. In Chapter 16. Group Facilitation and Problem-Solving: 
  http://ctb.ku.edu/en/tablecontents/sub_section_main_1154.aspx

---

**Activity 2**

*Learning Goal 2: Know how to apply participatory methods as a way of finding out about community livelihoods, needs, and aspirations as part of an Ecohealth framework.*

---

**INSTRUCTIONS**

1. Introduce participatory tools and techniques as examples of tools that generate broader or general information and those that generate more specific information. Facilitators can choose to focus on PRA or on COPAR tools (see Background Information). The instructions here assume a focus on PRA, but can equally be adapted to working with COPAR tools if students are already familiar with PRA approaches. Remember that each tool has its own potential to collect specific information, but there are techniques that apply to many tools, such as facilitation, mediation, dialogue, semi-structure interview, etc.

The following tools could be presented as examples of PRA techniques with which students should become familiar:

- Area / resource map
- Seasonal activity calendar
- Timeline
- Transect walk
- Scoring exercise
Please refer to the FAO references, the handouts, and Participatory Rural Appraisal, PRA by Khieu Borin (2001) for more details.

2. Once students are familiar with the participatory techniques, organize the students into small groups. Each group will carry out a role play to simulate one type of PRA technique. In each group, some students will be the interviewers/facilitators, and some will be the participants/interviewees.

**Option 1:**

Provide the students with a case study that will allow them to contextualize their role play. They should imagine they are using participatory techniques at the early stage of research to identify the core issues of community concern. One or two group members can act as facilitator for each group, and the rest will participate in the exercise.

Refer to a case study from one of the companion texts: Ecohealth research in Practice (Charron, 2011) or Ecohealth: A Primer (Waltner-Toews, 2011). Topics for the role plays could be drawn from one of the case studies used in the other modules, such as the Dengue case study from Module 4: Using Systems Concepts in Ecohealth.

**Option 2:**

Alternatively, the trainer can give instructions to the whole class and each group does the activity as participants. In this option, students should use real-life experience rather than a role play. For example, to do a community map they should do a map of their area (either where they live individually, or of the site where they all work/study together).

Facilitators/interviewers take notes during this exercise and present back to the rest of the class, describing how the participatory activity unfolded, what they learned from being interviewers and interviewees, how they could improve their techniques for real-life situations, and how this might be relevant for their Ecohealth work. See Recoup manual handout “Reflexivity” (Singal and Jefferey, 2008). If you have time, ask some of the groups to play out the role play in front of each other.
3. If the training venue has access to practical exercise, facilitators organize students in groups to test the tools they learn in the class. For example, they could practise these techniques on other students.

ALTERNATIVE ACTIVITY

Keep asking students about their attitudes and behaviour when doing field work. They can note these in their learning journals. How do these change as they gain more practice using these tools. How is it different being a facilitator compared to being a participant of a PRA exercise? (See Recoup manual handout “Reflexivity” (Singal and Jefferey, 2008).)

ADDITIONAL REFERENCES

Training module on PRA tools: in Part III - Training modules for training of trainers on participatory local development
http://www.fao.org/docrep/006/ad346e/ad346e0f.htm


Activity 3

Learning Goal 3: Organize participatory data and information analysis, synthesis, and present feedback to key informants and community members.

INSTRUCTIONS

1. Begin by delivering a short lecture on how to synthesize and analyze qualitative data. References are given in this module. Provide the class with examples of a few key methods, such as story-based methods, coding, and summarizing, and the use of triangulation.

2. The next exercise uses the data gathered during classroom PRA exercises, and, if time has allowed, from the field exercises.

3. Organize students in groups to work on their data and consider how they would analyze and present the data. It may be best to combine students from the earlier groups so they can bring the results from their different exercises together and consider how to combine these different types of information.

4. Identify the group leaders, note takers and presenters for presenting the results to the plenary session. In the feedback session encourage students to formulate problem statements that take into account different viewpoints around the issues.

5. Encourage students to discuss the importance of community participation in the analysis and interpretation of the data. They should be reminded that the outcomes of the field exercise with findings and recommendations are for both beneficiaries and the research team.

EXAMPLES


6. Close the session by eliciting reflections from the class on key learnings. If more time is available, a second day can be used for a field visit that includes participatory techniques. An evaluation of the module can be done using participatory techniques such as scoring/ranking. Students and trainer can write in their learning journals.

**SAMPLE TIMETABLE FOR MODULE 3 ACTIVITIES**

**PARTICIPATORY RESEARCH**

<table>
<thead>
<tr>
<th>Time</th>
<th>Intense short course (1 day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00-08:30</td>
<td>Introduction to the module and class introductions.</td>
</tr>
<tr>
<td>08:30-09:00</td>
<td><strong>Learning goal 1</strong></td>
</tr>
<tr>
<td></td>
<td>• Introductory lecture</td>
</tr>
<tr>
<td></td>
<td>• Principles of qualitative and participatory research in relation to the conventional research/survey.</td>
</tr>
<tr>
<td>09:00-09:20</td>
<td>Lecture/discussion: Why is participation important in development?</td>
</tr>
<tr>
<td>09:20-09:30</td>
<td>Break</td>
</tr>
<tr>
<td>09:30-12:00</td>
<td><strong>Learning goal 2</strong></td>
</tr>
<tr>
<td></td>
<td>• Introduction to participatory tools and techniques with group work</td>
</tr>
<tr>
<td></td>
<td>a) Area / resource map</td>
</tr>
<tr>
<td></td>
<td>b) Seasonal activity calendar</td>
</tr>
<tr>
<td></td>
<td>c) Timeline</td>
</tr>
<tr>
<td></td>
<td>d) Transect walk</td>
</tr>
<tr>
<td></td>
<td>e) Scoring exercise</td>
</tr>
<tr>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>13:00-14:30</td>
<td><strong>Learning goal 3</strong></td>
</tr>
<tr>
<td></td>
<td>Organization, synthesis, and presentation of data.</td>
</tr>
<tr>
<td>14:30-15:00</td>
<td>Wrap up and evaluation</td>
</tr>
</tbody>
</table>
Evaluation

Refer to Modules 1 and 2.

Terminology

**Beneficiaries**
Beneficiaries can be people who are directly and indirectly affected by the intervention; they could be farmers (better off and poor or disadvantaged), local authorities (village head and commune council), local organizations (youth, women, and religious groups). They actively engage in the outcomes of the development programs and projects and gain personal growth.

**Capacity**
Capacity is the resistance of a system potentially exposed to negative changes to be able to reach and maintain an acceptable level of functioning and structure. Definition as used in Community-Oriented Participatory Action Research (COPAR).

**COPAR**
Community-Oriented Participatory Action Research.

**Facilitator**
The facilitator is a person with the ability to create and brainstorm the discussion and meetings to the agreeable outputs; not limited to researchers, but community members can also take this role.

**Empowerment**
People are encouraged to take responsibility for tasks within their specialty, but should also encourage others to be involved to promote mutual learning and benefit.

**Outsider**
Outsiders are considered to be people who are not the residents of the intervention areas but involved in the intervention. It can be researchers, development workers, donors, etc.

**Participation**
Participation is the continuous process of people being involved in the development or intervention. Participation can take different forms, ranging from information sharing and consultation methods to
mechanisms for collaboration and empowerment that give stakeholders more influence and control of the development process.

PRA
Participatory Rural Appraisal.

Vulnerability
Vulnerability, in VCAs, is defined as a condition that reduces people’s ability to prepare for, withstand, or respond to negative changes in their systems. It is determined by physical, social, economic, and environmental factors.

Key References

Participatory Environmental Planning and Management (2001). Available at: https://www.vetswithoutborders.ca/index.php/what-we-do/asia/ecohealth

Training module on PRA tools: in Part III - Training modules for training of trainers on participatory local development
http://www.fao.org/docrep/006/ad346e/ad346e0f.htm


Additional References


FAO. The role and nutritional value of aquatic resources in the livelihoods of rural people: A participatory assessment in Attapeu Province, Lao PDR. http://www.fao.org/docrep/004/ad454e/ad454e05.htm


Training module on PRA tools: in Part III - Training modules for training of trainers on participatory local development http://www.fao.org/docrep/006/ad346e/ad346e0f.htm


Khieu Borin, Erin Michelle Smith, Sonia Fèvre, co-authors
### Examples of Research Approaches

<table>
<thead>
<tr>
<th>Qualitative</th>
<th>Quantitative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

### Characteristics, Advantages, and Disadvantages of Research Approaches

<table>
<thead>
<tr>
<th>Qualitative</th>
<th>Quantitative</th>
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</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
**MODULE 3 – HANDOUT 2 – ACTIVITY 2**

**Village Resource Map**

*(FOR LEARNING GOAL 2) (VWB/VSF 2009)*

<table>
<thead>
<tr>
<th>Description:</th>
<th>The Village Resource Map is a tool that helps us to learn about a community and its resource base. The primary concern is not to develop an accurate map but to get useful information about local perceptions of resources. The participants should develop the content of the map according to what is important to them.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives:</td>
<td>To learn the villagers' perception of the natural resources found in the community and how they are used.</td>
</tr>
<tr>
<td>With whom:</td>
<td>Female and male focus groups</td>
</tr>
<tr>
<td>Time needed:</td>
<td>2 hours</td>
</tr>
</tbody>
</table>

**KEY QUESTIONS**

1. What resources are abundant?
2. What resources are scarce?
3. Does everyone have equal access to land?
4. Do women have access to land?
5. Do the poor have access to land?
6. Who makes decision on land allocation?
7. Where do people go to collect water?
8. Who collects water?
9. Where do people go to collect firewood?
10. Who collects firewood?
11. Where do people graze livestock?
12. What kind of development activities do you carry out as a whole community? Where?
13. Which resource do you have the most problem with?
HOW TO FACILITATE

The Village Resource Map is a good tool to begin with. It is easy and fun for the villagers to do. It helps initiate discussion within the community and with the PRA team. All team members should observe the mapping exercise because it provides an overall orientation to the features of the community and its resources.

In our PRA, we would like to do this map with separate groups of men and women in the village. This is because women and men may use different resources. The women will map the resources they think are important (like water sources, firewood sources, etc.). The men will map the resources they think are important (like grazing land, infrastructure, etc.). Maps may include: infrastructure (roads, houses, buildings, bridges, etc.); water sites and sources; agricultural lands (crop varieties and locations); soils, slopes, elevations; forest lands; grazing areas; shops, markets; health clinics, schools, churches; special places (sacred sites, cemeteries, bus stops, shrines, etc.)

1. Find a large open place to work.
2. Start by placing a rock or leaf to represent a central and important landmark.
3. Ask the participants to draw the boundaries of the locality or village.
4. Ask the participants to draw other things on the map that are important. Don’t interrupt the participants unless they stop drawing.
5. Once they stop, you can ask whether there is anything else of importance that should be added.
6. When the map is completed, facilitators should ask the participants to describe it. Ask questions about anything that is unclear.

Use the key questions to guide a discussion about resources in the village. One or more facilitators should ask the questions, another should take notes on what is said.

Be sure to draw a picture of the map on a piece of paper. Be sure that the final map includes direction indicators (north, south, east, west).
MATERIALS

Sticks, pebbles, leaves, sawdust, flour, dung, or any other local material.
Module 3 – Handout 3 – Activity 2

Seasonal Calendar

(For Learning Goal 2) (VWB/VSF 2009)

<table>
<thead>
<tr>
<th>Type of group:</th>
<th>Mixed group for women and men.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>A seasonal calendar is a participatory tool to explore seasonal changes (e.g., gender-specific workload, diseases, income, expenditure, etc.).</td>
</tr>
<tr>
<td>Objectives:</td>
<td>To learn about changes in livelihoods over the year and to show the seasonality of agricultural and non-agricultural workload, food availability, human diseases, gender-specific income and expenditure, water, forage, credit, and holidays.</td>
</tr>
</tbody>
</table>

Key Questions

1. What are the busiest months of the year?
2. At what time of the year is food scarce?
3. How does income vary over the year for men and women?
4. How does expenditure vary over the year for men and women?
5. How does rainfall vary over the year?
6. How does water availability for human consumption vary over the year?
7. How does livestock forage availability vary over the year?
8. How does credit availability vary over the year?
9. When are holidays and how many days in which months?
10. When is most agricultural work carried out by women?
11. When is most agricultural work carried out by men?
12. When is most non-agricultural work carried out by women?
13. When is most non-agricultural work carried out by men?
14. Which could be the most appropriate season for additional activities for men and women? What time constraints do exist and for what reasons?
HOW TO FACILITATE

1. Find a large open space for the group. The calendar can be drawn on the ground or very big sheets of paper.

2. Ask the participants to draw a matrix, indicating each month along one axis by a symbol.

3. It is usually easiest to start the calendar by asking about rainfall patterns. Choose a symbol for rain and put/draw it next to the column that participants will now use to illustrate the rainfall. Ask the group to put stones under each month of the calendar to represent relative amounts of rainfall (more stones meaning more rainfall).

4. Move to the next topic and ask people during which months the food is usually scarce. Discuss the reasons why it is scarce and make sure that the different kinds of food donations that people receive are discussed and that this information is shown in the map.

5. Go on like this, topic by topic. After finishing all the columns your matrix should have covered the following 14 topics:

   (1) Rainfall
   (2) Food scarcity (many stones means less food available, indicate during which time people receive food donations; e.g., food for work).
   (3) Income (cask and kind) for women.
   (4) Income (cash and kind) for men.
   (5) Expenditure for men.
   (6) Expenditure for women?
   (7) Water availability for human consumption.
   (8) Livestock forage availability.
   (9) Credit availability.
   (10) Number of holiday days.
   (11) Agricultural work load for women.
   (12) Agricultural work load for men.
   (13) Non-agricultural work load for women.
   (14) Non-agricultural work load for women.

7. After the calendar is finished ask the group which linkages they see among the different topics of the calendar. Encourage the group to discuss what they see on the calendar.

8. Make sure that your copy of the seasonal calendar has a key explaining the different items and symbols used on the map.
MATERIAL NEEDED

Documentation sheet, this handout, white paper for copying the seasonal calendar.

1. If drawing on the ground: soft ground, stones, sticks, and other available material to produce symbols, or
2. If drawing on paper: a large sheet of paper, pencils, markers.
MODULE 3 – HANDOUT 4 – ACTIVITY 2

Time Line

(FOR LEARNING GOAL 2) (VWB/VSF 2009)

- A record of events in the past and present
- A vision of what the future should or could be like
  e.g., types of crops growing, number of people in village trained, etc.

PAST

| School built 1985 |
| Maize project started |

NOW

| Start micro-credit group |
| Create goat-buying cooperative |

FUTURE
Module 3 – Handout 5 – Activity 3

About Participatory Rural Appraisal (PRA)

The history of using participatory methods began in the late 1970s with the introduction of a new research approach called Rapid Rural Appraisal (RRA), which immediately became popular with decision-makers in development agencies. Building on close collaboration with local populations, RRAs were designed to collect first-hand data from local people about their perceptions of their local environments and living conditions in rural areas. A limitation of an RRA, however, was that it was extractive; the role of the local people was limited to providing information, while the power of decision-making about the use of this information remained in the hands of others.

Later a new terminology of Participatory Rural Appraisal (PRA) was developed to increase local people’s involvement in the development process, leading to a sound "ownership." It built up rural people’s own capacities for analyzing their circumstances of living, their potentials, and their problems for the decision on changes, while PRA facilitators accepted more and more the role of learners. This interactive mutual learning of both local people and PRA facilitators becomes the means for more sustainable development. One of the most important principles in PRA is the sharing analysis results, decisions, and planning efforts among the community members by open and public fora. PRA strongly supports and facilitates the introduction of more demand-responsive ways of managing development interaction, and process-oriented thinking.

Rural people have developed ability and skill to survive in coping with the changes of the environment and the available natural resources. Natural resources such as soil, water, forests, livestock, wildlife, river systems, etc., are closely linked to rural livelihoods. Methods in PRA help both researchers/facilitators and local people incorporate "participation" to achieve the development goal. These methods are used not just to enable the voice of local people — especially those who are marginalized — to be heard, but also to encourage all stakeholders to make their own analysis of their conditions.

It is important to stress that development strategies do not depend only on monetary assistance, credit, materials, and technology; development
depends on the thinking and perception of the members of the community. Development that pushes people to accept what they do not choose for themselves, leads to problems. The active participation of local people starts with identifying the real needs and searching for a suitable strategy to meet those needs.

Participatory methods and techniques tend not to follow a blueprint or standardized procedure. They are used creatively and generatively, often in combination with other tools. The methods used are often considered less important than the attitudes and beliefs of those carrying out the investigation.

The prosperity of a nation depends not so much on its monetary policy as on the expectations of its people.

Prof. Robert Lucas, Nobel prize in Economics
Data Collection

There is a need to understand and appreciate traditional management systems, livelihood systems, indigenous technologies, and the ways and reasons why people feel, see, think, and act in rural areas. Researchers need to take into account certain key features:

Figure: 3 Key features of data collection in PRA
Using systems concepts in Ecohealth
MODULE 4 – USING SYSTEMS CONCEPTS IN ECOHEALTH

Synopsis

Systems thinking is one of the six core principles of Ecohealth, and this module explores what it means in practice. Module 2: Introduction to Ecohealth introduced the idea that health, however it is defined, is the result of a complex set of social and ecological interactions. In that module we suggested that in some cases, the solutions to some problems might result in new problems. For example, certain ways of responding to malaria (draining swamps, use of certain pesticides) might reduce malaria transmission, but they might also increase food insecurity and create habitats for new diseases to emerge. Certain ways of responding to food insecurity (increasing prices) might improve farmers’ incomes, but also make it more difficult for urban consumers to afford that food. Such consequences are properties of systems, components, and processes that interact in uncertain and complex ways, and they create complex, messy problems often called “wicked” problems by social planners. In this module, the terms wicked problems and complex problems will be used interchangeably. Strategies and options to deal with them can be clarified if we have a better understanding of systems concepts, particularly those having to do with interrelationships, perspectives, and boundaries. This module will help students translate systems concepts from theory into the context of Ecohealth research.

In the face of complexity, an Ecohealth researcher has to deal with a range of difficult decisions: how broad should the research be, whose interests should be considered, how can the different ways of understanding the world be resolved, and how do things happen in complicated situations. In brief, how does the research handle complex interrelationships, divergent perspectives, and choices of where and how to place boundaries around the research in a fair and equitable way?
Introduction to Topic

Systems ideas can be traced back many thousands of years, but the modern systems movement traces its lineage to the middle of the twentieth century, starting in the 1930s and accelerated during the Second World War. The task that confronted planners and strategists was how to consider the implications for action of highly complicated, fast changing situations on the basis of limited information. In the past 50 years or so the field has expanded to encompass a wide range of methodologies, methods, and techniques. The language of systems has been incorporated into everyday speech and in many ideas that inform both the social and physical sciences. Despite this, the real power of systems approaches have not in general flowed into those activities that seek to address some of humanities more significant challenges.

This module is about how using ideas from the systems field can help you be more effective and productive in your Ecohealth activities – that is, the systems part of the ecosystems approaches to health. Systems ideas can
help reshape the way you understand and address complex problems – and provide new routes through to innovative solutions.

This module identifies and describes some key aspects of systemic inquiry and provides some easy to use but powerful tools that you can use in your work.

Module Aims

- Explain three core concepts in systemic inquiry: interrelationships, perspectives, and boundaries.
- Identify a dozen key questions that a systemic inquiry poses and link them to the process of research design.
- Explain that a systemic inquiry is more than observing how things interact with each other and depends on the mental models that people bring to a situation.

Why Is This Topic Important?

Systems thinking is one of the six core principles of Ecohealth as described by the IDRC and this module explores what that means in practice. Understanding and applying systems ideas will help provide students with tools to approach complex health problems. Understanding that complex systems are uncertain underlies another imperative, that being the adoption of a rigorous investigation: to develop research frameworks that take into account that complexity. It is particularly helpful for students of different disciplines to be taught this module together.

Key Concepts

KEY CONCEPT FOR THIS MODULE

This module uses three key systems concepts (interrelationships, perspectives, and boundaries) and asks questions about how they apply to Ecohealth research design.
Guiding Questions

1. What is the structure of the interrelationships within the situation of interest (i.e., how are the components arranged)?

2. What are the processes between components of that structure?

3. What is the nature of the interrelationships (e.g., strong, weak, fast, slow, conflicted, collaborative, direct, indirect)?

4. What are the patterns that emerge from these interrelationships over time, with what consequences and for whom?

5. Who or what are the key stakeholders and stakes within the situation?

6. What are the different ways in which you can understand or frame the situation?

7. Which interrelationships are privileged and which are marginalized? With what effect on whom?

8. Which perspectives (i.e., stakeholders, stakes, framings) are privileged and which are marginalized? With what effect on whom?

9. Boundaries – given that our understanding of any situation and our ability to respond has limits, how do we decide what should be included and excluded from our inquiry and response?

10. What does it mean to conduct Ecohealth research in a way that uses systems principles and ideas?

11. How can you manage the ethical, political, and practical consequences of these decisions, especially those that cause harm or have the potential to cause harm because they exclude an interrelationship or perspective?

12. How are these different framings going to affect the way in which stakeholders act or expect and thus need to be considered?
Basic Student Learning Objectives

After completing this module, the learners will be able to:

- Understand three key aspects of systemic inquiry: interrelationships, perspectives, and boundaries.
- Learn to use systems ideas to understand Ecohealth research design.

Advanced Student Learning Objectives

Advanced learners will be able to:

- Explain why research design is part of understanding complex and uncertain systems.

Practical Notes

- This module is centred on the design of a research project. However, it is important to stress (especially toward the end) that systems ideas can be used throughout an Ecohealth initiative.

- The module uses technical “systems” language. All fields have jargon – shorthand that allows members to communicate. One of the consequences of transdisciplinary working is the necessity to respect, learn, and use the jargon of many fields. The glossary at the end of this module explains the main technical words and phrases commonly used in the systems field. Participants should be encouraged to consult this glossary.

- There are no prerequisites for participants, although the proposed Dengue case study uses some technical language and may need to be explained to participants who have no background in biological sciences.

- The activities proposed can be carried out through individual study or within groups, but it is better and more consistent with the principles of Ecohealth teaching and systemic inquiry that this module be undertaken in a group setting.

- No special resources are required other than those outlined in the manual introduction.
The module will take approximately a half day at minimum, or a 3- or 4-hour session. It can be delivered as one entire session or divided into two separate sessions.

The lessons from this module should be applied and integrated to other training activities as soon as possible.

Links to Other Modules

This module is related to all other modules. It will be particularly relevant to teach before the applied Module 6: Disease Ecology and Module 7: Agriculture and Health.

Background Information

Three core concepts for systems thinking: interrelationships, perspectives and boundaries.

- Understanding complex causality; feedback; vicious and virtuous circles; and the possible consequences of intervention
- Addressing conflict; exploring multiple perspectives; developing mutual understanding; and agreeing on solutions that people are willing to implement
- Exploring value and boundary judgements about what should be included in or excluded from analysis, and whose views should count

After Midgley 2012
Activities

Before the exercise, participants should have read the case study on Dengue Fever (Handout 1) supplied at the end of this module. Ideally participants should read it before the course, but if not then make sure they read it before the start of the session. It will take five or ten minutes to read.

The aims and objectives below are just indicators of what the module will cover. It is intended as an introduction to participants. Don’t feel you have to explain this “cold.” The warmup exercise does it more gently.

Activity 1

Learning Goal 1: Warm up.

INSTRUCTIONS

This module uses a case study on Dengue Fever. However at this stage, do not circulate the case yet, just introduce the idea of a dengue issue. This Warm Up activity allows you to gently introduce the ideas in the case study.

INSTRUCTIONS FOR STUDENTS

You have been asked to participate in some applied research on controlling outbreaks of Dengue Fever in urban areas of Thailand. Dengue fever is a virus-caused disease that is spread by mosquitoes. What kinds of issues would you need to consider and negotiate when designing, carrying out and analysing this research?

This task can be structured in various ways, depending on the group and its size.
Here are two possibilities:

**OPTION ONE:**
Ask participants to consider for a moment what might be involved, and to form a “buzz group” with the person sitting next to them to discuss for 2 minutes. Then, one at a time, ask each participant or pair to suggest one thing. Write the responses on a flip chart or whiteboard. If a participant’s idea is already displayed ask them for another. If they don’t have one, move to the next participant. Continue until all ideas are exhausted.

**OPTION TWO:**
Circulate sticky notes to participants. Ask them to write clearly a word or phrase or an activity that describes what is involved. Participants are then invited to post the Post-Its on a wall.

Don't give participants too much time to think about this, and stop before the energy in the room dissipates.

**SOME THINGS TO GET YOU THINKING ABOUT SYSTEMS THINKING**

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**Activity 2**

*Learning Goal 2: Reading Activity.*

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**INSTRUCTIONS**

The short essay, *Handout 2: Three Core Concepts*, should be circulated to participants, who are given 15 minutes to read it.

Participants may ask questions about particular words and phrases. You can print out copies of particular words and phrases from the glossary – words contained in the glossary are highlighted in bold in the handout.
Activity 3

*Learning Goal 3: Reflection.*

**INSTRUCTIONS**

Having read the document, the next task is for participants to group their previously posted ideas into the three components of thinking systemically: interrelationships, perspectives, and boundaries. How this is done will depend on which Option was chosen, but it is a collective activity. Facilitators should listen and note carefully any important comments or disagreements.

It is important that participants understand that they can allocate an item to more than one category.

Commonly the “interrelationships” category has more items than the other two; so participants should be encouraged, once the categorisation has finished, to add any further items to the three categories.

Once this exercise is complete, there should be a reasonable period of reflection. This process is best done in small groups, but can also be done individually at first and then moving to small groups or the entire group, depending on numbers, time, and group dynamics.

**INSTRUCTIONS FOR STUDENTS**

Think back to the previous exercise where you were asked about particular aspects of work on Dengue Fever. Where would you place aspects in terms of the three systems dimensions and why? Don't worry if you can place them in more than one, but think of the difference between each option.

- Interrelationships
- Perspectives
- Boundaries
APPLYING SYSTEMS IDEAS TO ECOHEALTH RESEARCH

This is a good place to split the module if you are doing two separate classes on systems. This activity is best explored in small groups (max 6 to 8) with larger group plenaries.

At this point, introduce the case study on Dengue Fever and ask participants to read it. For the remainder of this module, participants will be working on this case. The case is short and may not contain all the necessary information; additional information could be provided by the instructor.

Some participants may feel frustrated that the case study does not provide sufficient detail. Explain to these participants that the case is provided for learning purposes, and that part of the research design process will always be an exploration of what is already known and what is not yet known about an issue. Participants will be expected to supply some information as part of the process, or suggest that information needs to be found. However, if you feel that participants' learning is being hampered by a lack of some information do not hesitate to make something up.

The following process focuses on the very early stages of a research design – long before decisions are made about specific methodologies, methods, or techniques. Indeed it is this process and analysis that helps decide specific methodologies, methods, or techniques. Some participants may not be familiar with this stage of a research design process – and have only experience of selecting methods. If that is so, then some guidance may be necessary.

Although this process focuses on research design, encourage participants to think about the relevance to other aspects of Ecohealth research, such as the fieldwork, research management, data analysis, and reporting. An exercise at the end of this module promotes this further.
The process of research design has two phases. The first phase is to deliberate on the problem, situation, or issue that you are interested in. The second phase is to identify the methods and techniques necessary to undertake the research. The process that follows is focused on the first stage, because that is where the key interrelationship, perspectives, and boundary decisions are made.

However, you can use systems approaches in any part of the research—design, fieldwork, analysis, and reporting.

This process takes the ideas of interrelationships, perspectives, and boundaries, including the 12 systemic questions and reorders them in a way that can be used to undertake this first phase of a research design.

The process involves four steps:

- Step 1: Construct a “rich picture” of the situation of interest
- Step 2: Frame the situation
- Step 3: Consider the ethical and pragmatic consequences of these framings
- Step 4: Assess the dynamics of the situation.

It is a generic process that needs to be and should be adapted to match particular situations. Don’t feel you have to pose exactly the questions that are listed here, or exactly the way they are worded, but do make sure that the principle underpins whatever questions you ask.

**STEP 1: CONSTRUCT A “RICH PICTURE” OF THE SITUATION OF INTEREST**

*See Handout 3 for instructions.*

For this exercise, students will need a large sheet of paper, some felt-tipped pens, and Post-It notes. Note that drawing a rich picture is usually a group exercise, and sometimes stretches over a period of a whole workshop or course, as people think of more things to add. Although the pictures will appear messy and sometimes simplistic, they form a basis for more sophisticated and locally rooted understanding of a situation. In some cases, rich pictures have been used as the basis for developing GIS computer simulation models (see Bunch, 2001; Bunch et al., 2008).
See Module 1. During the exercise, have the groups reflect not just on the content, but on who drew what, and if there were gender, cultural, or occupational differences in what is depicted.

Allow some time for reflection at the end and get people to compare results. See if you can get people to reflect on whether their “rich picture” reflects a limited number of perspectives. Ask what boundary choices have been made in drawing the picture and what the consequences might be.

**STEP 2: FRAME THE SITUATION**

See Handout 4 for instructions.

Participants may have some difficulty working out the difference between a perspective and a framing. The easiest way to distinguish is that people have perspectives but problems and issues are “framed” by defining what they are. Framings are often a complex combination of different perspectives. So there will be lots of perspectives on dengue fever, but you could frame it as a social issue, an economic issue, a health issue, an issue of poverty or overcrowding. Each step involves value-based decisions. For instance, two people may both frame an issue economically (a decision on what they value generally); but one may favour the perspective of small farmers and the other of urban consumers.

- Think back to Module 1. Ask the groups to reflect on how perspectives and framings were, or were not, included in that module.

- Allow people to have a good break after this session, because Step 3 is a big challenge.

**STEP 3: CONSIDER THE ETHICAL AND PRAGMATIC CONSEQUENCES OF THESE FRAMINGS**

See Handout 5 for instructions.

It is probably a good idea to break the group into smaller subgroups, each one working on a different framing. This is why starting with a large group first is a good idea.

Participants may find the next set of tasks difficult. In particular, people in the “caring” professions find difficult the idea that someone or something “ought” to be harmed or marginalized – or that they have some ethical
responsibility to explore harm mitigation even to those whom they really wish to be marginalized; indeed this process will likely draw on different moral judgments, not just harm mitigation.

Perhaps even more difficult for some is the realisation that all their actions are driven by values, even though it might appear to them to be derived from an objective “truth.” The best advice is to keep repeating that every endeavour, including this research, has to set boundaries, and part of systems practice is to set them ethically – which involves being concerned with the consequences.

- Instruct students to select one of the framings that emerged during the last session. Ensure that a wide variety of different framings are selected among the groups in your session.

- Ask the students to consider a number of different perspectives. Within that, you may consider a few differing perspectives, such as
  - What purpose ought the research to serve?
  - Who ought to be the prime beneficiaries of that purpose?

- Now ask the students to return to their rich picture. They should think and state clearly what their values and assumptions are with regards to:
  - Who should be involved in the research, what resources (money, skills, time, people) ought to be available to the research, and who ought to control those resources? Who ought not to control those resources? What is the consequence for whom of those decisions?
  - What sources of knowledge and expertise ought to be respected and what sources of knowledge and expertise ought to be ignored? What is the consequence for whom of those decisions?
  - How ought they to manage the ethical and practical consequences of these boundary choices and decisions, especially those that will disadvantage or advance certain points of view or have the potential to cause harm?
STEP 4: ASSESS THE DYNAMICS
See Handout 6 for instructions.
This step needs to be fully debriefed. In particular, you need to ensure that the participants are using the information and issues raised in Steps 2 and 3, exploring the dilemmas and contradictions that they pose, rather than just talking about things in general.

REFLECTION ON THE BROADER USE OF SYSTEMS IDEAS TO ECOHEALTH RESEARCH
This module has focused on the early stages of designing an Ecohealth research intervention.
As a whole group, discuss how systems ideas, especially the three key dimensions of interrelationships, perspectives, and boundaries could influence how you undertake these other stages of an Ecohealth research project:

- Method selection
- Fieldwork and data collection
- Analysis
- Reporting

Evaluation
Refer to the Module 2 and Module 1 for suggestions on evaluating this topic.

Terminology
Agent
A component of a situation. It could be people or things. Often the nodes of network relationships.

Boundary
Marks an important distinction between two features of a situation. It determines what is “in” or what is “out,” what's important or valid and what is unimportant or invalid, what is included and what is marginalized.
**Boundary decision**
The choice of where to place a boundary.

**Boundary critique**
The means by which you consider the implications of particular boundary decisions.

**Complex situations**
Situations whose behaviour is knowable only after the fact; uncertain and unpredictable. (Uncertainty is also a large area of study in its own right).

**Complicated situations**
Situations whose behaviour is knowable but not necessarily known, and once known is relatively predictable.

**Context**
Something that affects how a situation behaves but over which that situation has little influence or control. History is often an important aspect of context.

**Dynamic**
How agents interrelate and the consequences of those interrelationships over time.

**Feedback**
The phenomenon where an output of a process becomes the input of the same process.

**Framing**
A collection of perspectives that help you make sense of a situation in a particular way.

**Input**
Something that is changed by a process.

**Interrelationship**
Connections between components or agents within a situation.

**Marginalization**
In boundary setting, an aspect of a situation is marginalized if it is considered unimportant.

**Network**
A set of interrelationships between objects or agents.

**Object**
A component of a situation. It could be people or things, and is often the node of network relationships.

**Output**
The result of a process.
Pattern
A set of repeated behaviours.

Perspective
Values, assumptions, and viewpoints that stakeholders bring to a situation.

Problem
A situation that is of some concern or that contains issues that need resolving.

Rich picture
A graphic means of displaying key features of a situation that is unstructured and unfettered by preconceived views and ideas.

Simple situations
Situations whose behaviour is wholly known and predictable.

Situation
The set of circumstances that are of interest to us and on which we intend to apply systems concepts.

Situation or situation of interest
In systems language, a state of affairs that is of interest to you that you wish to explore further or intervene in.

Stake
Motivations, world views, and other factors that could benefit or be at risk.

Stakeholder
Someone or something that can affect or be affected by a situation or any action to address a situation.

System
Within this module “system” is used to describe an aspect of a situation that we choose to observe and describe using systems concepts.

Systemic
The process of thinking or applying ideas drawn from the systems field.

Systems field
A discipline that comprises a wide range of different methodologies, methods, and techniques.

Systems thinking
A means of understanding the world using systems concepts.

Worldview
A set of values and attitudes that influence how you engage with a situation.
Key References

Much material about systems ideas is available on the Internet. Two key sites are:

- Bob Williams' web site: http://www.bobwilliams.co.nz

Publications


Additional References

Rich Picturing


Boundaries


Case Study: Dengue Fever Prevention

Note: This case study is about a multi-agency research project in urban and peri-urban Thailand. It is based on an action research Ecohealth intervention. This description outlines only the main points of the intervention and, for the purposes of this course, does not describe the intervention itself or its outcomes. Essentially you are going to design the intervention during this session.

Aspects of the case that will emerge during the exercise are not fully covered in this description. This is done deliberately to allow you to uncover these aspects as you work through the case study.

CONTROL OF DENGUE VECTORS IN URBAN AND PERIURBAN SETTINGS IN THAILAND

BACKGROUND

Dengue Fever is considered one of the most important vector-borne diseases in Thailand and its incidence is increasing despite routine implementation of national dengue control programs. This study aimed to demonstrate application of integrated, community-centred, eco-bio-social strategies in combination with locally produced ecofriendly vector control tools within the dengue control program, focusing on urban and peri-urban settings in eastern Thailand.

Dengue has four viral serotypes (variations of virus types) and there is still no available quadrivalent vaccine (i.e., which applies to all four virus types). Control efforts in most countries, including Thailand, therefore have focused on controlling the mosquito vectors (carriers of the virus), especially *Aedes aegypti*.

With regards to ecological factors that contribute to dengue transmission, research findings have shown that the dengue virus, human host populations, and ecosystems show features of complex systems. Other investigations related to environmental and climatic factors have revealed that nutrients and temperatures could affect the growth development and survival of *Aedes* larvae, shorten the period during which the virus replicates in the mosquito’s body (extrinsic incubation period), and increase the incidence of dengue fever, while an increase of rainfall could cause a decrease of incidence.
From the initial program in the 1960s, the Ministry of Public Health of Thailand has concentrated on vector control for dengue by spraying insecticide to control adult mosquitoes and using temephos (1% abate sand granules) to control larval stages. However, despite having established intensive vector control programs and vector surveillance strategies all over the country, suppression of dengue transmission has not been fully achieved, as indicated by the number of reported cases in Thailand over the past 10 years (more than 30,000 per year). The lack of efficacy of ultra-low volume (ULV) and thermal fog application techniques has led to a reevaluation of recommended strategies for prevention and control of mosquito vectors, and strategies ranging from integrated approaches to community participation have been considered. Moreover, the consequences of intensive use of insecticides have caused insecticide resistance in many insects including mosquito vectors, and insecticide residues retained in the food chain affect many life forms, including soil bacteria and plants. For these reasons, the trend in dengue vector control has shifted away from the use of chemical-based control to biological-based control and source reduction/environmental management through community participation.

Research has shown that residential mixed with commercial and densely populated urban residential areas clearly exhibited the highest risk for dengue incidence. This suggests that dengue control programs could focus on this kind of urban ecosystem, especially during an economic crisis when there are lower budgets for such programs.

Although many research attempts have provided diverse lines of evidence about the drivers of vector abundance, virus circulation, and dengue transmission, they have not taken an integrated approach to investigating all of these factors together. Such a single-focus approach is no longer considered effective for figuring out the complexity of factors underlying the three epidemiological components. Theoretically, comprehensive dengue management requires getting an insight into the holistic disciplines that can assess the driving determinants and how they significantly interact. The need for interdisciplinary integration of ecological, biological, and socio-demographic dimensions of dengue has been recently confirmed by dengue experts in different disciplines.
ECOHEALTH RESEARCH

The intervention site in Thailand was in Chachoengsao Province, located approximately 120 km east of Bangkok. This province is representative of the geographic, social, economic, and epidemiologic situation in most of Thailand. Dengue (DHF) incidence exhibited a strong seasonal pattern in the province, with high transmission during the rainy season. The peak outbreaks of dengue were in 1987 and 2001, as in other provinces. In general, households and buildings were more tightly packed and infrastructure (connecting roads, electric service, and tap water supply) was better in urban settings as compared to peri-urban areas. In all the study areas, both tap water and rainwater were used by households, and although the piped water supply was reliable, people still stored water in various types of containers. An efficient municipal waste management system was in place.

Indoor spraying and fogging was intensively used in the high endemic area, while preventive measures were markedly applied in the low endemic area. A majority of the stakeholders involved in the dengue problem and vector control were public health service offices. Dengue control activities in this area were mainly driven by public health authorities who are directly in charge, whereas other respective stakeholders rarely participate in control programs.

The key breeding containers were found to be water storage jars, cement baths/basins, and buckets. Before intervention, 7095 containers were inspected, yielding 1231 pupae in 231 containers, and leading to the mean pupae per person index of 0.38. A considerable proportion of the respondents in low dengue transmission areas possessed sufficient overall knowledge about dengue, whereas respondents in high dengue transmission area did not.

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**MODULE 4 - HANDOUT 2 - ACTIVITY 2**

**Three Core Concepts: Interrelationships, Perspectives, and Boundaries**

Systems thinking is one of the six core principles of the Ecohealth approach (Charron, 2011). But what does it mean to conduct Ecohealth research in a way that uses systems principles and ideas? What does it mean in practice? What does it mean for the design, practice, analysis, and reporting of Ecohealth research?

What does “systemic” mean to you? What enters your mind when you read that word? Perhaps something like “looking at the big picture,” or “being aware of how things link together,” or “even seeing things from lots of viewpoints.” These are all very fine ideas, but no great help when confronted with the kind of tricky problem or messy situation that confronts you when dealing with designing and carrying out some Ecohealth work. After all the “big picture,” complicated relationships, and multiple perspectives are what made the problem or situation difficult to address in the first place.

So what does being systemic or thinking systemically mean in practice? A bit of history helps.

Systems ideas can be traced back many thousands of years, but the modern systems movement traces its lineage to the middle of the twentieth century, starting in the 1930s and accelerated during the Second World War. You can recognize three main phases since then.

From the early days until the late 1960s, the focus of the systems field was very much on interrelationships. This period represented the “wiring diagram” phase of thinking systemically and is still influential today. Indeed some of the maps in other modules (e.g., network maps, concept maps) originated during this first phase).

By the early 1970s, many people in the systems field felt that focusing entirely on interrelationships, while important, was not as useful as it appeared. For instance, the relative importance of particular interrelationships often depended on the different perspectives through which people observed a situation, usually reflecting what they have already experienced, think is most important, or value most highly. Think
briefly of the first exercise today – there are probably many perspectives represented. Thus systemic thinking began to include the implications of applying different perspectives, world views, or framings to the same situation.

However, by the mid-1980s, some systems thinkers concluded that focusing on perspectives had its problems. Perspectives influence what we consider relevant or irrelevant; they determine what is “in” our framing of a situation (the way we understand a situation) and what lies “outside” that framing. Whoever defines the dominant perspective controls the boundary of a systemic inquiry or intervention. Thus, the importance of studying boundaries and critiquing boundary decisions (including those who made them) is the third core concept underpinning a systems approach.

So let us look at each of these concepts in turn.

**INTERRELATIONSHIPS**

Many newcomers to the systems field are familiar with the idea of interrelationships. Questions of how things are connected and with what consequence stem from the earliest thinking about systems. It is also the concept most strongly embedded in the popular imagination. When we talk about the education system or the health system, we imagine a set of objects and processes that are interconnected in some way. The popularity of system dynamics and complex adaptive systems in many parts of the world cements the notion that interrelationships are an important systems concept.

However, systemic thinking doesn’t concern itself with just any interrelationships. It focuses on particular aspects of them:

- How the interrelationships affect the behaviour of a situation over a period of time (dynamic aspects).
- How the size of the output or effect of interrelationships appears unrelated to the size of the input to the interrelationship. This is often but not always caused by “feedback” (and other nonlinear aspects). The simplest example of nonlinear relationships is exponential growth patterns familiar in ecology and your bank account.
- How the same interrelationships in different contexts have different results (Sensitivity to Context). Disease control methods that work in Thailand may not work in the Philippines.
• How to understand interrelationships that are so complicated or complex that you cannot assess them in terms of simple cause and effect.

When studying interrelationships systemically we ask the first 5 of the 12 questions we will be considering:

1. What is the structure of the interrelationships within the situation (i.e., how are the components arranged)?
2. What are the processes between components of that structure?
3. What is the nature of the interrelationships (e.g., strong, weak, fast, slow, conflicted, collaborative, direct, indirect)?
4. What are the patterns that emerge from these interrelationships over time, with what consequences and for whom?
5. What are ways in which these complicated and complex dynamics can be identified and managed effectively?

PERSPECTIVES

However, a systemic approach is more than describing how things fit together or how networks operate. Just looking at interconnections does not make an inquiry or intervention systemic. What makes it systemic is how you look at the interrelationships. People will see and interpret those interrelationships in different ways depending on their perspectives. A local cafe owner might view issues to do with preventing the spread of dengue quite differently than someone from the health service, even though they may “see” the same thing.

Although it is useful to explore perspectives for getting a more comprehensive understanding of the situation, there is an even more important benefit. What a health inspector does when he or she “sees” a cafe premises will be different from what the cafe owner does when he or she “sees” the same thing. Our perceptions promote behaviours that affect the way a situation unfolds. Indeed what we see as unintended patterns within a situation often result from our unwillingness to understand or explore other people’s perceptions. We write these behaviours off as “unintended” without considering that somebody, somewhere, may indeed have intended the result that we consider a problem. Thus we cannot comprehend the dynamics of a situation without identifying and understanding the range of relevant perspectives that people bring to it.
It's helpful to distinguish between three forms of perspective: stakeholders, stakes, and framings.

Stakeholders are groups of people or things that have a common role in a situation or intervention (e.g., teachers, consumers, writers). In contrast, stakes relate to individual values and motivations (e.g., wealth, honour, fairness, past history, purpose, ideas of professionalism). People belonging to different stakeholder groups may share the same stakes, and any one stakeholder grouping will contain within it several different (perhaps conflicting) stakes.

Deliberating on the impact of different stakeholders and stakes gives us an opportunity to reframe issues; literally consider a situation from a different angle. Framing is a bit more than just listing stakeholder views, although that is often a good place to start. Framing is really trying to work out what the situation is – or could be – about. Framing is a means of identifying how people understand a situation and thus how they behave. Framing is the lens through which you (or others) view the situation or an intervention.

Some of the core principles of Ecohealth are examples of framing. In particular:

- Social equity
- Gender equity
- Transdisciplinarity
- Knowledge-to-action
- Sustainability

If you designed or looked at the result of an intervention only through a sustainability framing, you might come up with a very different design or assessment than if you used a social equity framing. These are not necessarily “right” or “wrong” framings, sometimes seeing things through a different framing helps solve a tricky problem. There's a famous story about a large manufacturing company that framed a particular situation in terms of an “industrial relations” problem (lots of disputes around ways of hiring and firing people). A consultant encouraged them instead to see the situation as a “business model” issue (controlling fluctuating demand for their products). By doing this they not only created a new set of products but solved the industrial relations problem by generating a more stable workforce that didn't need to be fired periodically.
We will explore these issues of stakeholder, stakes, and framings later in this module, but in the meantime here are the next four questions, that allow you to be systemic in terms of perspectives.

9. Who or what are the key stakeholders within the situation?
10. What are the key stakes?
11. What are the different ways in which you can understand or frame the situation?
12. How are these different framings going to affect the way in which stakeholders act or expect and thus need to be considered?

BOUNDARIES
Every endeavour has to set boundaries. That’s because a boundary differentiates between what is “in” and what is “out,” what is deemed relevant and what is irrelevant, what is important and what is unimportant, what is worthwhile and what is not, who benefits and who is disadvantaged. Boundaries are the places where values are exposed and disagreements are highlighted. A lot of power issues get wrapped up in boundaries – just as the person with the magic marker controls what goes on the whiteboard, the person who decides the boundaries exercises powerful influence on any situation.

In her introduction to Ecohealth Research in Practice, Charron discusses the important systems concept of scale. Scale can be anything that implies a particular size or focus. It can be geographical (village, country, region, global), it can be sectoral (apple growing, horticulture, agriculture, food production), it can be professional (research microbiologist, microbiologist, biologist, natural scientist). Decisions about the scale of an intervention are related to boundary decisions because something that might be seen as “valuable” at one scale (e.g., the use of pesticides may benefit particular crops but devastate biological diversity), may seem different at another scale.

Setting boundaries is not optional. You cannot do everything, consider everything, see everything, record everything. Treating boundaries systemically means that you set boundaries consciously and consider the implications.

But why bother?
From an ethical point of view, you hold certain values and those values reflect your ethical stance on things. If you believe that women should have an equal voice on preventing Dengue Fever, then you will want your intervention to ensure that their voices are enabled and acknowledged.

From a pragmatic point of view, those who are marginalized (or those who represent marginalized interests) are not likely to take things lying down. Some people may not like the efforts to include women’s ideas and may oppose your intervention and hinder its execution. You need to work out a way of managing that situation. So there is a pragmatic reason to explore who or what is marginalized and see how those marginalized interests can be accommodated in your intervention.

We have found the following questions good places to start when addressing boundary decisions:

13. Which interrelationships are privileged and which are marginalized? With what effect on whom?

14. Which perspectives (i.e., stakeholders, stakes, framings) are privileged and which are marginalized? With what effect on whom?

15. How can you manage the ethical, political, and practical consequences of these decisions, especially those that cause harm or have the potential to cause harm because they exclude an interrelationship or perspective?

The last question of course raises the further question of what kind of harm to whom. Hence the iterative nature of boundary questions; they raise the possibility that you may need to reassess your initial judgments on interrelationships and boundaries.

To summarize: Systems approaches can be understood as addressing three important factors within a situation:

- The interrelationships between aspects of a situation.
- The perspectives through which that situation can be understood.
- The boundaries that are necessary to allow us to address a situation.

This module will help provide ideas, drawn from the systems field, on how you can do this.
MODULE 4 – HANDOUT 3 – ACTIVITY 3, STEP 1

Construct a “Rich Picture” of the Situation of Interest

This is a mapping process where you display all the key aspects of the situation you want to research.

It is very important to free your mind as much as possible from any preconceived ideas you may have about the situation. Too many mapping processes try to place too much order too quickly into a situation. In contrast a “rich picture” displays as much of the situation as possible, but without trying to fit it to any preconceived ideas.

Sometimes “rich pictures” are called “systems mess” because that is what your picture will look like. For many, the value of rich pictures is only revealed once they start using them in a group. One of the difficulties in thinking and learning about a messy situation is that different people in the situation have different perceptions of and assumptions about what is going on. Looking at what different people in the same group contribute, and then comparing pictures between groups, is an effective way of revealing these differences because they express things you wouldn’t think of saying. And sometimes they allow you to say in a simple and unthreatening way things it might have seemed rude or frivolous to articulate.

Here are three example of rich pictures: Notice how they convey a lot of information in a variety of different ways. Notice too that one is messy and complicated while the other is tidy and relatively simple. It doesn’t matter a great deal as long as the picture conveys all the important aspects of the situation.

This is a rich picture of the Working for Water Programme (WWP) in South Africa, United Nations (Martin Reynolds, Open University, UK)
Rich picture: Wendy Fisher’s perspective on WWP

This is a rich picture of a water management project in South Africa:

(Courtesy of Gerald Midgley : ISSS Conference paper 2009).
Here is another diagram that concerns river pollution issues in Vietnam:

(http://worldessay.net/index.php/2011/05/environmentalissuepoorgovernanceinenvironmentalprotections.)

Return to the case study on urban Dengue Fever. You are going to develop a rich picture of this situation. It's often difficult to know where to start, so let’s start with some of the 12 questions:

Write on separate sticky notes:

• Who or what are the key stakeholders?

• What are the key stakes (e.g., purposes, motivations, values, norms, aspirations, goals)?

A key stakeholder or stake is one that has or might have a significant impact on the dengue situation in urban Thailand.

Now place them on the paper and annotate them in a way that allows you to address the following questions. Use words, pictures, graphics, or whatever works to illustrate and enable this picture to be really “rich.”

• What is the structure of the interrelationships of stakes and stakeholders within the situation?
• What are the processes between elements of that structure?
• What is the nature of the interrelationships (e.g., strong, weak, fast, slow, conflicted, collaborative, direct, indirect)?

Now stand back and look at what you've done.

Ask yourself the following questions.

Is everything that's important to the situation represented? Are all these things represented?

• Structures
• Processes
• Culture
• People
• Issues expressed by people
• Conflicts between people or ideas

Can any of the words be replaced with pictures or drawings to give the picture more depth than words can ever bring?

Has it fallen into the trap of too much structure? For instance, did you decide that the dengue had a biological reproduction process, an infection process, a contagion process, a prevention process, and put them together?

If other groups are working in parallel to you, take a look and see what they've included.

Finally and importantly, are you in the picture? You are planning research and therefore you are part of the situation and need to be represented.

Go back and alter the picture.
Frame the Situation

The rich picture probably looks a mess. Indeed the term “systems mess” is often applied to rich pictures. This second step helps you to make sense of the emerging picture and to help identify how to focus your research.

Your task now is to determine possible ways of framing the situation and exploring the consequences of each framing for your intervention.

- What are the different ways in which you can understand or frame this situation?

The following process will help you to identify some key framings.

Look at your rich picture:

1. List those stakeholders who have the largest (in terms of magnitude of effect) impact on the situation. The impact can be positive or negative. Write this on a sheet of paper.

2. List the stakes that are the most powerful influences (in terms of decision-making) in the situation. The influence could be positive or negative. Write this on the same paper.

3. Compare the list of stakeholders and stakes and consider their impacts on the situation. What issues arise out of these impacts? Write them on the paper.

4. Looking at issues, what are the different ways of understanding what the situation is about or how people understand what it is all about. Write them on the paper also.

5. Now as a group decide which of these framings are going to give you the best insights into how to design your research? These will be your key framings.

Hint: Think about the possible “framings” of Ecohealth projects mentioned in the introductory reading – they may give you some clues about important framings for this case study.

Typically you will have three to five key framings.

- Once your group has done this, compare your assessment with other participants. What are the similarities and differences? What might that mean for the research?
Finally the first task is to select a framing and work on it. You need to ensure that participants consider only that framing and not take any other framing into consideration. This is much harder than it sounds, especially if participants have selected a framing that is different from their own experience and knowledge. Your task is to keep them focused.

Framings imply value judgments about what is relevant and what is to be ignored. In systems language these are called boundary decisions. Boundary decisions have ethical and pragmatic dimensions that practitioners need to make explicit and deliberate on. Different framings imply different boundary decisions.

Select one of the framings that emerged during the last session. Try to ensure that a wide variety of different framings are selected among the groups in your session.

Consider only your framing and no other way of understanding the situation. Within that, you may consider a few differing perspectives:

- What purpose ought your research to serve?
  For instance, if your “framing” is about economic development, then the purpose of your research may be to explore ways to undertake mosquito control that enhances the economy. If framing is about sustainability, then the research might look at ways of controlling mosquitoes that does the least damage to the environment.

- Who ought to be the prime beneficiaries of that purpose? This is a function of both the framing (e.g., economic development) and the perspective (e.g., income of small farmers, which may benefit the rural economy, versus agro-industrial development, which may benefit the urban economy).

Try to be specific rather than general. So, in the above example, avoid saying the beneficiaries will be “people.” Be specific, what kind of people, where?
Return to your rich picture. From the orientation of your key framing, write down:

- To achieve this purpose in ways that benefit the beneficiaries, who should be involved in the research, what resources (money, skills, time, people) ought to be available to the research, and who ought to control those resources? Who ought not to control those resources? What is the consequence for whom of those decisions?

- To achieve this purpose in ways that benefit the beneficiaries and within the available resources, what sources of knowledge and expertise ought to be respected and what sources of knowledge and expertise ought to be ignored? What is the consequence for whom of those decisions?

- How ought you to manage the ethical and practical consequences of these boundary choices and decisions, especially those that will disadvantage or advance certain points of view or have the potential to cause harm?

You may notice that some of the questions are in an “ought” mode. This is important because it forces you to be explicit about the values you use in determining boundaries.

You will find similar ideas expressed in Module 3: Participatory Research, Module 5: Collaboration and Transdisciplinarity, and Module 9: Sustainability.

At this point, you:

1. have observed the enriched picture of the dengue situation
2. have selected an important way of understanding that situation
3. have identified some of the implications for your research of that framing.

What next?
MODULE 4 – HANDOUT 6 – ACTIVITY 3, STEP 4

Assess the Dynamics

Ecohealth research is action research; it does not study just people, it involves them, intervenes in their lives, and affects their situation.

The first three steps have given you plenty of information about the current situation and the implications for the dengue prevention research project.

The final set of questions will help you explore the implications of this for your research scope, focus, methodology, methods, and techniques.

First, take some time to look at other people's framings and their analysis.

Next, in your groups explore, discuss and conclude:

- How are these different framings and boundary choices going to affect the way in which people are likely to act in response to your research?

- How will these individual behaviours affect the overall behaviour of the situation? What patterns are likely to emerge? Will they help the research achieve its purpose, or hinder it?

- What are ways in which these complicated and complex dynamics can be identified and managed effectively?

After this systemic exploration of the situation, you would now be in a position to continue to the next stage of a research design – the identification of research methodologies, methods, and techniques that are capable of working within and exploring the issues raised in your systemic inquiry.
Collaboration and transdisciplinarity
MODULE 5 – COLLABORATION AND TRANSDISCIPLINARITY

Synopsis

Ecohealth is used to understand and solve complex problem of health and environment, which necessitates involvement of different disciplines. Transdisciplinarity is considered one of the main pillars of Ecohealth (it usually refers to transdisciplinary research), integrating the social and natural sciences in a common approach (interdisciplinarity) and simultaneously including nonscientific knowledge systems in a participatory and interactive process. Those who contribute to the development, planning, research, and follow-up on Ecohealth projects usually include researchers, community members and policy makers. These general groups include many subsets, such that researchers from different disciplines would normally work together, and different types of communities may be stakeholders. The success of a project depends on how these people work together. To ensure the interdisciplinarity and collaboration work within an Ecohealth project, conditions and skills for working together are essential.

This module is designed to help you teach how the concept of transdisciplinarity can be understood from an Ecohealth perspective and what it can mean in practice, applied in your (and your students’) research context, as well as in the process of teaching and learning. The idealized goal of “working together” across disciplines and schools of thought can be termed “transdisciplinarity,” and the reasons why this may be desirable but difficult to attain, are discussed. A working definition of transdisciplinarity is suggested.
Module Aims

- To help understand what interdisciplinarity and transdisciplinarity are and how to explain the need for transdisciplinarity in an Ecohealth project.

- To explore why the inclusion of different types of knowledge and expertise is important and understand some of the implications of such recognition.

- To help develop social and communication skills of participants to support team-building.

- To help identify the most appropriate style of working together for a particular task and the necessary levels of agreement, resources, and management support necessary for that style.
Why Is This Topic Important?
We are faced with complex and uncertain (wicked) problems of environmental change and human wellbeing, where the health sciences’ dedication to a clinical/medical model is exposed as not just limited, but potentially part of the problem. This situation demands that we go beyond disciplinary norms and their theoretical frameworks and methodologies. “Real-world” problems require proper characterization and not only integration of theory and methods from multiple disciplines, but also perspectives and knowledge from the public themselves, where problems will be formulated, and with whom solutions will be found. This collaboration, considered central to Ecohealth approaches, shifts the focus of attention to place-based activities, demanding an exploration of case studies, each with a unique set of socio-cultural circumstances. Ecohealth involves understandings from not only different academic disciplines but also other knowledge systems (including local, traditional, and intuitive). Such research and intervention go beyond interdisciplinary research in a collaborative, transdisciplinary venture, where knowledge is legitimately derived from different value systems, different ethical bases, and different philosophical traditions.

Key Concepts
The module explores the importance of “working together” in both the teaching and learning of Ecohealth, as well as in Ecohealth research processes. The idealized goal of working together across disciplines and schools of thought can be termed transdisciplinarity, and the reasons why this may be desirable, but difficult to attain, are discussed. On a practical level, the module discusses successful features and strategies of collaboration and how these apply to team work situations in which the students have been involved. It thus aims to help students develop strategies and a better understanding of how to use collaborative approaches in their work.
Guiding Questions

1. How does one distinguish between different categories of knowledge?
2. How do “learning” and “research” contribute to any of these types of knowledge?
3. Why do we need different types of knowledge (and those who are “particularly good at” those types), to understand and solve a problem?
4. Why then does working together become needed for a particular task?
5. What skills, attitudes, structures, processes, and resources does one need to ensure that this style of working together becomes more successful?
6. What else (in addition to the above) would you consider important to fully comprehend the scope of transdisciplinarity?

Basic Student Learning Objectives

After completing this module, the learners will be able to:

- Recognize that different types of knowledge and expertise have value and influence the way problems are identified, defined, and acted upon.
- Be able to explain why, due to the complex nature of Ecohealth research, well-developed cooperation and communication among scientific disciplines and between science and society are required.
- Understand the features of working together successfully through collaboration.
Advanced Student Learning Objectives

Advanced learners will be able to:

- Integrate different types of knowledge and expertise in developing research and action plans, including using principles of participation and equity in the integration.
- Become aware of the potentials and limitations of their own disciplinary research approach, then build up an understanding and appreciation of other epistemologies and methodologies, as well as of nonacademic knowledge, and adapt their research practice based on lessons learned.

Practical Notes

- Ideally instructors should have experience using collaborative approaches in teaching or conducting research. Instructor knowledge of Ecohealth or experience in Ecohealth research is an asset.
- The module can be completed within 2 to 3 hours, although it can be extended if more time is available.
- No prerequisites are required of the students, although students ideally should be in a position where they will have further opportunities to work as part of collaborative groups. If possible, students should be asked to read the case studies before attending the course.

Notes About the Case Study

This module will use a case study on land management as an example to stimulate students to discuss transdisciplinarity and collaboration. Students are requested to read carefully and critically the case study before the module starts. It is best to send the file to students beforehand, depending on how trainers use and adapt this for the other module.
Background Information

**Disciplinary and multidisciplinary research**

Disciplinary research follows cognitive and practical goals within a clearly defined scientific school and related institutional framework. Disciplinarity embraces growingly specialized fields of knowledge related to a single discipline that evolves in isolation from other disciplines. Therefore a person may, in fact, study biology and handle it well without the need to consider specific knowledge related to physics or psychology. A discipline uses standard and accepted methods and techniques, with centralizing theories and dogmas that appear stable and generate power, capable of maintaining boundaries between other such pursuits.

In multidisciplinary research, the different disciplines look at one research object from different perspectives. Multidisciplinary research is based on a combination of several scientific disciplines, without implying that continual interaction and negotiation between these disciplines is necessary (as opposed to interdisciplinary research). Each discipline carries out its analyses separately, applying the approaches and methods inherent to their individual disciplines. Generally, the final result is a multifaceted picture of an object of study. No systematic integration or synthesis is made. Results are often expressed in disciplinary journals.

**Interdisciplinary research**

Interdisciplinary research integrates two or more scientific disciplines with the goal of advancing the understanding of complex cognitive and practical problems. It involves the development of a common conceptual or theoretical framework and, to a great extent, also a methodology that integrates or connects the research methods of the participating
disciplines. In research programs focusing on complex society-health-environment interrelations like Ecohealth, interdisciplinary research usually incorporates the natural and technical sciences and social sciences and humanities, coordinated to achieve a higher-level purpose, or value, or desirable achievement.

Transdisciplinary research

Transdisciplinary research integrates the social and natural sciences in a common approach (interdisciplinarity), and simultaneously includes nonacademic knowledge systems as well to understand and solve socially relevant problems. Max-Neef (2005) argues that transdisciplinarity coordinates four critical questions: what exists? (the disciplines), what are we capable of doing? (multidisciplines), what is it we want to do? (interdisciplines), and finally what we must do, or rather, how to do what we want to do?

Social learning for transdisciplinarity

Societal learning, which is necessary for moving toward a more Ecohealth approach, is a combination of social learning at all three levels:

- Individual level: sharing knowledge and information, developing social, emotional and learning competences (openness, taking others’ points of view), improving communication, adapting prevailing ways of thinking, and personal attitudes, intentions, and behaviour;

- Organizational level: individuals often work in organizational setups that do not allow them to put suggested changes of attitudes and intentions into practice; therefore, organizational and institutional norms, values, and rules need to be adapted simultaneously;

- Structural level: most complex adjustments have to be made at the social, economic and political levels where different organizations and institutions interact, representing different parts of society or nations.
Skills required for transdisciplinarity

- Communication among scientific disciplines on the one hand, and between science and society on the other hand, are key challenges in trying to achieve societal learning. Societal learning requires a shift from individual to collective learning. Indeed, apart from sound disciplinary knowledge, Ecohealth research also calls for inter- and transdisciplinary research, which in turn involves social, ethical, and communication skills, such as:
  - A reflective and critical attitude toward one’s own discipline, knowing its potentials but also its limitations, and being able to question one’s own standpoint.
  - An open, tolerant, and respectful attitude toward colleagues from other scientific disciplines, as well as toward nonacademic actors.
  - The ability to manage conflicts of interests.
  - Learning the language of the other.
  - Develop reciprocity; being prepared to give time to the agendas of other people.
  - Clarity when communicating.

Activities

Section One: Transdisciplinarity

Activity 1

Learning Goal 1: What is transdisciplinarity and when do we need it?

INSTRUCTIONS

TRANS DISC I PLINARITY AND SOCIAL LEARNING FOR TRANS DISC I PLIN ARITY

Introduce the module by giving a presentation on transdisciplinarity, which will take about 20 to 30 minutes. The introduction will focus on the discussion of different types of research, disciplinary, multidisciplinary,
interdisciplinary to transdisciplinary research within an Ecohealth context. Discuss the skills required for transdisciplinary research.

Several schools are discussing the definition of these terms, but finding a common and acceptable term for a common understanding will be part of this exercise.

The following points can be covered:

- Transdisciplinary research is often a new form of learning and problem solving for students, involving cooperation among different parts of society and academia to meet complex social challenges and to solve socially relevant problems.

- Those who contribute to the development, planning, research, and follow-up of Ecohealth projects usually include researchers, community members, and policy makers. These general groups include many subsets, such that researchers from different disciplines would normally work together, and different types of communities may be stakeholders. The success of a project depends on how well these people work together.

- Discuss the differences between disciplinary, multidisciplinary, interdisciplinary, and transdisciplinary approaches. Refer to the section Background Information for more detailed discussion of these terms.

Activity 2

Learning Goal 2: Determining the degree of transdisciplinarity.

INSTRUCTIONS

This exercise aims to stimulate student discussion about the degree of transdisciplinarity in a project. Split the class into groups of 3 to 5 participants, briefly introduce the selected case study on Dengue Fever intervention (see Handout 1 in Module 4: Using Systems Concepts in Ecohealth) to be analyzed. Alternative case studies can be used if desired.
1. Instruct the class to read the Dengue Fever case study if they are not already familiar with it.

2. Encourage the groups to work through the table and engage in the discussions suggested in the handout.

3. Alternatively, deliver a lecture using a different case study that provides an analysis of transdisciplinarity for the students.

Handouts for this activity:

- Case study, suggested: Dengue Fever Prevention (Handout 1 in Module 4).
- Handout 1, Transdisciplinarity table ranking matrix.

After the group discussions, guide the class in a discussion to show that transdisciplinary working is not always appropriate or desirable, and when appropriate, can be achieved to different degrees of success. Have students discuss when it is best to have high levels of transdisciplinary working or low levels, and when interdisciplinary working or disciplinary modes of working might be more appropriate and useful.

### Activity 3

**Learning Goal 3: Discussion of research processes involving a transdisciplinary approach.**

**INSTRUCTIONS**

Discuss the research processes that involve a transdisciplinary approach with different phases of disciplinary research, interdisciplinary research, and societal discourse.

Lead a discussion about how different types of disciplinary integration can be relevant at different phases of research. **Figure 1** provides a good talking piece.

- Transdisciplinary approach: The shaded “wave” in **Figure 1** represents a possible sequence of different phases of integration over time.
- Level of societal discourse: The research process begins with a societal discourse of negotiating research questions and hypotheses among researchers and other actors involved (1). At regular intervals, scientists and nonacademic actors meet (2) to exchange knowledge and identify collective action (to solve the problem under consideration). Further exchange opportunities occur informally during fieldwork (3). After the program ends, a final workshop can be conducted to share results and implementation, and prepare future collaboration (4).

- Interdisciplinary level: Joint development and continuous adaptation of an integrative conceptual framework and methodology (5), and joint fieldwork (6) help build mutual understanding and ease synthesizing the findings at the end.

- Disciplinary level: At this level individual researchers conduct their specific experiments or studies (7).

**Figure 1**: Interlinkage of disciplinary research, interdisciplinary research and societal discourse in a transdisciplinary approach (Herweg et al., 2010, adapted from Hurni et al., 2004).
Section Two: Collaboration

Activity 4

Learning Goal 4: Reading exercise or brief lecture on collaboration.

INSTRUCTIONS
This section focuses on two aspects of working together:

- the conditions necessary for effective collaboration
- ensuring effective teamwork.

This session is best achieved through a mix of individual work and group discussion.

Be prepared to hand out pens of various colours.

The first task is to provide the handout on Networks and allow time for students to read.

Alternatively, you can provide a short lecture about collaboration and working together, based on the contents of the Handout 2: Networks.

Activity 5

Learning Goal 5: Key features of successful collaboration.

INSTRUCTIONS
This section is based on a case study and students will need time to read it. Ideally refer to a case study that has already been covered in another module.

There is a risk that participants will only undertake the first two or three items on the list below. To overcome this problem, spread the work
around the groups and ask each group to start off with one of structure, process, or resources.

Stress that participants should go into as much detail as possible and avoid restating the positive and negative versions of the original statement. So, for example, alongside the feature “roles are clearly defined” it is not helpful to write “roles are not clearly defined” as a hindrance. Participants should explore the case study and their knowledge and assess what might be a cause of roles not being clearly defined.

Suggest linking these discussions to the issue of interrelationships, perspectives, and boundaries identified in Module 4 and the issues raised in Module 3.

This section will need to conclude with a good plenary debriefing.

**ABOUT COLLABORATION**

Collaboration is an expensive business. A lot of time and energy is needed to create and sustain effective collaboration. Therefore, like the point made earlier about transdisciplinary working, collaboration should be used under quite specific circumstances. If these circumstances are not present, then much less intensive means of “working together” should be attempted. Sometimes just staying in touch with each other is enough.

The three key features of a situation that require the collaboration option are:

- When the issue, situation, or problem is complex.
- When it is necessary to have vision and goals shared by key stakeholders.
- When it is necessary to share resources (i.e., people, knowledge, money, skills).
INSTRUCTIONS FOR STUDENTS

It has been decided that the intervention described in the case study requires a high degree of collaboration. The table “Key features of successful collaborations” in **Handout 3** features what research tells us are key conditions necessary for successful collaboration. These conditions may not be present at the beginning of the work and may need to be developed.

From what you know from the case study and your past experience, describe what might help and what might hinder the establishment of these conditions, and how you might make the hindrances weaker and the helps stronger.

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**Activity 6**

*Learning Goal 6: What are the basic components of successful teams?*

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**INSTRUCTIONS**

This section is based on personal experiences.

Refer to **Handout 4**: “What are the basic components of successful teams?” for specific instructions. Ask the class to think of a time when they worked together with others successfully, and to use the diagnostic tool “Scoring your responses” in the handout to think through that experience.

If participants have worked together already in the course it is possible that they could choose that same process of working together as an example. This would need careful handling. If sufficient participants in the class have participated in the same team then their similar and different assessments of that team could be an important opportunity for learning (e.g., different motives and perspectives lead to different assessments of the team).
Alternatively, students can choose examples of working together with others from outside the course.

Suggest linking these discussions to the issue of interrelationships, perspectives and boundaries identified in Module 4: Using Systems Concepts in Ecohealth and the issues raised in Module 3: Participatory Research.

This section will need to conclude with a good plenary debriefing.

**INSTRUCTIONS FOR STUDENTS**

Think of a time when you worked together with others successfully and use the diagnostic tool in the Handout to think through that experience. (Refer to handout for more detailed instructions).

After the class has been through the table once, provide these subsequent instructions:

Now think of a time when a team was going badly. The worst possible example. Choose a pen of another colour and go through the table again.

After the exercise, lead a discussion as follows:

As a whole group, add up the scores for each item and discuss these questions:

1. What are the three big differences between a successful and an unsuccessful team?
2. What can be done to ensure that the positive factors are most favorable in teams?
Activity 7

Learning Goal 7: Debrief and evaluation.

INSTRUCTIONS

This module has covered a lot of ground, dealing with two substantial topics: transdisciplinarity and what the module terms “working together.” It is important that participants have time to process what they have learned, in particular the relationship between the parts of the module and their own work. There is no single best way of doing this; it will depend on the time available, the energy of the participants, and the size of the group.

Allow time for students to reflect on what they have learned. They could do this through personal reflection and writing in their learning journals. You could also give them time to talk in pairs or to contribute to a plenary discussion.

INSTRUCTIONS FOR STUDENTS

We have covered some important ground in the past few hours. Spend some time reflecting on what has been covered and its implications for your own work. You will find the following questions useful:

- What are the implications for my own work in adopting a transdisciplinary approach? When would it be appropriate to work in this way, and when not? What are the opportunities for transdisciplinarity and how can I develop them? What are the barriers and how can I reduce them?

- How can I further develop transdisciplinary skills and learning opportunities?

- In terms of the networks that are useful to me, how can I make sure they have the appropriate balance of purpose, structure, process, and resources?
SAMPLE TIMETABLE

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 minutes</td>
<td>Introduction to module</td>
</tr>
<tr>
<td></td>
<td>Section One</td>
</tr>
<tr>
<td></td>
<td>Activity 1: What is transdisciplinarity and when do we need it?</td>
</tr>
<tr>
<td>30 minutes</td>
<td>Activity 2: Determining the degree of transdisciplinarity using a case study</td>
</tr>
<tr>
<td>10 minutes</td>
<td>Activity 3: Discussion on research processes involving a transdisciplinary approach</td>
</tr>
<tr>
<td></td>
<td>Break</td>
</tr>
<tr>
<td>10 minutes</td>
<td>Section Two</td>
</tr>
<tr>
<td></td>
<td>Activity 1: Reading exercise or brief lecture on collaboration</td>
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<tr>
<td>30 minutes</td>
<td>Activity 2: Key features of successful collaborations using case study</td>
</tr>
<tr>
<td>60 minutes</td>
<td>Activity 3: What are the basic components of successful teams</td>
</tr>
<tr>
<td>20 minutes</td>
<td>Activity 4: Debrief and evaluation</td>
</tr>
<tr>
<td>Total: 3 hours, 15 minutes</td>
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</tr>
</tbody>
</table>

Evaluation

Refer to Module 1: Approaches to Designing and Teaching Ecohealth Courses and Module 2: Introduction to Ecohealth.
**Terminology**

**Collaboration Network**
A network with the primary purpose of achieving joint and mutually agreed goals

**Communication Network**
A network with the primary purpose of exchanging information or resources.

**Cooperation Network**
A network with the primary purpose of preventing duplication and promoting individual and shared goals

**Coordination Network**
A network with the primary purpose of ensuring that decisions are taken with some degree of synchronicity

**Discipline**
A specific branch of knowledge

**Interdisciplinarity**
The integration of more than one discipline in a particular task or situation

**Multidisciplinarity**
The application of more than one discipline to a particular task or situation

**Network**
A structure that exchanges information or resources

**Resources**
People, money, skills, time, and other artefacts that enable things to be achieved.

**Transdisciplinarity**
An approach that integrates the social and natural sciences in a common approach (interdisciplinarity), and simultaneously includes nonacademic knowledge systems as well to understand and solve socially relevant problems. This approach considers what exists? (the disciplines), what are we capable of doing? (multidisciplines), what is it we want to do? (interdisciplines), and finally what we must do, or rather, how to do what we want to do? (Max-Neef, 2005)
Key References


Additional References

Additional background reading. These can be general and are not essential reading. If possible, please provide at least one reference which relates to the Southeast Asian context.


Bob Williams and Hung Nguyen, Co-authors
Determining the Degree of Transdisciplinarity

EXPLANATIONS:

- Table H1 provides you with a list of (proposed) criteria and ranking categories to analyze the degree of transdisciplinarity in the case study; discuss the criteria and adapt or improve them as necessary.

- Evaluate the degree of trandisciplinarity as “high,” “moderate,” “low” in the selected study, if possible for each criterion and for each phase of the study; if you consider it impossible or not meaningful to evaluate (rank) selected criteria or phase combinations, explain why.

- Optimizing the degree of transdisciplinarity means involving other actors in a meaningful way, depending on the theme and the purpose of the study; it does not mean letting everybody interfere at any time and at any cost!
Table H1: Ranking matrix of transdisciplinarity in a research project.

<table>
<thead>
<tr>
<th>Transdisciplinarity criteria</th>
<th>Phases of a research project</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Defining the research question or hypothesis</td>
<td>Determining the objectives &amp; methodology</td>
<td>Fieldwork</td>
</tr>
<tr>
<td>Involvement of societal actors (negotiation of what problem will be the focus)</td>
<td>Low: Involvement of &lt; 25% of all key actors</td>
<td>Moderate: 25-50%</td>
<td>High: &gt; 75%</td>
</tr>
<tr>
<td>Involvement of academic disciplines (degree of interdisciplinarity)</td>
<td>L: only natural or social sciences (disciplinary)</td>
<td>M: social &amp; natural sciences separately (multidisciplinary)</td>
<td>H: social &amp; natural sciences integrated through joint objectives &amp; methodologies (interdisciplinary)</td>
</tr>
<tr>
<td>Worldviews (“realities”) involved (philosophical background of knowledge)</td>
<td>L: no consideration of any epistemology</td>
<td>M: different scientific epistemologies/ontologies considered (social &amp; natural sciences, qualitative &amp; quantitative approaches)</td>
<td>H: explicit dialogue between scientific and other epistemologies/ontologies</td>
</tr>
<tr>
<td>Knowledge of other key actors considered</td>
<td>L: not explicitly considered</td>
<td>M: at least one other key actor’s knowledge explicitly involved</td>
<td>H: explicit consideration of &gt; one other key actor’s knowledge</td>
</tr>
<tr>
<td>Type of knowledge involved in knowledge sharing</td>
<td>L: systems knowledge (“how the system works”)</td>
<td>M: systems and target knowledge (“where to go,” development visions)</td>
<td>H: systems, target and transformation knowledge (“what to do and how,” searching for solutions)</td>
</tr>
<tr>
<td>Mutual learning orientation 1. bilateral 2. focus groups 3. workshops with 2/3 of key actors</td>
<td>L: option 1 only</td>
<td>M: options 1 &amp; 2</td>
<td>H: options 1, 2 &amp; 3</td>
</tr>
</tbody>
</table>
Interpretation “Determining the degree of transdisciplinarity”

- In case you have ranked the degree of transdisciplinarity as “low” or “moderate” for several criteria, list possible reasons for this.

- It is not always possible or meaningful to increase the degree of transdisciplinarity in every phase of the study or for every criterion. Discuss where in the selected study it would be useful to increase the degree of transdisciplinarity. Develop some ideas about how to do this.

- Identify key skills/competences required of researchers and other actors for practicing successful transdisciplinarity research (you can conduct a small roleplay simulating a typical working situation in which researchers, extension workers, and local actors meet).

- On the basis of this analysis, identify ways of further optimizing transdisciplinarity at two levels:
  - List factors that support or hinder transdisciplinarity work at the individual level
  - Based on your own experience, propose how to optimize the preconditions for successful transdisciplinary work at the organizational level (university, municipality, etc.) by describing the prevailing challenges and limitations of transdisciplinary research.
Networks

Transdisciplinary approaches rely heavily on people being able to work together effectively, over time, and with the highest degree of collaboration. This part of this module will help you identify what conditions need to be established for effective collaboration.

What does research tell us about high-level collaboration?

First, let’s step back a bit. The degree of working together can vary from just keeping in touch with people (basic communication) to the kind of high-level working together that we describe as collaboration. In between there is coordination (where you keep in touch and respond to what you hear and see) and cooperation (where you work together more actively, but in a limited way). Here are some key findings from research about these ways of working together (Williams, 2003). Note that from this point on, the terms working together and networks are used interchangeably.

- Different kinds of networks are best for different kinds of tasks and need different kinds of strategies. In particular, the strategies for establishing and supporting networks that primarily share information are very different from partnerships that undertake joint projects and work.

- All forms of networks usually take longer than expected to establish themselves.

- A critical part of building a network is positive expectation of that network.

- Networks’ tasks must reflect their constituency. Therefore, local networks are most effective in dealing with local issues, local agendas, and local priorities. Local networks cannot be expected to deal with national issues, agendas, or priorities, unless they have local relevance.

- One of the big challenges in establishing networks is to move them beyond information sharing. A critical part of building more ambitious networks (e.g., cooperation and collaboration) is the articulation of a clear mission, guiding purpose, and agreed shared values.
• Network participants need the active support of the organizations they represent, especially when the network starts taking decisions about projects and resources. Indeed networks rarely operate effectively when their participants do not have the active support of their own agencies.

• Networks are not organizations, they cannot be expected to do what organizations do.

• Networks that are made up of a wide range of different perspectives and knowledge are likely to be more creative than networks that have few differences.

• Not everyone has to be involved all the time. Typically networks tend to have core and peripheral members, who participate at different levels in the overall task.
### Key Features of Successful Collaborations

<table>
<thead>
<tr>
<th>Feature</th>
<th>What helps this to happen?</th>
<th>What hinders this happening?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All players in the network are capable of making decisions on behalf of their organizations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roles are clearly defined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Links between members are formal and written into agreements</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High levels of leadership and trust</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ideas and decisions equally shared</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly developed communication, adapted to needs and communication styles of different participants (community members, policy makers, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No significant conflict between goals of network and goals of members or member agencies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability of network members to “champion” the network</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network members’ authority to take decisions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feature</td>
<td>What helps this to happen</td>
<td>What hinders this happening?</td>
</tr>
<tr>
<td>--------------------------------------------------------------</td>
<td>----------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended time horizons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High support from external bodies, participants' management, and professional agencies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexible financial arrangements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability of members to get resources for the network</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COLLABORATION STRATEGIES**

How can the factors that help be strengthened and the factors that hinder be reduced?

<table>
<thead>
<tr>
<th>Feature</th>
<th>Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure</strong></td>
<td></td>
</tr>
<tr>
<td>All players in the network are capable of making decisions on behalf of their organizations</td>
<td></td>
</tr>
<tr>
<td>Roles are clearly defined</td>
<td></td>
</tr>
<tr>
<td>Links between members are formal and written into agreements</td>
<td></td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td></td>
</tr>
<tr>
<td>High levels of leadership and trust</td>
<td></td>
</tr>
<tr>
<td>Ideas and decisions equally shared</td>
<td></td>
</tr>
<tr>
<td>Feature</td>
<td>Strategies</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Highly developed communication, adapted to needs and communication styles of different participants (community members, policy makers, etc.)</td>
<td></td>
</tr>
<tr>
<td>No significant conflict between goals of network and goals of members or member agencies.</td>
<td></td>
</tr>
<tr>
<td>No significant conflict between goals of network and goals of members or member agencies.</td>
<td></td>
</tr>
<tr>
<td>Ability of network members to “champion” the network</td>
<td></td>
</tr>
<tr>
<td>Network members' authority to take decisions</td>
<td></td>
</tr>
<tr>
<td>Resources</td>
<td></td>
</tr>
<tr>
<td>Extended time horizons</td>
<td></td>
</tr>
<tr>
<td>High support from external bodies, participants' management and professional agencies</td>
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</tr>
<tr>
<td>Flexible financial arrangements</td>
<td></td>
</tr>
<tr>
<td>Ability of members to get resources for the network</td>
<td></td>
</tr>
</tbody>
</table>
MODULE 5 – HANDOUT 4 – ACTIVITY 6

What are the Basic Components of Successful Teams?

A major feature of collaborative working is through teams. What are the basic components of a successful team?

Here is one way of identifying those basic components as well as a way to identify well and poorly performing teams.

Think of a time when a team you were working in was working really well. It felt great to be part of it. This could have been at your work, or with a sports team, or with a group of neighbours or family. Set this experience very clearly in your mind.

The table provides a diagnostic tool for you to complete.

INSTRUCTIONS

If you totally agree with one of the statements and disagree totally with the other, circle the number nearest the statement you agree with (either 1 or 5).

If your agreement is partial or “somewhat” rather than “total,” circle the number next to the end (2 or 4).

If you feel divided because each of the statements is true about half of the time, circle the number in the middle (3).

Respond to all 20 pairs of statements. As you record your ratings, think of the full range of your experience in the team, not just the most recent activities. You may wish to note in the margin the reasons for your rating.
<table>
<thead>
<tr>
<th>1</th>
<th>I was unclear about the goals or performance standards we were trying to accomplish in our team.</th>
<th>I understood our mission and the goals and performance standards our team was expected to meet.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2</th>
<th>Our members were more concerned with personal goals and roles than with the team’s.</th>
<th>We learned to put personal agendas aside and work cooperatively to achieve team goals.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3</th>
<th>We were not very effective at dealing with problems that came up in our team’s work.</th>
<th>We were able to reduce or eliminate most of the problems that arose in connection with our work.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4</th>
<th>We were not very good at dealing with conflict and differences of opinion among our members.</th>
<th>We valued differences of opinion, explored reasons, and made better decisions because of the differences.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5</th>
<th>We were hindered by organizational barriers that blocked our work effectiveness.</th>
<th>We were free of organizational barriers that might have blocked our effectiveness as a work team.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Team decisions were made without full input of all members so commitment was sometimes lacking.</td>
<td>Decisions were discussed, issues were understood, and we attempted to get consensus whenever possible.</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>We were often side-tracked and had a hard time sticking to the tasks we had to perform.</th>
<th>Our activities were productive and focused on the tasks we had to perform. We did not let distractions derail us.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Our communication with one another tended to be guarded rather than open and honest.</th>
<th>Our communication with one another was open and honest. We talked freely, and shared our true feelings about issues.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>A lot of time that we spent in team meetings was wasted and not used productively.</th>
<th>Our meetings were highly productive and were conducted in an efficient and a time-conscious way.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Our team was not very well respected or thought of by others with whom we interacted.</th>
<th>Our team was held in high regard and respected by others with whom we interacted.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Statement 1</td>
<td>Statement 2</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>11</td>
<td>Our team could have functioned more effectively if we'd had a different mix of members and skills.</td>
<td>We had a very effective mix of members and skills in our team – the right faces in the right places.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>We did not listen to one another or respect other’s views and suggestions.</td>
<td>We listened to one another and respected the viewpoints of others, even when they didn't agree with the group.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>We could have functioned a lot more effectively in our team if the leadership were to change.</td>
<td>The leadership of our team was very effective in helping us to work together in achieving our goals.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>We rarely took time to review progress and discuss how we could improve as a team.</td>
<td>We often reviewed progress and agreed on actions to improve the way we functioned as a team.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>As a team we rarely heard from management. Sometimes we wondered if they knew we existed.</td>
<td>We got feedback or support from management on a regular basis, and knew that they were aware of how we were doing.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>Membership in the team has not done much to develop my skills and growth.</td>
<td>My personal growth and skills have benefited from my membership of the team.</td>
</tr>
<tr>
<td>17</td>
<td>We were so busy with tasks that we neglected to improve our teamwork.</td>
<td>We had a good balance between getting the work done and improving our teamwork.</td>
</tr>
<tr>
<td>18</td>
<td>Our productivity would have been the same or higher if we'd worked as individuals and not as a team.</td>
<td>Our members were far more productive as a team than they would have been if they had worked as individuals.</td>
</tr>
<tr>
<td>19</td>
<td>I’m not very proud to have been a member of that team.</td>
<td>I’m proud to have been a member of that team.</td>
</tr>
<tr>
<td>20</td>
<td>For me, job satisfaction was no better in this work team. I’d have been just as happy working alone.</td>
<td>My job satisfaction was greater because of my membership in that team. The work was more satisfying.</td>
</tr>
</tbody>
</table>
SCORING YOUR RESPONSES: EXERCISE: WHAT ARE THE BASIC COMPONENTS OF SUCCESSFUL TEAMS?

The *odd numbered* items describe **organizational issues** relating to the effectiveness of your group.

The *even numbered* items describe **interpersonal issues** that affect the members of your group.

Place your scores for each item in the tables and total them.

<table>
<thead>
<tr>
<th>ORGANIZATIONAL ISSUES</th>
<th>INTERPERSONAL ISSUES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Odd Item</strong></td>
<td><strong>Even Item</strong></td>
</tr>
<tr>
<td><strong>Your Score</strong></td>
<td><strong>Your Score</strong></td>
</tr>
<tr>
<td>-----------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>1. Mission /Goals</td>
<td>2. Cooperation</td>
</tr>
<tr>
<td>5. Barriers</td>
<td>6. Decision making</td>
</tr>
<tr>
<td>7. Focus</td>
<td>8. Open communication</td>
</tr>
<tr>
<td>9. Meetings</td>
<td>10. External relationships</td>
</tr>
<tr>
<td>11. Skills / Mix</td>
<td>12. Listening / respect</td>
</tr>
<tr>
<td>15. Managem’t Support</td>
<td>16. Personal Development</td>
</tr>
<tr>
<td>17. Task/Process Balance</td>
<td>18. Collective productivity</td>
</tr>
<tr>
<td>19. Pride</td>
<td>20. Job satisfaction</td>
</tr>
<tr>
<td>Total (A)</td>
<td>Total (B)</td>
</tr>
</tbody>
</table>

Add Total A and Total B to get Total C

I.e.. Total A ........ + Total B ........ = Total C ........

To achieve a team score: average the totals A and B for the team.

I.e.. Team Score = Average Total A ........ + Average Total B ........ = .......... Out of 100
Disease ecology
Synopsis

Ecology, the science of how living things relate to each other and the world around them, has contributed significantly to Ecohealth. In this module students are exposed to systems thinking within a context of disease ecology to reinforce the ideas that adverse health outcomes are influenced by – and influence – the interactions between hosts, etiological agents, and socio-ecological conditions. The module also exposes students to the modelling approach to describing disease ecology, giving them a chance to consider how modelling applies to Ecohealth thinking and complex systems. Disease ecology models are used in this module as a “shorthand” to describe relationships between variables and to help students see how variations in relationships within a system can have profound impacts on disease outcomes. This module is not intended to make students proficient in disease ecology but rather to expose them to how some researchers attempt to describe ecological relationships in health, as well as to reinforce systems thinking by explicitly examining system components and interactions through class activities. Finally, although non-infectious diseases such as mercury and pesticide poisoning are embedded in social-ecological processes, this module focuses on infectious diseases.
Conceptual Map

Module Aims

The goal of this module is to relate concepts of disease ecology to the principles of Ecohealth and its pre-analytic vision. The aim is threefold (1) to introduce a way of thinking about disease that can be helpful in conceiving of and studying infectious diseases – a subject common to many Ecohealth projects; (2) to demonstrate the utility of an approach to disease ecology that links multiple disciplines (using a specific example); and (3) to use disease ecology to reinforce the concept of health as a property of a socio-ecological system.

In this module, models are used to achieve these aims as well as to provide an opportunity for discussion about the role of quantitative modelling in Ecohealth. The models are only teaching aids. The mathematics are simply shorthand versions of paragraphs that describe relationships and variables that are associated with disease outcomes. They are used for two reasons. First, they are a convenient way to describe relationships that can be manipulated in class to demonstrate
the effects of changing conditions on health outcomes. Second, mathematical modelling is routinely used by those who study disease ecology. Students require exposure to it to understand the disease ecology approach as well as to begin to contemplate the role of modelling in complex dynamic systems. The models themselves should not be emphasized as teaching outcomes, but rather as learning tools. In creating the models investigators are forced to clarify the variables they think are important and how they are related to each other. As well, building models often enables participants to identify important missing information.

Why Is This Topic Important?

Many Ecohealth learners struggle with defining and applying the concept of health. Many still approach health from “ill-health” – a disease prevention or curative model. Others may have had training that has focused them on specific causal agents of disease. Sometimes it can be better to introduce the students to ecological thinking by having them think about diseases and pathogens, parasites and hosts – topics with which they are perhaps more familiar. Disease ecology can, therefore, serve as a bridge to help people reconceptualize health outcomes not solely as a result of interactions of hosts and etiological agents, but rather as the result of interactions of a suite of host, social, and environmental variables.

Historically, many Ecohealth projects and programs have focused on infectious diseases, including in Southeast Asia. Disease ecology provides analytical and conceptual approaches that allow us to examine potential interactions of population, individual, pathogen, environment, and management variables and how these interactions affect disease patterns. It is a topic with which many infectious disease epidemiologists and public health workers have some familiarity.

Disease ecology combines information and thinking from biology, microbiology, epidemiology, and ecology to study ecological influences on the abundance and distribution of infectious diseases. It can be defined as the study of the interactions between the behaviour, management, and ecology of hosts with the ecology of pathogens, and how these interactions lead to different disease patterns in populations. It therefore considers factors from the molecular to social to systems levels. It is an
example of a multidisciplinary topic, which can be compared and contrasted with Ecohealth.

In Ecohealth, we often talk about looking at socio-ecological systems to understand the manifestation of health outcomes. Understanding the basic principles of disease ecology provides students a powerful conceptual model and the methods to understand and analyze the ecological component of this system. By looking at upstream or associated determinants of these ecological components of infectious disease epidemiology, we are also able to identify and integrate social factors in a disease system. (See Module 2 for discussion of what is meant by “upstream” factors.) Disease ecology can therefore be considered a core methodology for Ecohealth researchers and practitioners.

Disease ecology can be introduced at a conceptual level to Ecohealth learners, helping them to blend the ideas of ecology and health outcomes, or sophisticated analytical methods for modelling disease ecological interactions can be presented to the advanced learner. In this module, learners are introduced to basic concepts of disease ecology and work with those concepts to expand their ability to think of disease in ecological terms and to improve their ability to conceive of health in ecological terms.

Instructors who want to introduce advanced topics on disease ecology methodology should consider a multi-day course focused solely on that topic rather than try to integrate these complex topics into an Ecohealth workshop. Instructors who want to explore the philosophy and science behind complex systems science and their application to Ecohealth are also encouraged to develop a longer module.

The basic equations in disease ecology will serve as the foundation for this module. They will be used to reinforce understanding of the importance of interactions between multiple variables in the manifestation of health outcomes.
Key Concepts

1. Factors in addition to the disease etiological agent play critical roles in the manifestation and control of disease.

2. The abundance, distribution, and impacts of a disease are influenced by the relationship between a suite of biological and environmental variables.

3. Social factors often affect the aforementioned variables and therefore influence the ecology of a disease.

Guiding Questions

1. How is the concept of a socio-ecological system relevant to infectious disease prevention and control?

2. Why is the idea of a disease ecosystem relevant to Ecohealth?

3. How is contact between hosts and transmission between them a function of their behaviour, and in what ways is their behaviour a function of gender and power relationships, occupations, the natural ecology of households and livelihoods, ethnicity, and religion?

4. What might be the unintended population and ecological consequences of different interventions to prevent disease?
Basic Student Learning Objectives

After completing this module, the learners will be able to:

1. help learners see that social factors can affect ecological relationships between populations and environments, and thus help them to conceptualize socio-ecological systems when discussing health outcomes.

2. gain some fluency in ecological concepts relevant to epidemiology and useful for disease management.

3. recognize that changing relationships and starting conditions affect health outcomes in a system.

4. learn about various software programs freely available to apply to disease ecology programs.

Advanced Student Learning Objectives

Advanced learners will be able to:

1. Understand the value of or problems with dynamic systems modelling to describe socio-ecological systems.

2. Explain the role of key variables in basic reproductive ratio models and demonstrate how environmental and social change can modify or affect those variables.

Practical Notes

This is conceived as a half-day module. It can be extended to a full day for more advanced learners who are seeking some additional introduction to further methods in disease ecology.

Students should have completed Module 2: Introduction to Ecohealth and Module 4: Using Systems Concepts in Ecohealth, and/or be familiar with a causal network, upstream determinants of health, and socio-ecological systems.

This module will rely on access to computers and shareware (e.g., Win Episcope).

Instructor(s) will require an understanding of basic epidemiological concepts and infectious diseases.
If desired, this module can be taught independent of the other modules as an introduction to disease ecology.

There can be benefits to timing this module early in the Ecohealth course to help people transition from a more conventional biomedical approach to health to an ecological conception. The timing will depend on the audience.

**If the class is composed of many people without background in basic epidemiology or infectious diseases, there can be benefit in preceding this module with a primer on key concepts of infectious disease epidemiology.**

### Links to Other Modules

Module 2 should be delivered before this module to ensure that students have an understanding of the socio-ecological perspective, the idea of upstream factors that affect health outcomes, and the idea of systems. Modules 3 and 4, and the mini-module on equity and gender will prime students to consider the types and sources of the information they gather, and the values that these reflect.

### Background Information

Disease ecology can be defined as the interaction of the behaviour and ecology of hosts with the biology of pathogens, as it relates to the impact of diseases on populations. Epidemiology can be defined as the study of the causes, distribution, and control of disease in populations. Disease ecology, therefore, provides insights and understanding that can be used for epidemiological studies and disease control planning. The line between infectious disease ecology and infectious disease epidemiology can blur because they can use very similar methods and approaches. Disease ecology tends not to be concerned with pathology in individuals (like clinical medicine) or with characteristics of specific diseases (like epidemiology). Rather, it seeks to understand general processes of population interactions that influence patterns and impacts of infectious diseases.
Basic to the idea of disease ecology is the understanding that the spatial and temporal distribution of a disease is a factor of interacting populations (hosts and pathogens) with their shared environments (abiotic, biotic, and social). Those multidimensional environmental conditions that affect where and when a species (or disease) can survive are together known as a niche. Variations in disease patterns are a result of how populations and niches overlap and interact over space and time. Disease ecologists study these interactions to help predict how changes in some component of this population–niche interaction (an ecosystem) will affect disease outcomes. Mathematical modelling is often used to help foster understanding and prediction capabilities.

At their simplest, disease ecological models contain three components: host, pathogens, and environment. The Mass Action Principle establishes that the interaction between infectious and susceptible individuals is a key factor determining the distribution and abundance of an infectious disease.

The Reed-Frost model is a simple model that was developed to help predict how an epidemic would change over time (it will be used in some of the exercises below). This model assumes that infection is spread directly from infected individuals to others by an amount of "adequate contact." Any non-immune individual in the group, after such contact with an infective individual in a given period, will develop the infection and will be infectious to others only within the following time period. In subsequent time periods, an individual who has been ill is considered to be wholly and permanently immune. Each individual has a fixed probability of coming into adequate contact with any other specified individual in the group within one time interval, and this probability is the same for every member of the group because the individuals are wholly segregated from others outside the group. This model thus makes assumptions that are not often met in nature, and does not account for changing social-ecological dynamics; nevertheless, it has provided some useful insights into how epidemics unfold. Understanding even such a simple model illustrates how model building can be useful as a tool for understanding diseases in populations.

The traditional notation for the Reed-Frost model (described by Fine) is as follows: the probability of a susceptible individual contracting the disease during time period t is 1–(1–p)C, or, substituting q for 1–p, St = 1–qCt,
where \( S_t \) is the number of susceptible individuals at time \( t \), \( C_t \) = the number of active cases at time \( t \), and \( p \) = the probability that any two individuals selected at random will come into effective contact (contact sufficient for an active case to infect a susceptible individual).

Elaborations of these concepts are part of SIR models: where \( S \) = susceptible; \( I \) = infectious, and \( R \) = recovered or removed (dead).

Individuals in a population can only be part of one of those groups at a time. In these models, susceptible can only become infectious if the infectious agent is transmitted. Variables have been developed to explore this transmission coefficient, which can be affected by properties of the environment, the pathogen, and population interactions. SIR models examine transitions between these categories.

The basic reproductive number, known as \( R_0 \), helps to describe the number of secondary cases that will arise when an infectious individual is introduced to a wholly susceptible population. Although once again this may not reflect nature, \( R_0 \) models are the foundation for many disease ecology models. It is used to help forecast if an infectious disease will continue or fade out, either due to natural conditions or interventions, such as a vaccination program. Generally, the larger the value of \( R_0 \), the harder it is to control the epidemic. The basic reproductive rate is affected by several factors, including the duration of infectivity of affected hosts, the infectiousness of the organism, and the number of susceptible individuals in the population that the affected hosts are in contact with.

These basic concepts are expanded upon in the references provided below. Instructors unfamiliar with disease ecology are strongly encouraged to read and understand these references to provide the foundational knowledge required to effectively implement the proposed learning activities below.

Some Ecohealth scholars question our ability to reduce complex systems to “simple” mathematical formulae. This module will provide the opportunity to discuss how one can learn from building even simple models.
For example, this simple model can then be used as a basis for participants to ask more in-depth questions. How is contact between hosts and transmission between them a function of their behaviour, and in what ways is their behaviour a function of gender and power relationships, occupations, the natural ecology of households and livelihoods, ethnicity, and religion? Do changing demands for food result in changes in the way livestock are reared and encroachment into wilderness areas, and how do these influence the probability of adequate contact between individuals? What happens when you get multiple species, with different relationships within and among them? What if the infectious agents do not confer immunity? What might be the unintended population and ecological consequences of different interventions to prevent disease? All of these questions can be used to discuss links with other modules, as well as the Ecohealth vision and principles. Trainers and class participants should think about these issues as the module continues to explore more complicated models.

Instructors are encouraged to read the following papers as background on modelling in complex health systems, especially if they choose to make this topic a focus of the introductory or advanced module:


There are a few reasons to discuss disease ecology in an Ecohealth course. First, many Ecohealth projects deal with infectious diseases. Second, disease ecology helps to provide a conceptual foundation for students to understand that patterns of disease are affected by ecological process – in other words, they are affected by interactions of the host with the world around them. Third, it shows students that there are quantitative methods that can be applied to describing and assessing ecological relationships affecting diseases. Finally, if presented properly, learners can see that ecology includes human ecology and social
interactions. Disease ecology thus can help bridge the gap between a clinical or laboratory understanding of disease and the conception of disease as a socio-ecological phenomenon. For learners not from a veterinary or medical background, the basic concepts of disease ecology help them to develop some basic understanding of disease dynamics and how diseases are ecological and social phenomena.

Activities

Activity 1

**Learning Goal 1:** Students will be able to think of variables as interacting dynamic factors rather than a list of possible causal variables when thinking about disease ecology.

**Teaching focus**

Activities should emphasize that different variables have different effects on health outcomes (some might increase disease, some might decrease disease) and that factors other than the etiological agent and host immune systems play significant roles in determining disease outcomes.

**Examples of ways these can be achieved**

- Lectures on basic ecology and introduction to ecology of disease to transmit factual information on basic disease ecology.

- Case studies used to highlight how different variables act differently or contribute differently in different diseases. Have students create their own case study, beginning with what appears to be a straightforward outcome (e.g., a sick person or animal), and then elaborating with rich pictures and causal webs the social-ecological dynamics that resulted in that individual being ill.

- Explore a conceptual model or standard formula for disease risk and expand from basic models to reveal a hierarchy of interacting social and environmental factors.
INSTRUCTIONS

1. Start by introducing a generic model for zoonotic disease risk such as:

\[
\frac{HcN\beta}{(h + \alpha)}
\]

Where \( H \) = human density, \( c \) = rate of contact between people and wildlife that allows for pathogen transmission, \( N \) = density of the wildlife host, \( \beta \) = transmission of the pathogen between wildlife hosts, \( h \) = mortality rate of uninfected hosts, and \( \alpha \) = mortality rate of infected hosts.

The instructor may choose to present this conceptual model written as a mathematical formula and then talk about it, explaining what each variable is and how it may influence whether or not people get the disease. There are two alternative ways to present this information.

First, the instructor may present the concepts of this formula as a simple description. For example, s/he may start by saying, “It makes sense that if there are more people in an area and they encounter an infected wild animal more often, the chances of them getting a disease from that animal is higher than in areas with low human density and few wildlife encounters. But that risk is modified by the likelihood that the human-wildlife encounters result in transmission of an infectious agent.” This simple narrative has introduced the ideas represented by \( H \), \( N \), and \( \beta \). S/he could subsequently say something like, “but, if an infected person or animal dies soon after being infected, there are fewer opportunities for transmission,” thus introducing the variable \( \alpha \). The instructor need not write the mathematical formula down initially, but instead, summarize all the relationships by first writing formula as a paragraph and then summarizing the ideas of the paragraph by the formula. This helps students see the relationship between the concepts and their symbolic representation.

The second option is to have a brainstorming session with the students to see if they can conceive of variables that could influence the risk of people getting disease from wildlife, and the instructor facilitating the discussion, to group the ideas thematically based on the formula variables.
Note that it is important to tell the students that this is a conceptual model only and not one that can be used for quantitative analysis in specific situations. Instructors can represent the thinking about relationships of variables as a formula, as a conceptual map, or in any other way that allows the variables to be shown relating to each other and the zoonotic disease risk.

2. You may leave the discussion general and generic for this exercise or introduce a local wildlife zoonotic disease to help the students think more specifically about the possible factors affecting the disease risk, preferably not a vector-borne disease because these diseases have more complicated mathematical formulae.

For example the following paper uses concepts of disease ecology to discuss rabies elimination:


3. After writing the formula on the board to represent the summary of the class thinking about the disease, for each of the variables work outwards to brainstorm what factors (social and ecological) would affect each of the variables, looking for interactions among them.

This will allow the students to link disease ecology to the exercise in Module 1: Introduction to Ecohealth, where causal networks were drawn.

The diagram shows an example of how the formula can be built on to bring in upstream determinants of the formula’s variables and how this formula can be used to demonstrate the critical role of poverty in determining the ecology of a zoonotic infection.
4. Next, define an ecosystem.

Use a simple definition first. For example, an ecosystem is the interaction of the thing that interests you (a species, population, or disease) with its environment, where the environment is everything that is not that thing.

Follow with a standard text book definition such as “a localized group of interdependent organisms together with the environment that they inhabit and depend on” or “a system formed by the interaction of a community of organisms with their environment.”

Then ask the class to review the diagram drawn and decide if this represents an ecosystem.

ALTERNATIVE ACTIVITY

1. Display a causal web model which includes an infectious disease. If available, you can use a causal web developed in Module 2.

2. Post the diagram up for students to see (note, instructors may wish to neaten the copy developed in Day 1 to clarify and make it easy to see the relationships).

   Students are assigned to four groups:
• Demography group
• Susceptibility group
• Immunity group
• Transmission group

Each group is tasked with identifying factors diagrammed in the causal web that can influence the subject of their group (i.e., demography, susceptibility, immunity, or transmission). Each group works independently. After sufficient time, the groups compare their lists to look for differences and similarities and interactions.

3. Next, define an ecosystem.

Use a simple definition first such as “an ecosystem is everything that affects the thing (species, person, disease, etc.) that you are interested in” and supplement that with a standard text book definition such as given above.

Then ask the class if a disease has its own ecosystem, encouraging discussion and debate within the class.
Activity 2

Learning Goal 2: Students will be able to recognize that disease patterns can be affected by changes in the starting conditions. This will reinforce the concept that variation in socio-ecological context can determine health status and outcomes.

Teaching focus

Teaching activities should focus on the theme of variation and codependence between population processes and health outcomes.

Examples of ways these can be achieved

- Use simple disease models and vary the conditions, either instructor-led or student group work, to illustrate dependence of disease patterns with variable conditions.
- Disease case studies of how interventions (such as an immunization program, poverty reduction, or conservation) affected disease outcomes, and explore through class discussion how those changes may have come about.
- Lectures introducing some classic disease ecology models used to control disease and explore how those variables relate to real-world situations.

INSTRUCTIONS

1. This activity will allow the class to apply some basic concepts to manipulate ecological interactions and discover how such changes can affect the course of a disease.

2. Using a program such as Win Episcope, select a program that allows the manipulation of the Reed-Frost model of infectious diseases. Briefly introduce the model and define its variables, relating it to the concepts introduced in the previous activity. Once again, reinforce to the students that the formula is just shorthand for some variables that affect disease, and that the simple model used in this exercise can be elaborated into a hierarchy of interdependent variables, as was illustrated in the last exercise.
• In Win Episcope, the model is introduced in the index under the help menu. The program is found under the “Models” tab.


3. Break the class into groups according to scenarios below. These scenarios are the assumptions for different starting conditions. (You can introduce other variations depending on class size.)

• Scenario 1: 1 case is introduced into a small population (5,000) of which none are immune. The disease has a low probability of spread (0.1%).

• Scenario 2: 1 case is introduced into a small population (5,000) of which none are immune. The disease has a high probability of spread (30%).

• Scenario 3: 1 case is introduced into a small population (5,000) of which 50% are immune. The disease has a low probability of spread (0.1%).

• Scenario 4: 1 case is introduced into a small population (5,000) of which 50% are immune. The disease has a high probability of spread (30%).

• Scenario 5: 100 cases are introduced into a small population (5,000) of which 50% are immune. The disease has a low probability of spread (0.1%).

• Scenario 6: 100 cases are introduced into a small population (5,000) of which none are immune. The disease has a high probability of spread (30%).

• Scenario 7: 1 case is introduced into a large population (500,000) of which 50% are immune. The disease has a high probability of spread (30%).

• Scenario 8: 1 case is introduced into a large population (500,000) of which none are immune. The disease has a high probability of spread (30%).

4. Have students develop graphs. If possible print off the graphs and have them posted on a board for examination by the group. If a printer is not available, have the students draw their graphs and post them.
As a group, examine how changing the parameters in the model change the pattern of the disease.

- As a group, discuss what ecological, social or management factors could affect the number of cases entering a population, the proportion of the population that is susceptible, the proportion that is immune and the probability of infection.

- Discuss this for a human population, a population of farm animals and a wildlife population.
  
  i. Where possible, use locally relevant diseases that may be familiar to the learners to facilitate discussion. Instructors are encouraged to find locally relevant and topical cases that can be linked to local areas and priorities.

  ii. Remember, the goal of this is not to identify the true variable affecting the epidemiology and ecology of a specific disease, but rather to show how population and environmental change can affect disease outcomes.

ALTERNATIVE ACTIVITY

The instructor uses Win Episcope (or similar program) undertaking similar calculations as above, projecting the results for the class to see.

The results are summarized as a Powerpoint lecture where the SIR model is defined and principle determinants of demography, susceptibility, transmission, and immunity are explained.

For more advanced audiences, more detailed formulae that introduce the mathematics of vector-borne infections and vaccine effects are also introduced.

Instructors are encouraged to refer to standard papers on this subject if they wish to develop material for more advanced audience. Examples include:


Activity 3

Learning Goal 3: Students will understand the role of the social and environmental determinants of disease (upstream factors) and the centrality of social and ecological factors in health protection, prevention, health promotion, and action when studying and managing infectious disease. Students will be able to clearly identify these issues in a case study involving infectious diseases.

Teaching focus

Reinforce social and environmental determinants of health in the case of infectious disease.

Examples of ways these can be achieved

- Relate the day’s activities to any case studies that are crossing all modules and have the students start to refine a causal web or systems model for a relevant problem that relates to infectious disease.

- Introduce a unique case study and have students attempt to hypothesize the core variables affecting the disease and the relationships between those variables.

- Lecture on the successful application of disease ecology theory and history for positive public health outcomes.

INSTRUCTIONS

1. Invite a representative from the local disease control authorities to discuss the management of the zoonotic disease used as an example above. Preferably having representatives from the agencies responsible for public health and for animal (wildlife) health.

- It is best if these people are familiar with Ecohealth principles and the goals of the module. It would also be useful to have used the
case study as an illustrative example in the previous activities in this module.

- Central and local government agencies, relevant NGOs, community groups, medical and veterinary practitioners, and academics might all be considered.

- If it is difficult to find such guests, use an example from the instructor’s experience.

The Instructor can outline the case scenario and ask the learners to role play key stakeholders that may be involved in the case, such as veterinarians, farmers, physicians, community members, etc.

The goal of this exercise is to use a real-life scenario to expand on the basic formulae and concepts learned above to help students conceive of how ecological relationships can be affected by changing social and environmental conditions.

2. Based on the results of the preceding exercise, have the students work as a class or in small groups (depending on class size) to identify ways within the hypothesized ecosystem of the disease where disease prevention or control may be achieved. Circulate among the groups to facilitate the discussion so that students are assisted in thinking about upstream drivers and determinants.

1. Reassemble the class and ask them to nominate the three most significant things they think can be done to control the disease.

2. Ask the invited guests to comment on the students thought and explain the current approach to disease control.

3. Have a group discussion on the advantages, disadvantages, and practical facilitators and obstacles to managing upstream variables.
Activity 4

Learning Goal 4: Students will be able to sketch out an approach to disease ecology that will serve to reinforce core Ecohealth concepts (participation, knowledge-to-action, and systems thinking).

Teaching focus
To explicitly link this module with core concepts of Ecohealth as a summary to the class.

Examples of ways these can be achieved
- Evaluation / assessment with a case scenario involving an infectious disease, with social, political, and environmental factors in the storyline. Students can be asked to determine an appropriate intervention.

INSTRUCTIONS
Bring out the class working definition for Ecohealth developed as part of Module 1: Introduction to Ecohealth and ask the class to reexamine it to ask (1) does it need to be modified given the day’s disease ecology activities, and (2) what are the potential advantages and disadvantages of the Ecohealth approach for infectious disease prevention and control.

This provides an appropriate time to contrast some perspectives in disease ecology (which may follow a more mechanistic, predictive perspective) with complex systems thinking (wherein uncertainty is emphasized and prediction is not a goal, rather learning and adaptation are emphasized).

- One way to do this is to compare and contrast the generic Ecohealth diagram with outputs of Learning Goal 2 above, and consider through open discussion with the class if the set of complex interactions in the emerging zoonotic disease system would allow for reliable prediction and, if it did, could those predictions be generalized beyond a very specific time and place.

- An alternative approach would be to have a short presentation by the instructor that defines complex adaptive systems and illustrates through exploration of the class’s output in Learning
Goal 2 that zoonotic disease systems are complex socio-ecological systems.

ADDITIONAL READING FOR ADVANCED LEARNERS

If the class is composed of people seeking more in-depth experience with disease ecology, additional learning activities will be required. Only examples are provided below and detailed disease ecology instruction is not a principle goal of the Ecohealth training course.

Some resources available through Google books online include:


Sample Timetable

<table>
<thead>
<tr>
<th>Time allotted</th>
<th>Short Course</th>
<th>Time allotted</th>
<th>Longer course</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 minutes</td>
<td>Introduce the day’s goals</td>
<td>15 minutes</td>
<td>Introduce the days goals</td>
</tr>
<tr>
<td>20 minutes</td>
<td>Learning goal 1: Introduce zoonotic disease risk model (lecture/brainstorm)</td>
<td>20 minutes</td>
<td>Learning goal 1: Introduce zoonotic disease risk model (lecture/brainstorm)</td>
</tr>
<tr>
<td>30 minutes</td>
<td>Work to identify socio-ecological factors affecting the model’s variables to develop the disease ecosystem OR Groups identify factors from causal web and develop definition of ecosystem</td>
<td>30 minutes</td>
<td>Work to identify socio-ecological factors affecting the model’s variables to develop the disease ecosystem OR Groups identify factors from causal web and develop definition of ecosystem</td>
</tr>
</tbody>
</table>

BREAK
<table>
<thead>
<tr>
<th>Learning goal 2: Win Episcope scenarios (groups / teacher led)</th>
<th>Learning goal 2: Win Episcope scenarios (groups / teacher led)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 minutes</td>
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<tbody>
<tr>
<td>40 minutes</td>
<td>40 minutes</td>
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</table>

<table>
<thead>
<tr>
<th>Learning goal 3: Discussion about disease control with local representatives OR Lecture about disease control by trainer</th>
<th>2.25 hrs (with break)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 hr (with break)</td>
<td>Discussion about disease control with local representatives (for longer sessions, include people with formal and informal responsibilities, including community members if feasible)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Class ends with a review of the definition of Ecohealth</th>
<th>1 hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 minutes</td>
<td>Review of the Ecohealth definition from Introduction to Ecohealth as group discussion. Assign further reading.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total 4 hours</th>
<th>5.5 hours</th>
</tr>
</thead>
</table>

### Evaluation

1. To determine if students are seeing the relationships of Ecohealth and disease ecology.
   - Option 1: Learners provide feedback in the form of a reflection on how they see disease ecology influencing Ecohealth and vice versa.
   - Option 2: Review of modifications to the class Ecohealth definition.
   - Option 3: Students are assigned to critically comment on the disease control plan discussed in class and offer suggestions for alternative targets or means for control that may reflect the Ecohealth approach.

2. In-class assessments, the trainers should ask the class to comment on whether the information given was too basic for them. If it was, then
more advanced models than the Reed-Frost model can be used. If the class found it too complex, the trainers may wish to start with an introductory lecture on basic concepts of infectious disease epidemiology.

**Terminology**

**Disease**
An impairment of the normal state of the living animal or plant body or one of its parts that interrupts or modifies the performance of the vital functions, is typically manifested by distinguishing signs and symptoms, and is a response to environmental factors (as malnutrition, industrial hazards, or climate), to specific infective agents (as worms, bacteria, or viruses), to inherent defects of the organism (as genetic anomalies), or to combinations of these factors. (Merriam-Webster Medical Dictionary).

**Disease ecology**
The study of the interactions between the behaviour, management, and ecology of hosts with the ecology of pathogens, and how these interactions lead to different disease patterns in populations. It therefore considers factors from the molecular to social to systems level. It is an example of a multidisciplinary topic, which can be compared and contrasted with Ecohealth. Disease ecology combines information and thinking from biology, microbiology, epidemiology, and ecology to study ecological influences on the abundance and distribution of infectious diseases.

**Epidemiology**
Centers for Disease Control and Prevention, USA (CDC) define epidemiology as "the study of the distribution and determinants of health-related states in specified populations, and the application of this study to control health problems." A look at the key words will help illuminate the meaning:

- **Study** – Epidemiology is the basic science of public health. It is a highly quantitative discipline based on principles of statistics and research methodologies.
- **Distribution** – Epidemiologists study the distribution of frequencies and patterns of health events within groups in a population. To do this, they use descriptive epidemiology, which characterizes health events in terms of time, place, and person.
- **Determinants** – Epidemiologists also attempt to search for causes or factors that are associated with increased risk or probability of disease. This type of epidemiology, where we move from
questions of who, what, where, and when and start trying to answer how and why, is referred to as analytical epidemiology.

- **Health-related states** – Although infectious diseases were clearly the focus of much of the early epidemiological work, this is no longer true. Epidemiology as it is practiced today is applied to the whole spectrum of health-related events, which includes chronic disease, environmental problems, behavioral problems, and injuries in addition to infectious disease.

- **Populations** – One of the most important distinguishing characteristics of epidemiology is that it deals with groups of people rather than with individual patients.

- **Control** – Finally, although epidemiology can be used simply as an analytical tool for studying diseases and their determinants, it serves a more active role. Epidemiological data steers public health decision making and aids in developing and evaluating interventions to control and prevent health problems. This is the primary function of applied, or field, epidemiology.

**Ecosystem**
A biophysical environment consisting of all the organisms living in a particular area, as well as all the nonliving (abiotic), physical components of the environment with which the organisms interact, such as air, soil, water and sunlight. (Wikipedia)

**Infectious disease**
A disease caused by the entrance into the body of organisms (as bacteria, protozoans, fungi, or viruses) which grow and multiply there. (Merriam-Webster Medical Dictionary)

**Reed-Frost model**
A mathematical model of infectious disease transmission and herd immunity. The model gives the number of new cases of an infection that can be expected in a specified time in a closed, freely mixing population of immune and susceptible individuals, with varying assumptions about frequency of contact. (Stedman’s Medical Dictionary. © 2006 Lippincott Williams & Wilkins. All rights reserved.)

**Web of causation**
A web of causation, or causal web, is an interrelationship of multiple factors that contribute to the occurrence of a disease. (Mosby’s Medical Dictionary, 8th edition. © 2009, Elsevier.)
Zoonoses (zoonotic diseases)
Diseases that can be passed from animals to humans. These are infectious diseases, caused by bacteria, viruses, or other disease-causing organisms that can live as well in humans as in other animals. They can be transmitted in different ways.

SUPPORTING DOCUMENTS

Win Episcope 2.0 can be downloaded at:
www.clive.ed.ac.uk/cliveCatalogueltem.asp?id=B6BC9009-C10F-4393-A22D-48F436516AC4

Introductions to epidemic models on Wikipedia

Key References

References are provided throughout the text as examples of information sources that can inform teaching and provide additional details. These three highlight some key concepts relevant to the module.


Additional References


Some resources available through Google books include:

Agriculture and health
Synopsis

Agriculture, also called farming or husbandry, is the cultivation of animals, plants, fungi, and other life forms for food, fibre, and other products used to sustain life. Agriculture and health have intrinsically close links that are being increasingly understood in the last decades. Health is a goal and also precondition of human development, which is well reflected by the Millennium Development Goals (MDGs), of which almost all development goals are health or health-related.

This module is about developing good understanding and strong analytical and action capacity to address the links between agriculture and health in an Asian context through an Ecohealth approach. The module is designed in a way that allows participants to apply what they have learned about Ecohealth approaches in other modules of this training course to a specific area, namely agriculture and health. The complex and diverse patterns of agriculture practices – which range from subsistence farming to intensive modern agriculture, and their multiple, dynamic, and complex interactions with the health of humans, animals, and ecosystems – provide a rich field for the application of Ecohealth approaches that include systems thinking, transdisciplinarity, participation, and social and gender equity, etc. Agricultural activities are so diverse that it is impossible to cover every issue in a training course in a limited time. Thus, selection is essential and a few key agriculture and associated health issues should be selected as examples or case studies to help participants gain knowledge and develop capacity. This module will first give participants a broad overview of the connections between agriculture and health and then select some key issues in Asia for in-depth case studies.
Conceptual Map

Module Aims

This module provides an opportunity for the participants/trainee/students to apply what they have learned about the principles of Ecohealth approaches in other modules in a specific arena: agriculture and health. The aims and goals of this module are to expose participants/students/trainees to the many complex, diverse, and dynamic links between agriculture and health. This is accomplished by introducing a few key conceptual frameworks and practical examples, conducting in-depth case studies and group discussion to equip participants with new insights about the connections between agriculture and health and to help students develop capacity of conducting research in this important area from an Ecohealth perspective.
Why Is this Topic Important?

At present, agriculture still employs around 50% of the world population. In developing countries in Asia, where agriculture is the main livelihood for many people the percentage is higher. Links between agriculture and health in Asia have been manifested by the endemics of several emerging infectious diseases such as Avian Influenza, SARS, and the Nippah virus.

Agricultural intensification, defined as an increase in the productivity of crops and livestock per unit of input, was selected as the focus of a 5-year project to build the field of Ecohealth in Asia (the Field Building Leadership Initiative: Advancing Ecohealth in Southeast Asia), which supports the development of this manual. This topic was identified as important because agricultural intensification can bring many benefits to society such as improved food security and nutrition, adaptation to urban or peri-urban environments, improved livelihoods, and export-oriented production. At the same time, it can negatively affect the natural resource base that supports productive capacity in farming areas, and is often a causal factor in human and animal health problems. Moreover, agricultural intensification imposes external costs on society, such as biodiversity loss, pesticide and chemical fertilizer use, nutrient runoff, excessive water usage, and (re)emergence and spread of infectious diseases. The impacts of agricultural intensification, coupled with climate change, pose critical problems for ecosystems and human health at local, regional, and global levels.

There are many issues of relevance to Ecohealth in an agricultural setting, including livelihoods, rural-urban connections, poverty, host-parasite relationships, and human and animal health.

There is a need for human resource development to improve knowledge and skills in the links between agriculture and health and better manage associated health risks. At the time of writing, curricula of both medical or public health universities and agricultural universities in Southeast Asia contain limited content on this important topic. It is hoped that a module on agriculture and health in the context of Ecohealth in Southeast Asia will help fill this gap in current teaching in universities in the region.
Key Concepts

Agriculture is a very broad field that covers many different practices, patterns, and technologies. The concept of health embodies a wide range of issues that are affected by many biological, ecological, and social determinants, which have been discussed at length in this course.

Some key concepts for this module include, but are not limited to subsistence farming, green revolution, agricultural intensification, animal husbandry, zoonotic diseases, sustainable agriculture, nutrition, food safety and security, and the health of environment and ecosystem.

An understanding of the interactions between agriculture and health should be one of the major learning objectives for the participants of this module.

Several key themes are selected for in-depth case studies for participants to develop the needed knowledge and capacity:

- Crops and health: will cover important and relevant issues such as pesticide and fertilizer use and overuse, and food safety.
- Livestock rearing and health: will cover issues such as zoonotic diseases, emerging infectious diseases, and food safety.
- Agricultural water development and health: will cover water-related and water-borne diseases such as malaria and schistosomiasis.
- Agroforestry, agro-biodiversity, nutrition and health: will cover food security, food safety, and nutrition.

Several other topics could be included, such as antimicrobial resistance, and the resistance of pests to pesticides, but the module cannot attempt to address all topics related to agriculture and health.
This module refers to Ecohealth research and the design of research frameworks. In discussing research design, students should be encouraged to think through the whole process, including the following steps:

1. determining the problem statement
2. determining the research objective
3. defining the research question or hypothesis
4. establishing the methodology, sampling strategy, data collection, and analysis process
5. determining the dissemination of research findings and the integration of knowledge-to-action.

Guiding Questions

These questions can be provided to the students at different stages of the module. They can also be listed in table form, and students encouraged to write down their thoughts as they proceed through the module.

1. What are the conceptual frameworks that can help us to better understand the links between agricultural practices and the health of humans, animals, and ecosystems?
2. What are the practical and theoretical connections between agriculture and human health?
3. What are some of the skill sets required to approach agricultural issues using an Ecohealth approach?
4. What are the major agricultural practices in the place where you live?
5. What kind of implications, both positive and negative, that these practices have or potentially have for the health of people, animals, and ecosystems?
6. What are the practical solutions to address the negative impacts from an Ecohealth perspective?
7. How can we design research about agriculture and health that uses an Ecohealth approach?
8. Who should be involved in designing such a project? Why?
Basic Student Learning Objectives

After completing this module, the learners will be able to:

- Explain the multiple, diverse, dynamic, and complex links between agriculture and health.
- Be familiar with case studies that use an Ecohealth approach and be able to draw experience and lessons through analyzing these case studies.
- Demonstrate a capacity to approach agricultural and health issues with an Ecohealth perspective that includes systems thinking, transdisciplinarity, stakeholder participation, social and gender equity, knowledge-to-action and sustainability.

Advanced Student Learning Objectives

Advanced learners will be able to:

- Engage with others from different disciplinary backgrounds and work collaboratively to characterize and address an agriculture-related health issue using an Ecohealth approach.
- Understand how to integrate key elements of an Ecohealth approach into the design of research frameworks focused on agriculture and health.

Practical Notes

Because this module covers two very broad fields, namely agriculture and health, it puts high requirements on the trainers. If possible, at least two trainers are needed with complementary expertise in agriculture and health. Ideally, trainers should also have experience in Ecohealth research.

Another option is for course organizers to ensure that the class participants come from a variety of health and agricultural backgrounds. In this case the trainers, who should in any case have good facilitation skills, can draw out the complementary knowledge from the class members themselves. In this case, the trainers should prepare themselves in advance by reading more books and papers on agriculture or health to fill out gaps in their knowledge and skills.
In any case, it is desirable that the students come from diverse disciplinary backgrounds such as agricultural science, public health, ecology, and social science.

This module is not a stand-alone module; it builds on all the modules that have come before it as part of the Ecohealth Trainer Manual. The previous modules lay the foundations for this one, which provides a chance for the students to apply their learning about Ecohealth to a set of issues. This module should therefore be delivered after the other modules, at minimum after Module 2: Introduction to Ecohealth, and the trainers should be familiar with the overall contents of all modules. As in other modules, participants should reflect on how this work relates to the overall vision and principles of Ecohealth, as described in the Preface.

This module starts by facilitating a broad overview on the connections between agriculture and health, and then looks at the specific case studies. It can be used as a complete one-day class, or it can be tailored to fit a course given over a period of time.

To understand the links between agriculture and health and be able to develop capacities for dealing with health problems associated with agriculture, both the trainers and their students need to have some basic knowledge about the two fields. Given the fact that current curriculum of medical universities includes little content about agriculture, and the textbooks of agricultural and other universities offer little information about human health, participants may lack basic knowledge about one or other of the fields. In this case, they should be encouraged to read about them in advance.

To teach this module, trainers need to prepare themselves well by reading books and materials on agriculture and health. The two companion texts (Charron, 2011; Waltner-Toews, 2011) are good references for this purpose. In addition, the essential reading material listed in this module also provide background information and teaching materials.

Trainers will need to provide handouts of case study materials and presentations. This module is designed to be delivered over a 5- to 7-hour period, in one day or over a number of classes.
Notes about Case Studies

Case studies are an important learning activity in this module; they provide real scenarios for the students to learn how Ecohealth approaches can be applied. Initially, a case study should be developed together with class participants, based on their own experiences. This participatory exercise will “prime” the thinking of the participants and enable them to better explore several published case studies, which we provide. The published studies cover key agriculture and health issues in this region, which are the focus of this module, including crops and health; livestock rearing and health; agricultural water development projects and health; agroforestry, agro-biodiversity, nutrition, and health. Some case studies were research projects conducted by using an Ecohealth approach, whereas some were not undertaken from an Ecohealth perspective; both are good learning materials for students. All case studies or stories are from Asia and trainers can select several cases for this module. Trainers should be familiar with these case studies so they can provide additional information when needed.

One such study was published in the journal of Ecohealth. The paper introduces an Ecohealth framework and applies the framework in three case studies located respectively in Vietnam, Thailand, and West Africa (Cote d’Ivoire). It may be hard for the trainees to read and understand this academic paper. If this is the case, then trainers can simplify the text and tailor it into short and an easily understood account for use in the training.


Another study is based on an Ecohealth research project conducted in Yunnan Province, China. The paper used water to link a number of important health issues associated with agriculture intensification.

- Jing Fang, Xinan Wu, Jianchu Xu, Xuefei Yang, Xiaoxiao Song, Guangan Wang, Maosheng Yan, Mei Yan, and Danni Wang. Water Management Challenges in the Context of Agricultural
Intensification and Endemic Fluorosis: The Case of Yuanmou County, EcoHealth (2011) Volume 8:4 pp 444-455

A short story on malaria is provided by Dr. Umar-Fahmi Achmadi from Indonesia. The text is written in simple language and thus it can be used to teach students who have less experience in research and practice.

- Umar-Fahmi Achmadi, Case study on malaria from Indonesia, University of Indonesia.

An article published in the journal Lancet more than 20 years ago describes a problem that remains in many parts of Asia. The paper is about pesticide use and its health consequences and was written from the perspective of epidemiology. Although the paper was not written from an Ecohealth perspective, the trainers can use this paper to facilitate the discussion about the possible research if an Ecohealth approach were used.


Links to Other Modules

This module links to Module 2: Introduction to Ecohealth, and to modules on Ecohealth principles that include transdisciplinarity, systems thinking, participation, gender equity and knowledge to action. The nature of this module is to provide an opportunity to apply an Ecohealth approach in specific arenas. Ideally, all Ecohealth principles should emerge from discussions of the cases. It is the responsibility of trainers to help students uncover the principles embedded in these case studies.
In Southeast Asia, the “Green Revolution,” which began in the 1960s, promoted the widespread use of high yielding varieties, requiring high inputs of inorganic fertilizers, pesticides, herbicides, fungicides, and water to boost productivity. Although it has contributed substantially to meeting the growing demand for food over the past half century, it has also led to serious environmental and human health consequences.

Intensified livestock development has also occurred in Southeast Asia for the last three decades, and has improved diets and the nutritional status of populations, but also causes health and environmental problems. With increasing incomes and demand for meat, dairy, and egg products, livestock has become the fastest growing component of the agricultural sector. This in turn has led to structural changes in livestock production – from subsistence systems to intensive, commercial production systems. Livestock intensification is characterized by high-input practices, including the use of industrial feeds, which cause both environmental and public health problems, while also neglecting the needs of poor farmers who still rely on subsistent livestock production.

According to the World Health Organization (WHO), about 75% of new diseases affecting humans over the past decade have been caused by
pathogens originating from animals or animal products (WHO, 2011). This can be affected by how livestock are managed, which can potentially increase risks for human health. Zoonotic emerging infectious diseases threaten human, animal, and environmental health, representing one-quarter of the overall infectious disease burden in least developed countries (Grace et al., 2010). However, the positive effects of livestock intensification also need to be considered, such as reducing the price of protein for urban consumers, and improving biosecurity and disease control measures on well-managed farms, reducing the risk to human health.

Activities

**Activity 1**

*Learning Goal 1: To draw from the life experience of participants to identify the connections between agriculture and health, to identify themes and linkages, and to sensitize them about this important topic.*

**INSTRUCTIONS**

(20 minutes)

1. Ask participants to list agriculture activities that they know and then group those activities into themes such as crops, animal husbandry, fishery, and aquaculture, etc.

2. Then, ask participants to list the environmental and health impacts which those agricultural activities may have.
Activity 2

Learning Goal 2: Link agriculture and health issues and understand them in the context of Ecohealth principles and approaches. Explain those issues and their relationships, and understand how one might create conceptual models to “manage” them.

PARTICIPATORY CREATION OF A SCATTERGRAM OR RICH PICTURE OF ISSUES IN AGRICULTURE AND HEALTH AND HOW THEY ARE RELATED TO EACH OTHER.

INSTRUCTIONS

(60 minutes)

Building on the previous brainstorming session, ask students as a class, or in small groups, to create their own rich understanding of Ecohealth and agriculture.

1. Instruct participants to begin with a particular agricultural “commodity” (e.g., chickens or other livestock, or a particular crop). Then, ask them to write, without guidance, all the things that are related to raising, say chickens. We are looking for inputs (feed, water, disease case), outputs (manure, food, etc.), and outcomes (human nutrition & health – farmers and non-farming consumers, human disease, farmers’ income, etc.). Students could write on a large sheet, unstructured, as a kind of messy scattergram, or it could be created as a “rich picture,” as described in Module 4: Using Systems Concepts in Ecohealth.

2. Lead a discussion about, or ask students to draw the links between the various items they have listed, and talk about who is responsible for those things, and what are the gender and power issues that arise. This draws on the expertise and experience of the group, and begins to open up the discussion. The discussion should also include the reasons why people do the things they do (e.g., why do people raise chickens, why do they raise them in certain ways, etc.)?

At this point there is no intention of creating a model or theory. We are simply trying to expand the participants’ ideas about issues associated with agriculture and to link this module with the previous core modules.
Activity 3

Learning Goal 3: Develop capacity to approach agricultural and health issues with an Ecohealth perspective, relating these activities to the principles and vision of Ecohealth. Be able to compare the strengths and weaknesses of various conceptual models used to understand the links between health and agriculture.

INSTRUCTIONS

(30-40 minutes)

Lecture to introduce some conceptual frameworks on the links between agriculture and health.

Deliver a lecture to introduce some conceptual frameworks on the links between agriculture and health and to provide some real research examples on this topic.

The purpose of this activity is to equip participants with some theoretical frameworks and practical examples. The participants will be reminded to view those frameworks and examples from an Ecohealth perspective and to compare them with ideas they developed in the first two exercises.

HANDOUT

Print out your PowerPoint presentation.

The frameworks on the links between agriculture and health can be taken from the Key References, e.g., “Understanding the links between agriculture and health” (Hawkes and Ruel); and “For sustainable architecture, think bug.” (New Scientist).
Activity 4

Learning Goal 4: Understand the case studies that used an Ecohealth approach and be able to draw experience and lessons. Engage with others from different disciplinary backgrounds and work collaboratively to address an agriculture-related health issue using an Ecohealth perspective.

SMALL GROUP WORK ON CASE STUDIES AND REPORT BACK TO THE PLENARY.

INSTRUCTIONS

(2 hours)

1. Divide participants into small groups (about 5 participants per group). Ideally each group should contain participants from different disciplinary backgrounds. Each group is given a handout of case study materials on specific topics, for example, pesticide use related to a health issue, or animal husbandry related to a zoonotic disease, and some guiding questions.

Each group will be asked to conduct in-depth analysis of those case studies from an Ecohealth perspective and then to share their findings by reporting back to the plenary.

The purpose of this activity is to provide a chance for participants to apply what they have learned about Ecohealth to a real research project and to deepen their understanding about the principles of Ecohealth.

The cases suggested would provide good materials for this exercise. The selected cases should not only provide the results of the study, but also the process of the research including lessons learned and barriers encountered as well as coping strategies in overcoming the barriers during the process so as to provide a real sense of how Ecohealth approach was applied in reality. This activity probably needs 2 hours including group work and plenary feedback.

2. Summarize lessons from the case studies and bring out key learning points that may have been missed in the students’ discussion.

Handout

Case study materials provided by the manual or other case study materials selected by trainers.
Activity 5

Learning Goal 5: Develop capacity to approach agricultural and health issues with an Ecohealth perspective that includes systems thinking, transdisciplinarity, stakeholder participation, social and gender equity, knowledge-to-action and sustainability. Design the key elements and methodologies for an Ecohealth research project to investigate an issue where there appears to be a clear link between agriculture and health.

SMALL GROUP DISCUSSION TO WORK ON LOCAL AGRICULTURE AND HEALTH ISSUES.

INSTRUCTIONS

This session will need at least 2 hours including the reporting back session.

1. Participants are divided into small groups. This time participants from the same geographic location will be put in one group. Each group should be given a handout with questions and asked to discuss the questions. Encourage students to reflect back on the whole course and to integrate tools and ideas from the other modules.

2. Students are then asked to design a small Ecohealth research project on one of the identified issues. The purpose of this task is to link the knowledge and skills of Ecohealth to the reality participants face in their own contexts, and to encourage them to apply what they have learned.

3. Groups report back to class

Handout 1

See the Handout provided: “Small group work on local agriculture and health issues.”
Activity 6

Learning Goal 6: Summary and evaluation of the module.
Trainers summarize the module activity and evaluate the learning of participants.

INSTRUCTIONS

(30-40 minutes)

An effective evaluation activity would be to use the group work from the previous exercise as a basis for exploring what students have learned and how they have worked as teams to develop new understandings.

Alternative evaluation methods can be used.

This may also be an opportunity to evaluate the whole course, in which case more comprehensive evaluation tools should be used such as quizzes, evaluation forms, etc.

Timetable of the module

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>20 minutes</td>
<td>1. Initial brainstorming session on agriculture and health.</td>
</tr>
<tr>
<td>60 minutes</td>
<td>2. Participatory creation of a scattergram or rich picture of issues in agriculture and health and how they are related to each other.</td>
</tr>
<tr>
<td>30 minutes</td>
<td>3. Lecture to introduce conceptual frameworks on the links between agriculture and health.</td>
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<tr>
<td>2 hours</td>
<td>4. Small group work on case studies and report back to the plenary.</td>
</tr>
<tr>
<td>30 minutes</td>
<td>5. Plenary discussion facilitated by trainers on how to apply for lesson learned from the case studies to local issues face participants or students.</td>
</tr>
<tr>
<td>2 hours</td>
<td>6. Small group discussion to work on local agriculture and health issues.</td>
</tr>
<tr>
<td>40 minutes</td>
<td>7. Summary and evaluation of the module.</td>
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<td>Total: 7 hours</td>
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</table>
Evaluation

Various methods can be used to evaluate the learning of participants. For example, a simple quiz can be used to test whether participants understand the links between agriculture and health. Open-ended questions can be distributed to participants to obtain their reflection on this module. Other participatory evaluation methods can be used to do the evaluation. Trainers should select the methods based on their experience and needs. Refer to Module 2: Introduction to Ecohealth and Module 1: Approaches to Designing and Teaching Ecohealth courses for more details.

Terminology

**Subsistence farming**
Farmers are engaging in subsistence farming when they grow only enough crops for themselves and their families. They face different problems than commercial farmers, (e.g., a rise in fuel costs may not affect them, but problems like droughts and being sick or injured for a few days would). Subsistence farming is usually on a small plot of 1-3 acres. These farms have simple tools (e.g., hoes, machetes and digging sticks). The work is done by the farmer and family and the produce is eaten by the farmer and family. (Wikipedia)

**Green revolution**
A great increase in production of food grains (especially wheat and rice) that resulted in large part from the introduction into developing countries of new, high-yielding varieties, beginning in the mid-twentieth century. Its early successes were in Mexico and the Indian subcontinent. The new varieties require large amounts of chemical fertilizers and pesticides to produce high yields, raising concerns about cost and potentially harmful environmental effects. Poor farmers, unable to afford the fertilizers and pesticides, have often reaped even lower yields with these new grains than with the older strains, which were better adapted to local conditions and had some resistance to pests and diseases. (www.answers.com)

**Agricultural intensification or intensive farming**
The cultivation of land where there are very high inputs of labour, fertilizers, pesticides, herbicides, fungicides, to obtain the maximum output. Examples include mono cropping (plantations) of coffee, tea, or cattle ranching in Amazonia.
Intensive farming or intensive agriculture is an agricultural production system characterized by high inputs of capital, labour, or heavy use of technologies such as pesticides and chemical fertilizers relative to land area.

Intensive livestock farming can involve large numbers of animals raised on limited land, and requiring large amounts of food, water, and medical inputs. Confined indoor intensive livestock operations are often referred to as factory farming and present issues related to animal welfare, pollution, and health. (Wikipedia)

Animal husbandry
The agricultural practice of breeding and raising livestock.

Zoonotic diseases
Any disease or infection that is naturally transmissible from vertebrate animals to humans and vice-versa is classified as a zoonosis according to the PAHO publication “Zoonoses and communicable diseases common to man and animals.” Over 200 zoonoses have been identified and are caused by all types of agents: bacteria, parasites, fungi, viruses, and unconventional agents. (www.who.int)

Sustainable agriculture
Farming that integrates ecological principles. Defined as “an integrated system of plant and animal production practices having a site-specific application that will last over the long term to: satisfy human food and fibre needs; enhance environmental quality and the natural resource base on which the agricultural economy depends; make the most efficient use of non-renewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls; sustain the economic viability of farm operations; and enhance the quality of life for farmers and society as a whole.” (Wikipedia)

Food safety
Food safety is the use of various resources and strategies to ensure that foods are properly stored, prepared, and preserved so they are safe for human consumption. One of the most important aspects of practising food safety involves preventing foods from becoming contaminated. Making sure foods are stored properly helps avoid any type of food contamination. (www.wisegeek.com)

Food security
People are considered food secure when they have all-time “access to sufficient, safe, nutritious food to maintain a healthy and active life” (Definition adopted by the 1996 World Food Summit). Food security includes these three main elements:
Food availability: Food must be available in sufficient quantities and on a consistent basis. It considers stock and production in a given area and the capacity to bring in food from elsewhere, through trade or aid.

Food access: People must be able to regularly acquire adequate quantities of food, through purchase, home production, barter, gifts, borrowing or food aid.

Food utilization: Consumed food must have a positive nutritional impact on people. It entails cooking, storage, and hygiene practices, individuals’ health, water, and sanitation, and feeding and sharing practices within the household (World Food Program, www.wfp.org/food-security).

Ecological health

Ecological health, ecological integrity or ecological damage are the symptoms of an ecosystem's loss of carrying capacity, its ability to perform ecological services.

Measures of ecological health, like measures of the more specific principle of biodiversity, tend to be specific to an ecoregion or even to an ecosystem. Some general symptoms of ecological damage include:

- The build-up of waste material and the proliferation of simpler life forms (bacteria, insects) that thrive on it – but no consequent population growth in those species that normally prey on them;

- The loss of keystone species, often a top predator, causing smaller carnivores to proliferate, very often overstressing herbivore populations;

- A higher rate of species mortality due to disease rather than predation, climate, or food scarcity;

- The migration of whole species into or out of a region, contrary to established or historical patterns;

- The proliferation of a bio-invader or even a monoculture where previously a more biodiverse species range existed.

Some practices such as organic farming, sustainable forestry, natural landscaping, wild gardening, or precision agriculture, sometimes combined into sustainable agriculture, are thought to improve or at least not to degrade ecological health, while still keeping land usable for human purposes.

Deforestation and the loss of deep-sea coral reef habitat are two issues that prompt deep investigation of what makes for ecological health. (Wikipedia)
Key References


CASE STUDIES


Achmadi, U.-F. Case study on malaria from Indonesia, University of Indonesia.

Additional References


Fenner-Crisp, P., Carl L. Keen, Jason Richardson, Robert Wood, Rudy Richardson, Karl Rozman, (2010). A Review of the science on the potential health effects of pesticide residues on food and related statements made by interest groups.

### Small-Group Work on Local Agriculture and Health Issues

<table>
<thead>
<tr>
<th>Question</th>
<th>Answers / Points from discussion</th>
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<tbody>
<tr>
<td>1. Briefly describe the place you are considering.</td>
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<td>2. What are the main agricultural activities in your place and what are the current and potential consequences of those agricultural activities on the health of humans, animal, and ecosystems?</td>
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<tr>
<td>3. Is there any action taken by the government, community, or other stakeholders to deal with the adverse health outcomes of those agricultural activities?</td>
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<td>4. To the best of your knowledge, has any research been done to look into those issues? If so, what kind?</td>
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5. This is the most important part of the exercise and should take most of your time.
Reflect back on all the tools, ideas, strategies, and principles you have learned about during the Ecohealth course. See if you can apply any of those tools and ideas in this exercise.

How could you undertake an Ecohealth research project to fill one of the gaps?
How could the research outcomes be best applied to reduce the adverse health outcomes of those agricultural activities on human health, the health of animals and the environment?

In developing a research idea, consider the following stages of research design:
1) determine the problem statement;
2) determine the research objective;
3) define the research question or hypothesis; and
4) establish the methodology, sampling strategy, data collection, and analysis process; and
5) determine the dissemination of research findings and the integration of knowledge to action.
APPENDIX I AND II

Appendix I: Defining and Negotiating Health

Appendix II: Using and Developing an Ecosystem Approaches to Health Case Study in Your Teaching
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) Constitution: “...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 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

"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).
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.”

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 Appendix X 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.

**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.

**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
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:
  o How is “health” a negotiable term?
  o How did the negotiating process occur?
  o Are any of these definitions transdisciplinary?
  o 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

GENERAL 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.
Using and Developing An Ecosystem Approaches to Health Case Study in Your Teaching

Lead authors: Dr. Bruce Hunter, Dr. David Waltner-Toews, and Suzanne McCullagh

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?

*Using and Developing an Ecosystem Approaches to Health Case Study in your Teaching*
**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.

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<th>Step</th>
<th>Description</th>
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<td>1. <strong>Introduce the case study place.</strong></td>
<td>This could be a film, images, or guest lecturer which introduces the people and the place that the case study connects with.</td>
<td>Gain a sense of place.</td>
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<td>2. <strong>Introduce case scenario or narrative and clearly articulate the case study work and expectations.</strong></td>
<td>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.</td>
<td>Confront a complex ecohealth issue.</td>
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<tr>
<td>3. <strong>Site visit. (If possible.)</strong></td>
<td>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.</td>
<td><strong>TASK:</strong> Have students take photographs during the site visit that they can later use in constructing a <em>Rich Picture Map.</em></td>
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<td>Step</td>
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<tr>
<td>4. Site visit debrief (1/2 hour)</td>
<td>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.</td>
<td>Reflective activity</td>
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<td>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.)</td>
<td>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.</td>
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<tr>
<td>6. Prepare students to facilitate community engagement. <strong>NOTE:</strong> Try to find ways to make this a two-way process, so that students are also involved in the community context and events.</td>
<td>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.</td>
<td>This could be done by providing sessions on conducting stakeholder meetings, focus groups and other forms of consultation.</td>
</tr>
<tr>
<td>7. Students prepare for conducting a community consultation.</td>
<td>Students will need to come together as a large group to decide how they will facilitate their time with community members.</td>
<td>Students practice building consensus, planning in large groups and collective action.</td>
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<td>Step</td>
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<td>8. Community consultation</td>
<td>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.</td>
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<td>9. Case Study Presentations</td>
<td>Students present their work in groups.</td>
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|                      | 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-biologic 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:


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?
  o 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.

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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?