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Ecosystem Management

Concept to Local-Scale Implementation

Facilitator Manual

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ISBN: 978-92-807-3253-5
Job Number: DEP/1505/NA

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Introduction for Facilitators

This Ecosystem Management training program is designed to bring together, in a facilitated and highly interactive setting, a group of 15–30 catchment managers, advancing their interest and skill in ecosystem approaches to water and to their catchment. Our opening perspective is that the managers most likely to attend are based in integrated watershed management IWRM and bring an engineers' approach to resource management. These materials are designed to support a facilitated, face-to-face, week-long workshop that will empower such managers to understand the tools and concepts needed to build programs, direct staff and allocate resources as they develop and implement an ecosystem approach. This week-long workshop is designed to be a facilitated experience; there is no intent that a participant will read and master the materials on their own.

There always will be benefit in local adaptation and customization of materials to be offered. Local case studies, a local facilitator, and strong local examples demonstrating gender roles are expected in every application of the materials. It is quite possible, for example, that the most appropriate participants in a region are unable to participate for more than 3 and a half days. In such an instance, it would appropriate to select a subset of these materials that best meets the needs of that chosen audience.

The role of the facilitators is central to the capacity-building approach we offer in the materials. We expect that there will be two facilitators involved in each offering of the training. Usually, one of those two will be familiar with the training materials themselves, and familiar with the field of ecosystem management. The second person is expected to have at least some experience in capacity building and in water or ecosystem management but is expected to play a more significant role in local calibration. As described below, the training is designed to be held in a self-contained, relatively isolated setting, perhaps a training facility or a lodge in a relatively rural setting. Such a setting will encourage the participants to focus on the material and the interactions, rather than on distractions from a surrounding community. The setting also will facilitate the two field trips that are built into the training design. We anticipate that the local facilitator will be very familiar with the physical setting of the training (i.e., the catchment where the training is being held) and therefore, will be able to lead local calibration (i.e., development of local case studies, interpretation of the materials in a local context, selection of participants, identifying gender specific examples, and arranging local logistics).

Our intent in designing these materials is that the two facilitators play very significant but distinct roles. The role of the local facilitator is envisioned to include:

- Identifying and recruiting participants, including sending, collecting and synthesizing the pre-questionnaire;
- Choosing the training facility (following the guidance below) and ensuring that it meets the needs of the workshop;
- Selecting a local catchment for the two field trips, and ensuring that the participants can view appropriate management practices, meet with local people, and have access to lunch, bathrooms and other amenities in the local catchment;

- Arranging for local logistics such as bus transport to the local catchment; and
- Participating as a co-leader in advance preparation discussions, in sessions during the workshop, in the evening reflection that occurs every night during the workshop, and in the post-workshop reflection session.

At this point, it will be wise for the local facilitator to consider the venue and the opportunities for local, on-the-ground knowledge. If you feel you cannot successfully organize the two field trips, as scheduled, an alternative might be to invite in one to three local people who have broad knowledge and could contribute to the participants' understanding into the workshop. However, this should be undertaken with caution; the specific role and expectations of the invitees should be considered before inviting them, as should the participant interactions in the workshop.

The role of the ***content facilitator*** is envisioned to include:

- Reviewing the ***Participant Manual and Facilitator Manual*** and making a first cut at a modified training design, then offering that design to the local facilitator for comment;
- Bringing expertise both in pedagogy (i.e., in facilitating and leading people in a workshop setting) and in content (having some expertise in the field of ecosystem management itself);
- Participating as a co-leader in advance preparation discussions and in sessions during the workshop; taking a leadership role in the evening reflection that occurs every night during the workshop, and in the post-workshop reflection session; and
- Leading development of the post-workshop report that goes from the facilitators to the leadership of the group that sponsored the workshop (e.g., UNEP) and to the leadership of the administrative home of the participants (e.g., a Ministry or a Catchment Board).

We stress that this is intended to be an adaptable experience. That is, this ***Facilitator Manual*** and the accompanying ***Participant Manual*** are generic materials intended to be a structure for a capacity-building workshop. Every implementation should be unique; each unique implementation should be adapted by the two (or more) facilitators to meet the ecological, cultural, political, economic, and practical needs of the audience being engaged.

Structure of the two manuals

As you have seen, the material for this capacity development experience is presented in two documents:

- Our intent is that each participant receive a printed copy of the ***Participant Manual***, which has content about all of the training. We suggest that the facilitators read the P***articipant Manual*** in advance, seeking modifications (e.g., local case studies, adaptation to a local political or geographic context) that could make the material more useful for their specific audience. These adjustments would then be reflected in modified slides for the presentation. It also is possible to custom-edit the ***Participant Manual*** before printing if you obtain a Word version (available from UNEP).
- The ***Facilitator Manual*** contains pedagogical guidance about ways we think the participants can best be engaged, and ways to conduct the workshop. This certainly is intended to be

customized for each offering. However, rather than revising and printing a customized version of the ***Facilitator Manual,*** we suggest that the facilitators review the material and work together to select the exercises, cases and discussions most appropriate for a particular audience and for the style of the facilitators involved. We recognize that each person has a particular teaching style, and each person will find some materials more comfortable than others. We feel that an instructor's comfort in the workshop strongly influences the quality of the experience received by the participants. Therefore, we strongly encourage customization.

- The ***Facilitator Manual*** is presented as a tool to guide facilitators through the material, and to support their leadership of the sessions. We have not repeated much of the material in the ***Participant Manual***; rather we offer headings and pedagogical thoughts, supplemented by entire case studies when we feel that facilitators may wish to use. Those extended cases are not in the ***Participant Manual.***
- In developing the ***Participant Manual***, and the entire workshop, we have attempted to ensure that the overall objective and the objectives of each day and each session are ***SMART.*** That is, they are intended to be Specific, Measurable, Achievable, Relevant and Time-bound. We encourage you to examine the structure of each day and each exercise, asking where and to what degree we have achieved that goal. We strongly encourage you as facilitators, to modify the objectives and/or the exercises to make the activities in your setting more intentionally ***SMART.***
- This manual and workshop, by design, are **continuously evolving and improving**. This Ecosystem Management training program was designed, reviewed and then tested by a large number of highly experienced trainers and facilitators. Every review comment, from authors, participants, reviewers and administrators has been considered and addressed where appropriate. We strongly request feedback, ideas, reactions, suggestions, case studies, examples and comments of any nature. Every comment received will be considered and will help improve the product for others. Please consider incorporating a formative evaluation, as we suggest at the end of Day 2, and a summative evaluation, as we suggest at the end of Day 5. We invite you to share any and all comments, from those two evaluations and/or from your reflections as facilitators with Elizabeth Khaka at UNEP Elizabeth.Khaka@unep.org.

Structure of the supporting slide decks

We have prepared an extensive series of PowerPoint slides in support of this capacity-building experience. They are distributed with the two manuals, and are organized to follow the Modules. When there is material to be presented in support of the content, we identify headings in the ***Facilitator Manual,*** parallel to the headings in the ***Participant Manual****.* We then identify the slide deck that corresponds to that material. You will notice that some exercises outlined in the slides refer to the participants' catchment while others refer to the workshop catchment. These exercises are intentionally targeted toward the catchment to which they refer. Exercises that focus on the participants' catchment will help participants build tools that they can use when they return home

and continue implementing ecosystem management. Exercises that focus on the workshop catchment inform and structure the field trips. As you use your slides, consider the differences as they are described in each exercise to avoid confusion.

Invitations and advance preparation

There should be routine communication between the content facilitator and the local facilitator for several months in advance of the workshop. That interaction should include review of the materials, agreement on roles (e.g., who is likely to lead each section), selection of venue and participants, and clarity on logistical arrangements. Such communication will allow the local facilitator to understand the materials sufficiently that he/she can develop local examples and case studies.

Inviting people: As described in the *Participant Manual,* the audience for this workshop includes managers of small- to mid-sized catchments. Those people should be ***decision-makers***, people with responsibility and authority for managing a land area (perhaps a catchment or a geo-political jurisdiction within which they have responsibility), and for water-resource management as well as the lands that control the quality and quantity of those water resources. In many countries, IWRM and other cross-sectoral ideas have resulted in institutions charged with catchment management. In others, it is very difficult to avoid the sectoral approach. Our intent is to engage the individuals most clearly responsible for decisions about management of the lands and waters of a catchment, whatever their institutional affiliation. We have used the concepts and ideas of IWRM because there is a global IWRM momentum that can assist people in on-the-ground decision making. The ecosystem management approach taken here differs from IWRM by incorporating ecosystem services and land-water interactions to a greater degree. Through this capacity development experience, we intend to increase the ability of our participants to take an integrated, ecosystem approach to identifying and solving problems on-the-ground or directing people who will do so.

We suggest that two or three people from a given catchment attend together; that will encourage interaction and sustainability, strengthening the utility of lessons learned. The invitation should be sent well in advance, so people can prepare any background materials you feel are appropriate. We suggest that participants be asked to bring information about the lands, or the catchment they manage. That information should include a map (any level of detail including a sketch is acceptable), a textual description of their watershed (one paragraph is plenty of detail), a short (two to three paragraph) discussion that addresses *What are the management objectives (usually IWRM objectives) for your catchment?, Are there objectives you are not able to meet at present?, How would you frame your catchment objectives at the ecosystem scale rather than focusing specifically on water*?

It will be helpful if participants complete a brief questionnaire about their background and responsibilities before the workshop. Such background information will assist the facilitators in targeting and pacing the content, and in grouping people through the week. A sample questionnaire, to be modified as appropriate is offered below.

Training facilities and exemplary catchments will vary widely depending on opportunity, cost and your own personal style. A core requirement is that you are easily able to reach a catchment in which you can demonstrate various land and water management practices and where you can stimulate discussions during the field trips on Days 2 and 4. The whole workshop rests on the idea of a conceptual model that is co-developed by the participants and the facilitators, and that then becomes a tool for visualizing ecosystem services, water flows, and land management. The catchment you choose does not need to have any particular attributes; it can be mountainous or coastal, wet or dry, but we feel that participants will get more out of the experience if most, or all, of the visit is to a rural not an urban part of the catchment.

Facilitators will need to spend time in advance of the workshop to structure the catchment field trips. You should identify one or two people who can speak about ecosystem management in the catchment. These could be people whose responsibility it is to manage water resources in the catchment, forest resources, water treatment, environmental restoration, invasive species control, large-scale agriculture, or other resources. You might consider a local political person who is responsible for balancing human values and distributing resources. The one or two people whom you decide can best speak about ecosystem management of the catchment should be contacted well in advance of the workshop to ensure that they can present to the group and be available for small-group interaction. In addition, workshop attendees will identify other stakeholders they would like to meet during the field trips. You may want to prepare in advance a list of people you think would be interesting to have workshop attendees meet and ask those people to be available to meet with groups.

The catchment field trips (afternoon of the second and fourth days) provide real-world experience with which participants revise their conceptual model. The workshop catchment is the place we use to build understanding of ecosystem management, and it is expected to provide constant reference material throughout the workshop. During Day 2, participants have their first opportunity to explore the catchment and meet with stakeholders. The goal of this field trip is to provide adequate substance that the participants use to revise the conceptual model they build during Day 1. It is important to consider how you want the participants to balance exploration time and stakeholder meeting time in the catchment. Plan to recommend key sites that demonstrate a range of management practices that are being used in the catchment. Possibilities of places you might consider include exemplary agriculture, waste water treatment, protected areas (local wildlife), problem areas (e.g., with invasive species), exemplary management actions on the ground (restored wetlands), or a local community. Build a framework of suggested visits to three to five places that participants can reach independently on foot. You may choose to use group transportation to visit a second site that demonstrates different conditions. Work to balance timing of site visits and stakeholder meetings so that participants have adequate time to experience management in the catchment and gain an understanding of management practices being implemented on the ground.

When participants return to the catchment on Day 4, they should be able to apply EM principles and guidance to the workshop catchment. At the end of the morning on Day 4, they will be asked to reflect on what they saw in the first field trip, frame their interpretation of goals and practices to achieve those goals, and criteria for evaluating the practices. That afternoon, they will go back to the workshop catchment and look at those practices with new knowledge about EM.

As facilitators, you will want to schedule locations for the participants to see and people for them to meet, so that they can get an idea of the goals and practices in the catchment watershed, and evaluate the degree to which those practices follow an EM approach.

The ultimate goal of the two field trips is to provide an on-the-ground context for framing and evaluating EM principles, empowering the participants to take ideas home to implement in their own catchments.

Regarding the training facility, our suggestion is that you will be most successful if the training occurs in a relatively rural setting, preferably in a small hotel. In our experience, the best places are small hotels set on the edge (within 3–5 kilometres) of a village. The facility should have enough rooms to house all of the participants, facilitators and observers, preferably in single rooms. It should have a restaurant so you can access all meals on-site, a plenary facility for 35–50 people (which might be the restaurant if you require the entire hotel) and breakout locations (which could be corners of the restaurant). In such a setting, people are more likely to be drawn to each other and to optimize their interaction. Such a setting encourages small-group meetings outside (weather permitting), morning and evening walks, and other more reflective ways to spend time. In our experience, these settings help participants delve more deeply into the content and explore more widely with their peers. Participants will be happier if they have wireless Internet access in their rooms. We advise against having two to three Internet terminals readily accessible from the training rooms because they will serve as a distraction.

Ensure that the training facility will provide restricted access to teaching equipment (i.e., restricted to the facilitators so you are not competing with other people who may be using the facility at the same time). That equipment should include a printer, copy machine, LCD projector in the room where you will hold plenary sessions, flip charts in breakout rooms, scanner, and Internet access (of course, Internet access does not have to be restricted).

Note, however, that a very wide range of training facilities can be made successful. The description we offer above is intended to offer you suggestions to be modified to meet your specific needs and opportunities.

A potential agenda for a week follows for your reference.

Participant Questionnaire

Greetings

We are delighted that you have decided to join us in ***(…location…)*** for the ***UNEP (…add co-sponsor as appropriate…)*** workshop on Ecosystem Management. We believe that Ecosystem Management is an exceptionally useful and integrated way to understand and manage the relationships among the land and water resources; the plant, animal and human communities of a catchment. Our goal is to engage you in a week-long capacity development experience that will allow you to develop an ecosystem management plan for your catchment.

In order for us to tailor the training materials most effectively to your needs, we would like to have a little information about your background and interests before we meet. Would you please complete this questionnaire and return it by ***(…post or e-mail…)*** to us? We would appreciate receiving the materials by ***(… date…)***. If we do not hear from you, we may not be able to meet your goals for the week.

Thank you and we look forwards to meeting you in ***(…location…)*** soon.

Sincerely

(Local facilitator) (Content facilitator)

(Institutional affiliation) (Institutional affiliation)

Name_____Gender ( ) M ( ) F Professional title _____

Catchment/location _____Years or professional service (any role) _____

Any dietary needs or restrictions? _____

Educational and professional background _____

This workshop will help you envision, and begin progress toward an ecosystem management plan for your catchment.

How likely are you to be willing and able to implement an ecosystem management plan?

( ) Very ( ) It's probable ( ) It's at least possible ( ) Quite unlikely

If you implemented an ecosystem management plan, about what percent of the plan would address water?

( ) About 100% ( ) About 80% ( ) About 60% ( ) 50% or less

Sample Agenda for the Week

Day 1: A Common Starting Point

Module 1 • Opening and Introductions	8:00–9:00
Module 2 • Starting Here: An initial conceptual framework	9:00–9:30
Break	9:30–10:00
Module 2 Continues	10:00–12:30
Working lunch	12:30–13:30
Module 3 • Complementarities Between IWRM and EM	13:30–14:30
Break	14:30–15:00
Module 4 • The Structure and Function of Ecosystems	15:00–17:00

Day 2: Thinking Like an Ecosystem

Module 5 • A Conceptual Framework for Understanding Ecosystem State and Impact	8:00–9:30
Break	9:30–10:00
Module 6 • State of Ecosystem Services and Functioning	10:00–11:30
Mid-term assessment: What things are going well and what could be improved?	11:30–12:00
Working lunch	12:00–13:00
Module 7 • Field trip • On-site discussion (17:00–18:00)	13:00–18:00

Day 3: Thinking and Acting Like a Manager

Module 8 • Understanding Current Conditions	8:00–10:00
Break	10:00–10:30
Module 9 • Thinking Like a Manager: Beginning the cycle of strategic, adaptive management	10:30–12:30
Lunch	12:30–13:30

Module 10 • Human Activities Are Central to Ecosystem Management	13:30–15:00
Break	15:00–15:30
Module 11 • Incentives and Tools for Local-scale Management	15:30–17:00

Day 4: Managing our Ecosystems

Module 12 • Valuing Ecosystem Services	8:30–9:30
Break	9:30–10:00
Module 13 • Trade-offs and Goals for Ecosystem Management	10:00–12:00
Lunch	12:00–13:00
Module 14 • Field trip—We will return to the same watershed, applying our conceptual model to that local condition, demonstrating good management practices currently in place	13:00–18:00

Day 5: Putting It All to Work

Module 15 • Selecting Tools for a Local Application	8:00–10:00
Break	10:00–10:30
Module 16 • Monitoring and Evaluation	10:30–12:30
Lunch	12:30–13:30
Module 17 • Completing the Cycle of Strategic, Adaptive Management	13:30–15:00
Break	15:00–15:30
Module 18 • Workshop Synthesis, Closing and Evaluations	15:30–17:00

Day 1: A Common Starting Point

Day 1 at a Glance

The workshop will begin by recognizing and building upon what people already know, starting with familiar ground. Participants will work together in groups to develop an initial framework about how catchments, landscapes and ecosystems are structured and how they function. We will build a conceptual model for use in the local catchment on Day 2 where we will develop a common visual reference and will ask people to begin to refine their initial models.

The afternoon session focuses on comparing and contrasting IWRM and EM as management models and increasing participant understanding of the structure and function of ecosystems. The background knowledge contained in these models will provide content that will be used extensively during the field trip on Day 2 to continue building and refining conceptual models.

- ***Ground this session in IWRM, using IWRM as a reference point and discussing ways EM complements IWRM.***
- ***Goals of the afternoon session are to demonstrate that***
  - Ecosystems have relatively similar patterns of structure and function;
  - As we change some attributes and flows, there is a concomitant change in others;
  - We can use a framework (DPSIR) to express those changes; and
  - People find that those attributes and flows are useful and valuable. We use the concept of *ecosystem services* to express that value.

Module 1: Opening and Introductions
8:00–9:00

The catchment scale allows managers and stakeholders to come together to understand and address the interactions between land and water in a relatively small, well-defined space. This facilitated, active-learning, five-day workshop will help catchment managers frame and implement management objectives that approach a catchment as an ecosystem, valuing ecosystem services as a metric for decision making.

It will be useful to point out to participants that the *Participant Manual* contains more depth than can be covered in the workshop. That serves as reference material and as a starting point for them to learn more about any subset they find particularly useful or interesting. Further, the structure of the *Participant Manual* is that it has a section for notes, a place to personalize each module.

Module 1 at a Glance

- 10 min Welcome on behalf of UNEP and IISD, or whomever are your contributing partners
- 20 min Introductions of all facilitators and participants
  - Tell us your name and affiliation
  - Tell us a little about your experience and interest in ecosystem management
- 30 min Overview of the workshop
  - Context and overall objectives
  - Specific learning objectives for the week
  - Walk-through of the week's agenda

Learning Objectives for Module 1

- ***Develop an understanding of workshop goals, objective and approach***
- Begin to develop familiarity with facilitators and other participants

Overall Learning Objectives of the Workshop

Our goal is to empower an ecosystem approach to informed decision making about water resources and the landscapes that influence their condition.

At the conclusion of this capacity development workshop, the successful participant will have experienced hands-on, highly interactive problem-solving in and around a problem of relevance to their professional lives. The participant will have a strengthened conceptual foundation and tool kit that allows her/him to frame local problems in an ecosystem context, and empower him/her to develop solutions to such a problem. Further, the successful participant will understand that ecosystem management is a reflective and adaptive experience. Successful implementation of an ecosystem approach requires framing objectives with measurable outcomes, collecting information on those outcomes and the forces that control them, reflecting on both the objectives and the controlling forces, adapting either or both as necessary, and implementing again in an iterative and transparent fashion.

Approach

During this entire workshop, gender will be integrated as a transversal theme. Gender is a planning approach, a methodology which increases the relevance, effectiveness and efficiency of interventions because it brings the respective needs of women and men to the heart of planning. This is particularly important for ecosystem management because women play key roles as users and often managers of ecosystem services. Throughout this workshop, and your personal application of ecosystem management, priority should be given to methods that encourage equal participation in group discussions, discussions in pairs, system of rotating chairs, limited speaking time per participant and monitoring male/female distribution in working groups.

Module 2: Starting Here—An initial conceptual framework
9:00–12:30

Module 2 at a Glance

We will get participants to think, interact and talk about their local experiences and their personal catchment. They will use that as a platform from which to build a conceptual framework that describes how a generic catchment works, how resources flow, attributes change, and people benefit as things change.

- 20 min Small group discussion.
  - Break participants into groups of four to six
  - Ask each group to develop a single answer to the question *What do you see as opportunities and constraints to developing an ecosystem management plan for your catchment?*

- 10 min Plenary report back from the groups

Break
9:30–10:00

- ***30 min Overview of the local catchment***
- ***90 min Groups develop initial conceptual framework of a catchment***
- ***30 min Plenary report back from the groups***

Learning Objectives for Module 2

- ***Become exposed to and familiar with the local catchment we will use for reference***
- ***Be able to frame a conceptual model for a catchment, describing both its material flows and its stakeholders***

An Adaptable Approach to Capacity Development

This capacity-development exercise is designed to be mobile, and to be locally adapted at the site of each implementation. Each time this workshop is offered, facilitators recruited by UNEP and their local colleagues develop specific materials relative to a local catchment; those materials are used in the workshop and the week includes two half day field trips to that catchment. The goal of this approach is to optimize participant engagement, to make this capacity development experience as practical and hands-on as possible.

Catchment Context

Background development: Working together as content facilitator and local facilitator, develop in-depth materials about the local catchment you will use as reference in this workshop. This should include detailed maps and photos, usually including materials from Google Earth. During this phase of the workshop, present an overview of that local catchment, the landscape, the people who live and work here, the issues being faced and the decisions that must be made.

Notes

How Does This All Work?

Assign people to groups of three to five for the rest of the session. Ask each group to develop a conceptual model or mind-map of the catchment and the ways people use resources. In this context, we are asking them to picture the flows of water through the landscape, and the ways people use and influence those flows. This model should include both the biophysical attributes of the catchment and the various stakeholders who have interest in those attributes. They should think about the quality, quantity and timing of the water resource. They should think about the land characteristics and land management that control those variables; how they would express those relationships in a way that would allow them to explain them clearly to someone else? Participants might ask themselves key questions (e.g., *Are women's/men's constraints, needs and views reflected in your catchment management, Who are the key players in this catchment*?)

Groups should elect a spokesperson who will represent their group

- Ask them to spend about 45 minutes developing a conceptual model of the catchment; allow the groups to interpret the term conceptual model in any way that seems to make sense.
- Return to plenary.
- Assign groups assigned numbers 1 through *n*.
- The spokesperson for group 1 presents the group's model.
- Group 2 serves as peer reviewer for group 1. In that function, the role of the peer review group is to pose one question that clarifies what the presenting group meant by some element of their model, or causes the group to think more deeply about some relationship in their model. It also allows Group 2 to provide or seek depth that Group 1 did not mention.
- Continue with Group 2, proceeding in a circle such that Group 1 is peer reviewer for Group *n*.

You probably want to make a common conceptual model to which everyone can refer as they visit the local watershed. You may wish to combine the best elements of various models into a common one, or you may wish to use your own or use the following as that common model (compliments Gregory Cunningham, US NPS, Kawaihae, Hawaii).

Figure 1: Model Watershed

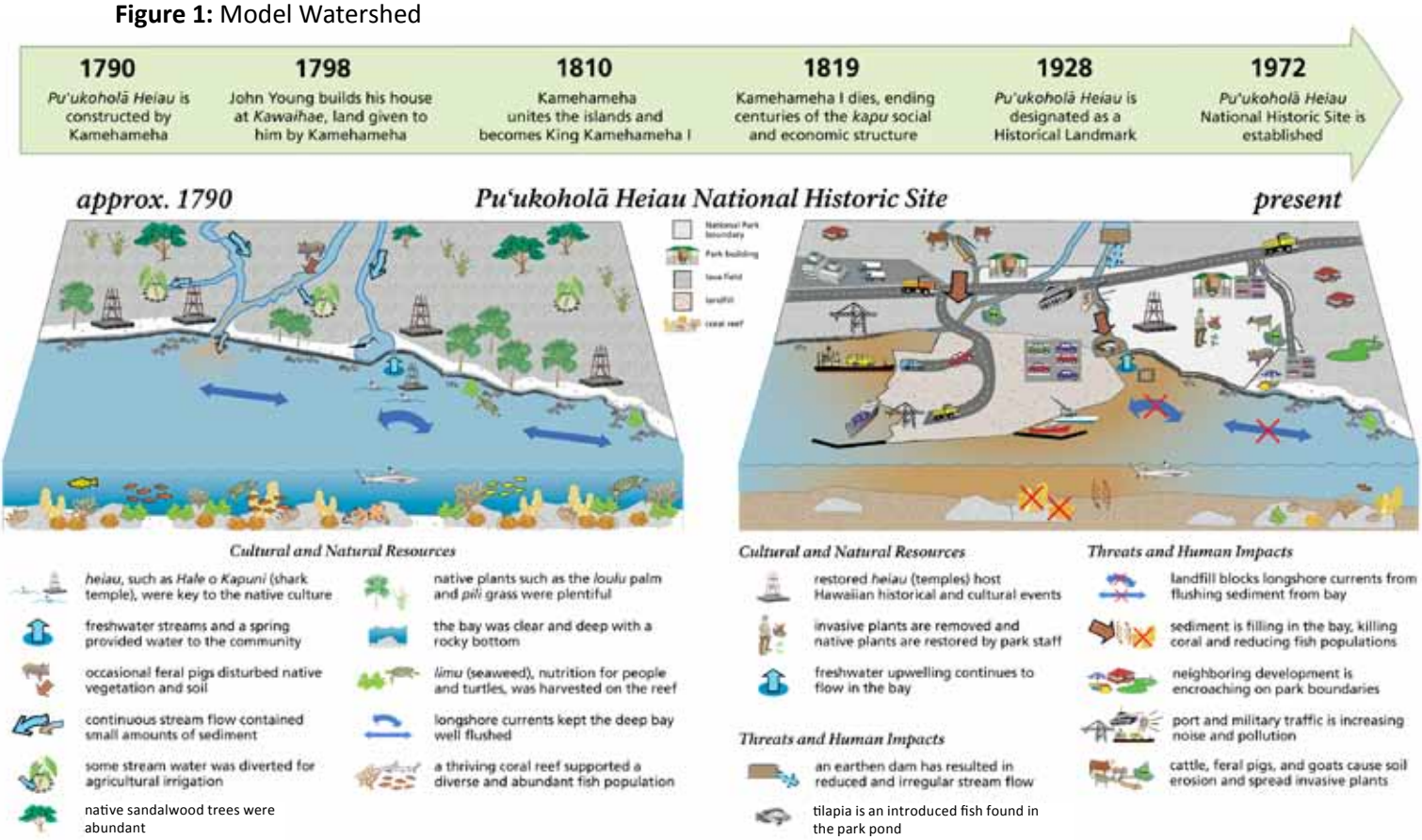


Image courtesy of US National Park Service, Pu'ukohla National Park

Working lunch
12:30–13:30

Participants should schedule lunch with their group. Tomorrow afternoon, we will visit the local catchment. During lunch, each group should identify at least three things they would like to see or know or learn about or people they want to meet in that local catchment.

Notes

Module 3: Complementarities Between IWRM and EM
13:30–14:30

Module 3 at Glance

IWRM is a globally important, widely accepted and adopted way of managing quantity and quality of waters. It ties together surface and groundwater, as well as policy and science. Ecosystem management can (but does not always) adopt the same endpoints as IWRM, but it takes a broader, more holistic and more landscape based approach to reaching the desired end states.

- 30 min Presentation
- 5 min Framed questions
- 15 min Presentation of material
- 10 min Discussion

Learning Objectives for Module 3

At the end of the module the successful participant will:

- Understand the concepts and scope of Integrated Water Resource Management (IWRM) and the elements that are subjected to integration; and
- Understand the differences and similarities between IWRM and Ecosystem Management.

Opening discussion with the whole group:

- How are you implementing IWRM in your catchment now?
- Does your current management allow you to meet the objective of increasing benefits from water resources? Can you increase other services from the catchment?
- Lead them to a discussion (suggested if necessary) that EM offers a tool for getting more services from the landscape

What Is Integrated Water Resource Management (IWRM)?

The Module 3 slides have content that allows you to present material addressing this topic.

What Is Ecosystem Management?

The Module 3 slides have content that allows you to present material addressing this topic.

Notes

Break
14:30–15:00

Module 4: The Structure and Function of Ecosystems
15:00–17:00

Module 4 at a Glance

Ecosystems are spatially bounded interactions among plants, animals, and their abiotic environment. All ecosystems have a range of attributes such as their structure (kinds and numbers of components) and function (rates at which various processes occur). In any given ecosystem, a subset of those attributes is of value to humans. Those valued attributes are ecosystem services, a metric that allows us to quantify the goods and services humans wish to retain from a given ecosystem. Ecosystem management consists of identifying those ecosystem services, and managing for their sustainability.

- 35 min Presentation: Ecosystems, their functioning and services
- 10 min Ask individuals to list and rate priority ecosystem services for any three stakeholders you specify
- 25 min Large group session to consolidate the groups' ecosystem service lists, identify additional services that were not included, discuss differences in rating among groups, and consider new stakeholders relevant to the workshop catchment
- 20 min Small group session to build a new table of ecosystem services for the top three stakeholders as identified by the group
- 15 min Draw plenary together to discuss and clarify issues
- 15 min Preparation for tomorrow's field trip

Learning Objectives for Module 4

- Understand ecosystem functioning in terms of structure and processes to such a degree that you can frame management objectives in such terms
- Understand what ecosystem services are and that they are often bundled

What is Ecosystem Management?

The Module 4 slides have content that allows you to present material addressing this topic.

What Is an Ecosystem?

The Module 4 slides have content that allows you to present material addressing this topic.

Notes

What Are Ecosystem Services?

The Module 4 slides have content that allows you to present material addressing this topic.

Notes

Using the Concept of Ecosystem Services in Management

The Module 4 slides have content that allows you to present material addressing this topic.

Notes

Ecosystem Functioning—Core processes and structure for the supply of services

The Module 4 slides have content that allows you to present material addressing this topic.

Ecosystem Processes

- Water cycling
- Mineral cycling
- Solar energy flow
- Biological growth

Notes

The Four Core Ecosystem Processes Are Aspects of the Same System

- Ecosystem structure
- Structure of the food web
- Physical structure of vegetation layers
- Soil structure
- Water bodies
- Spatial configuration of species

Notes

Ecosystem Resilience and Transformation Risk

The Module 4 slides have content that allows you to present material addressing this topic.

Notes

Day 2: Thinking Like an Ecosystem

Day 2 at a Glance

As facilitators, work together to develop your version of a conceptual model of a catchment, something you feel will be useful as a tool for drawing together and leading discussions about the various models the participants developed.

- ***By now, there should be three to five conceptual models, developed by the groups. Offer your own synthetic model as the common one to be used for the rest of the workshop. You may wish to offer your own as a framework, and then invite the groups to use their ideas to modify yours so everyone together develops a common model. Discuss the relationships among all models, showing how the various groups each took a distinct path, but there are similarities, allowing us to come to a common ground.***
- ***The conceptual models will guide questions and exploration of the workshop catchment during the field trip in the morning. Participants will make revisions to their models, ground their understanding in the workshop catchment, and consider ways they will revise their model to meet their local catchment.***

Module 5: A Conceptual Framework for Understanding Ecosystem State and Impact 8:00–9:30

As we change some attributes and flows, there is a concomitant change in others. We can use a framework (DPSIR) to express those changes.

Module 5 at a Glance

- *20 min* Presentation of material
- *5 min Q*uestions
- *45 min* Ecosystem service discussion in groups
- *10 min* Exercise
- *10 min* Discussion

Learning Objectives for Module 5

- Understand the concept of the DPSIR as a conceptual framework to map complex cause-effect linkages in coupled socio-ecosystems
- Learn how to apply the framework to identify causal interlinkages among elements of an ecosystem based on the field trip on the first day

Overview of the DPSIR framework

The Module 5 slides have content that allows you to present material addressing this topic.

Discussion Question: What is the key message of the DPSIR model, from your point of view? How applicable is it to your needs and experience with ecosystem management***?***

Notes

What Is Happening to the Ecosystem and Why?

Break the participants into groups of approximately six; give them 15 minutes to complete the following table:
Imagine that you are manager of a catchment. Your stakeholders have commissioned you to sustain delivery of several ecosystem services. Use the following table to indicate how you will know if stakeholder needs have been met.

Table 1.

Ecological Service	Indicator	Measurement
Drinking water		
Flood avoidance		
Adequate water for irrigation		
Avoidance of downstream nutrient impacts		
Avoidance of downstream sedimentation		
High aquatic biodiversity		

Second, give them 30 more minutes to address the following issue:

- Each person takes five minutes to reflect on your home catchment, considering the catchment from an ecosystem management perspective. What ecosystem services are not delivered now? Could they be? Should they be? Are there ecosystem services that should be and probably are delivered now, but you do not have a data collection scheme to be able to document that?
- As a group, elect a spokesperson, and discuss your reflections. Prepare to report back to plenary a synthesis of answers to those questions, across your group.

Plenary discussion 20 minutes

Group Discussion How readily can you differentiate among ecosystem states, pressures and drivers? What variables and terms would you use to distinguish them? Have you used this type of analysis in your practice before? What was your experience? If not, how could it help your work?

Notes

What Are the Consequences for Ecosystems and Humanity?

The Module 5 slides have content that allows you to present material addressing this topic.

Exercise, Step 1: Working in small groups, identify an important ecosystem state related to a specific issue. Select one or two indicators that describe the dynamics of change over time, and draw a simple diagram that shows the direction of change. Using this state variable, identify pressures and drivers contributing to the change observed, and then identify impacts. Use the simple table below as a model to capture your results on a flipchart.

Table 2.

STEP 1	STEP 2	STEP 3	STEP 4
Drivers	Pressures	Ecosystem state / condition: _____	Impacts
		Indicator name and diagram:	

Exercise, Step 2: Join another breakout group; use take two to three minutes for each group to present an overview of your results. Compare what you found. What are the similarities and differences? Where do you see interlinkages? How would this framing affect your perspective on your ecosystem issue? Did you find anything challenging about the process and how did you address it?

Notes

Break
9:30–10:00

Module 6: State of Ecosystem Services and Functioning
10:00–11:30

Module 6 at a Glance

The desired state of a catchment or other area under management can be defined in terms of ecosystem services needed for quality of life and incomes and the ecosystem functioning to supply these services.

- 40 min Presentation
- 30 min Working groups
- 20 min Plenary

Learning Objectives for Module 6

At the end of the module, the successful participant will:

- Be able to identify ecosystem services necessary for their quality of life and income
- Determine the necessary functioning of the ecosystem to deliver the desired services, in terms of ecosystem processes and structure
- Plan and monitor ecosystem management actions with this knowledge

Determining Management Objectives in Terms of Ecosystem Services, Processes and Structure:

The Module 6 slides have content that allows you to present material addressing this topic.

Relationships Between Ecosystem Processes and Services:

The Module 6 slides have content that allows you to present material addressing this topic.

Example: Ecosystem Services Related to the Water Cycling Ecosystem Process

The Module 6 slides have content that allows you to present material addressing this topic.

- Provisioning ecosystem services
- Cultural ecosystem services
- Regulating ecosystem services

Example: Ecosystem Services Related to the Mineral Cycling Ecosystem Process

The Module 6 slides have content that allows you to present material addressing this topic.

- Provisioning ecosystem services
- Cultural ecosystem services
- Regulating ecosystem services

Example: Ecosystem Services Related to the Solar Energy Flow Ecosystem Process

- Provisioning ecosystem services
- Cultural ecosystem services

Example: Ecosystem Services Related to the Biological Growth Ecosystem Process

- Provisioning ecosystem services
- Cultural ecosystem services
- Regulating ecosystem services

Defining the functioning of ecosystem processes

- Water cycling
- Mineral cycling
- Solar energy flow
- Biological growth

Determine the ecosystem structure for the functioning of ecosystem processes

- Food web structure
- Vegetation layer structure

Solar Energy Flow

Soil Structure

- **Map the landscape and waterscape structure to provide the required types of ecosystem structure**
- **Plan the management actions to achieve the necessary ecosystem and landscape structure**
- **Determine the risk of undesired ecosystem transformation and loss of services for each of the management actions, and adjust the actions if necessary**
- **Design the monitoring for progress and early warning of problems in achieving the desired ecosystem functioning and services**

Notes

Mid-term Assessment
11:30–12:00

We feel that it is important to understand what the participants seek in a workshop and how they are engaging with the experience. Therefore, we suggest offering a mid-term assessment. This is a formative assessment; its purpose is to help you better understand what is going well, what is not and what you might wish to consider changing or modifying. In a setting as short as a one-week workshop, it always will feel like the mid-term assessment comes too soon. However, if we wait until we have adequate data, we lose the opportunity to make changes. Therefore, we have scheduled it for Tuesday mid-day, because that will give you, the facilitators, time to consider the results and make whatever changes seem appropriate.

The following offers a draft instrument the facilitators should modify as appropriate, print and use for the mid-term assessment.

UNEP Ecosystem Management Workshop: Mid-term assessment

We would appreciate you taking the time this morning to offer reactions to the structure and flow of the workshop, as you have experienced them so far. We will consider every suggestion received and make the changes we can that might improve your experience in the workshop.

***The content*:** Reflect on the content of the *Participant Manual* and the material presented.

- Our intent is that you will develop and implement an EM plan for your catchment.
  - What do you see that is going well, advancing this goal? How might we tailor this material to better help you do that?

***The facilitation*:** Reflect on the ways the workshop is being conducted, the interactions within the room.

- Our intent is to have each person engaged at least to some degree, although there will be differences among people. What do you see that is going well, advancing this goal?
  - What do you think we could do better to improve your experience?

***The facilities*:** Reflect on the workshop setting, the hotel, grounds and local watershed.

- Our intent is to conduct this workshop in a place and way that is locally adapted and that encourages learning.
  - What do you see that is going well, advancing this goal?
  - What do you think that we could do better to improve your experience?
  - Are there other comments you would offer about what is going well and should not be changed, and/or things we might improve?

Lunch
12:00–13:00

Module 7: Field Trip
13:00–18:00

Module 7 at a Glance

As we visit the workshop catchment, encourage each group to explore the area, discuss management actions and concerns that they can see, and relate ways their conceptual framework would be useful in guiding management of this catchment. Each group should make any changes they feel are appropriate to their framework. Upon return, we will share frameworks, allowing each person to begin thinking about **What would make this most useful to me at home?**

Learning Objectives for Module 7

- ***Ground participants in a local reality***
- ***Develop on-the-ground familiarity with conditions, goals and management actions of a local catchment***
- ***Strengthen the participants' abilities to use this local catchment as a reference in discussion of principles and cases***

Visit to local catchment

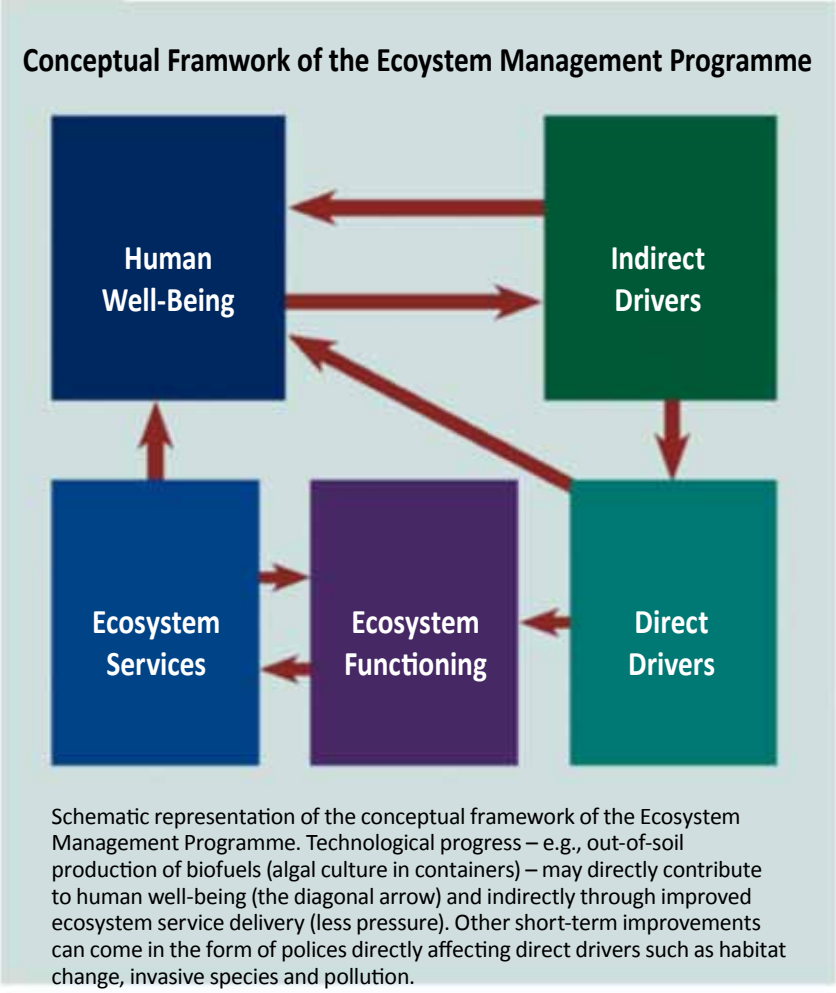
Notes

On-site discussion (17:00–18:00)
Ask groups:

- ***What did you want to know about the catchment?***
- ***Did you learn the answers to your questions?***
- ***Identify at least one change to your group's conceptual model that resulted from this visit***

The following model maybe of use in leading this end-of-field-trip discussion . . .

Figure 2.



Schematic representation of the conceptual framework of the Ecosystem Management Programme. Technological progress – e.g., out-of-soil production of biofuels (algal culture in containers) – may directly contribute to human well-being (the diagonal arrow) and indirectly through improved ecosystem service delivery (less pressure). Other short-term improvements can come in the form of polices directly affecting direct drivers such as habitat change, invasive species and pollution.

From http://unep.org/ecosystemmanagement/Portals/7/images/concept.gif

Notes

Day 3: Thinking and Acting Like a Manager

Day 3 at a Glance

Day 3 focuses on decision making, on the ways we make decisions about the resources we have and the ways we allocate our management energies. Throughout the day, participants will be engaged in understanding the management cycle, being adaptive, choosing tools and guiding decisions to achieve water resource and ecosystem service outcomes.

Module 8: Understanding Current Conditions
8:00–9:30

Module 8 at a Glance

As we consider management actions, we need a starting point. We have to have an initial state, a condition of our catchment (our ecosystem) today, so we know what to maintain and what to change.

- 10 min *Presentation of the learning objectives for this module*
- 60 min *Working group session with representatives from the same catchment*
- 20 min *Plenary report back from the groups*
  - Commentary on the experience shared

Learning Objectives for Module 8

The successful participant will

- Understand how the ecosystem approach can be applied to real-world conditions
- Learn about some of the tools available to help with implementation
- Be able to relate these tools to his/her own context
- Be provided with guidance on selecting tools useful for that context
- Adapt the lessons learned to his/her practical needs

The Information Base for Managing Ecosystems

The Module 8 slides have content that allows you to facilitate a working group session focused on specifying state and identifying indicators for their local catchment.

Module 8 in the Participant Manual contains and describes a list of additional resources that may be useful to participants as they return home and continue working with ecosystem management in their catchment. An alternative that you could consider during this module would be to facilitate a breakout session where participants would explore these websites and work to find tools that they could expand upon after the workshop. This module has not been constructed to specifically include this type of exercise because logistics and access to technology may be prohibitive in many places in the world where this workshop is offered.

Notes

Break
9:30–10:00

Module 9: Thinking Like a Manager: Beginning the cycle of strategic, adaptive management
10:00–12:00

Module 9 at a Glance

- Context and introduction
- Group discussion
  - Exercise 1: DPSIR
- Presentation and discussion
  - Exercise 2
- Presentation and discussion
  - Exercise 3

Learning Objectives for Module 9

- An ecosystem manager who completes this module will have a basic understanding of the rationale for and the means to undertake in an integrated manner the first three stages of strategic and adaptive ecosystem management (i.e., ecosystem assessment, shared visioning, and planning a portfolio of ecosystem initiatives).

The Cycle of Strategic and Adaptive Ecosystem Management
The Module 9 slides have content that allows you to present material addressing this topic.

Notes

Ecosystem Assessment

The Module 9 slides have content that allows you to present material addressing this topic.

The intent is to deliberate until a shared space is identified where everyone can agree on the ultimate outcome. Kai Lee offered an account of adaptive management in the Columbia River Basin in which he describes this process as creating an arena of bounded conflict. One person's goal may be another person's strategy. The facilitator helps the group move up the spectrum until shared space vision is found, then conduct trials on the strategies/means for achieving the shared vision.

The following case study may be a useful contribution; it is included only in the *Facilitator Manual.* We feel it will be used most effectively if it is paired with a case from a LDC.

Box 1: Case Study of the Columbia River Basin, Pacific Northwest of the United States (circa 2002)

Discussion of a case from the Confederated Salish and Kootenai Tribes of Western Montana, U.S. provides a real-life example of the difficulty of deciding on the services to be gained from a given ecosystem.

Understanding trade-offs between different services and values associated with an ecosystem is quite complex, and we have very few frameworks to guide us in doing this type of decision making. Sometimes, public lands managers lean towards the values with the highest economic (or non-economic, but priced) returns, sometimes towards the values that are least replaceable or non-renewable. It is difficult to obtain wide-spread public support for most decision-making frameworks, particularly if the public perceives that these frameworks do not represent the values they place on the ecosystems. Usually, the classification of land (whatever public or private purpose is prescribed) will guide us in making trade-off decisions. Private lands, unless controlled by public laws, are most commonly managed for highest economic return. Collectively held lands are more likely to have constraints that must be considered in trade-off evaluations, such as protecting wilderness character, protecting water values to off-site beneficiaries, or avoiding impacts to wildlife populations and their habitats.

The Confederated Salish & Kootenai Tribes case study demonstrates how a community actively decided to place some lands into protected status and then spent years trying to negotiate a process of decision making. When the community was split in their decision about how to move forward, science contributed by providing a method for more closely examining the meanings various parts of the

community attached to the landscape, and then explored with them the things that threatened those meanings (or values or benefits) in order to better understand and facilitate discussion about the trade-offs to consider in a more direct way.

In 1980, three respected elders of the Confederated Salish & Kootenai Tribes of Western Montana, U.S., went before their Tribal Council to advocate for protection of some of the Mission Mountain landscape of the Flathead Indian Reservation. Eventually, protection of over 100,000 acres as Wilderness and a Wilderness Buffer Zone occurred. This classification ensured tribal member engagement in decisions about the future of these areas. This collective action placed emphasis on some of the non-commercial services flowing from these lands thought to be most important by the Tribal people.

Management direction was clearest for the largest and most remote portions of these lands which were classified as wilderness, priorities for the buffer zone were less clear. Research conducted by scientists with the Wildland Resources Institute (a collaborative science group in Europe and the U.S.) found that the primary meanings attached to this buffer zone area included 1) protection of the wilderness, 2) wildlife and water quality, 3) recreation and scenic values, 4) access and functional attachments, and 5) personal and cultural meanings. Qualitative research was employed to provide in-depth understanding of each of the "layers" of meaning people attached to these lands.

Of particular interest in this session is the "water and wildlife" layer of meanings attached to the buffer zone. Tribal and Non-Tribal people on the Reservation attached different meanings to the flow of both wildlife and water across this buffer zone, with Tribal people being more likely to acknowledge spiritual and cultural meanings attached to both wildlife and free flowing, high quality water. Non-Tribal residents were more inclined to focus on the aesthetics of wildlife and functional or economic values associated with water (for domestic or irrigation purposes).

The area within the buffer zone was important for both cultural and ecosystem services values, with different values flowing to different stakeholders. The Confederated Salish & Kootenai Tribal Forestry Department had struggled for nearly 15 years with efforts to apply vegetation treatments in the Tribal Wilderness Buffer Zone, trying to reduce fire risk and allow more potential for wildland fire burning in the Tribal Wilderness Zone. In temperate U.S. ecosystems generally, and in the Tribal Wilderness specifically, one goal is to allow fire to play its natural role. After many years of suppressing fires in the U.S., restoration of fire is seen as a major actor in restoring the flow of ecosystem services for both on-site and off-site values.

The Tribal community, however, was split in its support for such action. While most people support more fire in the wilderness, the buffer zone is more contentious. Trust issues with forest management practices applied on the Flathead Indian Reservation have existed for many years. When the buffer zone was developed, most people saw the primary value of this area as protecting the wilderness from the non-wilderness. But many other ecosystem values were evident and most members of the

community were unconvinced that the area also protected the non-wilderness from the wilderness when the positive benefit of more fire in the wilderness was discussed.

Based upon greater understanding of the relationships attached to the landscape by the Tribal people, the research partners interacted with Tribal elders and other community members through a series of focus groups to determine how proposed fuel treatments aimed at improving ecosystem health would potentially interact with attached meanings and activities; they also worked to build trust between elders and Tribal Forestry.

The maps resulting from this project have provided managers and the public with good understanding of where and how intensely various types of meanings are attached to the landscape. These images are likely to build trust through manager commitment to understand and include knowledge about these local meanings in decision making. Results have been used to guide focus group discussions between forest managers and Tribal members about proposed fuel treatments in the Wilderness Buffer Zone. The maps of meanings, however, are not the ones providing the most useful stimulus for these discussions. To build trust among Tribal residents, fire planners must understand how proposed actions interact with local community values at risk and describe a defense prioritization process that addresses publicly perceived threats. In the mapping exercise, Tribal members were asked to describe the threats they believed created risk for the meanings they attached to the Wilderness Buffer Zone. Additional maps were generated to illustrate location of these threats and to stimulate discussion in focus group meetings on the Reservation.

Tribal members indicated many threats that posed risk to the meanings they attached to these important places. These included private land ownership within the Wilderness Buffer Zone, use of All Terrain Vehicles (ATVs) and their impacts, grazing of livestock, crowding in some places, recreation use in some places, evidence of temporary drug manufacturing laboratories, lack of respect shown for the land by users, fire, logging and vegetative change. For the purposes of this analysis, fire and logging were the threats of highest priority, needing most analysis as the community moved ahead on forest health issues in the Wilderness Buffer Zone.

Over 40 Tribal members participated in discussions; maps were created that showed, across all five layers of meanings, those places where either of these two threats were indicated. For fire itself, Tribal members mentioned such things as the threat of burning cultural areas, the possibility of lethal levels of fire, a catastrophic fire threat, wildfire, hazardous fuel and even fire fighters as a threat to the meanings they attach to these areas. This threat (or these threats, if plotted collectively), is intensive and there is agreement that this is distributed widely. However, logging was seen as the even more intense and broadly distributed threat. Tribal members chose a variety of words to describe this threat, including: loggers logging the area, large scale logging, commercial logging, clearcutting, irresponsible logging, incompatible timber harvest, too much logging, harsh logging, and even attributed threats to the presence of loggers.

Complete analysis links these mapped meanings to the threats respondents perceive associated with each layer of meaning. These are the priority inputs (i.e., location, meaning, intensity of meanings, threat) that in combination managers must integrate with resource management objectives to maintain public trust. Focus groups composed of Tribal members, facilitated by the Tribal Forestry Community Outreach Education Specialist, interacted with Forestry Department staff who proposed general fuel treatments in the Wilderness Buffer Zone. This final stage of the project was focused on application of place meaning knowledge to decision-making and an evaluation of whether public members believe better solutions resulting from these participatory activities would be obtained.

This phase was evaluated very positively by participating Tribal members. While a great deal was learned about the specifics of how fire and logging threatened these places, of most importance and very apparent during these focus groups, was the need for a method of managing trade-offs. Forestry activities aimed at revenue generation are not desired by most Tribal members participating, and some expressed extremely anti-logging attitudes. Similarly, many people (often the same people), were fearful of the catastrophic potential for any type of fire, from any source.

The interaction among researchers, community members and resource management staff allowed the community to develop a strategy for managing the trade-offs between the threats associated with fire and vegetation removal. Tribal Council members recognized that Tribal members did not support vegetative management that focused on efficiency and revenue production, but did support labour- intensive, tree-level efforts with low-level burning and immediate aesthetic and physical impact control. As a result, the Tribes are moving toward healthier forests, renewed public trust, and a protected natural and cultural resource.

- Use the case study text above as background; do you see ways that trade-offs among ecosystem services and values have taken into account both women's and men's needs?
- Consider a catchment with challenges to the ones described in Montana; based on the information here, use a role play exercise to address the problems described above (i.e., balanced threats) making sure that:
  - Women's and men's constraints, needs and views are taking into account the processes and approaches involve participatory by everybody; and
  - Basic scientific data have been disaggregated between women and men.

Notes

Exercise 1

Identifying commonalities and relationships among Issues—The Co-benefits Matrix

Task 1: Identify environmental states

Ask people to identify two to three environmental issues that are stressed in their ecosystem (one focal state of the environment for each issue). Have them create a flipchart page for each issue, using the DPSIR diagram as a template, and record the state of the environment on each page, including a description of the current state and past trend.

Task 2: Identify direct pressures

Using the flipcharts they created, have them list the direct pressures on the state(s) of the environment identified above, along with any specific targets cited.

Task 3: Identify high-level drivers

Now have them list the high-level drivers of change influencing the direct pressures identified above, along with any specific targets cited.

Task 4: Articulate impacts

As people to articulate the primary impacts associated with changes in the environmental state(s). Use the ecosystem services categories from Section 2.1 to assist with your analysis.

Task 5: Prepare a co-benefits matrix

Have them use the summary table provided below, and identify the commonalities between the two issues they selected by looking at the drivers, pressures, and impacts that you listed. Have them identify who the key stakeholders are.

Table 3. Template for a co-benefits matrix

Drivers, Pressures and Impacts	**Environmental State Issues of Concern in the Ecosystem**		**Commonalities and Stakeholders (i.e., a common driver, and/or a driver influencing another driver or pressure)**
	Issue #1	**Issue #2**	
State of the Environment List the state of the environment for the issues you have identified			
Pressures List the direct pressures on the state(s) of the environment identified above.			
Drivers List the high-level drivers of change influencing the direct pressures identified above, along with any specific targets cited			
Impacts Articulate the primary impacts associated with changes in the environmental state(s). Use the ecosystem services and human well-being categories to assist with this analysis.			

Shared Visioning

The Module 9 slides have content that allows you to present material addressing this topic.

Exercise 2: Articulating a Shared Vision

Articulating a shared vision for an ecosystem first requires an assessment of the current state and trends of the ecosystem. This process has been summarized in the previous section, including the creation of a co-benefits matrix to help the ecosystem manager begin navigating and facilitating the process of creating a shared vision for the ecosystem. The tasks outlined below present a simplified visioning process.

Task 1: Identify key ecosystem issues of concern in the watershed

For purposes of this exercise, have participants use the two issues selected in Exercise 1 as the priority issues for their ecosystem. In many settings, the ecosystem issue(s) of concern will be obvious and will have been the catalyst for the ecosystem management intervention. However, in some settings, many ecosystem states may be simultaneously stressed, necessitating the refining of a set of priority issue areas and a facilitated process using an array of consensus and/or voting techniques (Pinter *et al*., 2008).

Task 2: Clarify the environmental state indicator of focus

For the environmental issues selected, ask people to identify the specific indicator that best represents the issue. For example, if lake eutrophication is the environmental issue, algal density, water transparency or phosphorous concentration might be the chosen state variable.

Task 3: Assess the current state and trend of the ecosystem indicator

Have people compile specific data on their ecosystem indicator using reports they brought with them and/or accessing credible sources via the Internet. Tell them to be sure to compile data going back as many years as possible to get as complete a picture as possible of the historic trend. Have each group address the following questions:

- What is most positive about this current state?
- What is most alarming about this current state?
- What direction is the state likely to go in the future, and why?

Task 4: Articulate the desired future state of the ecosystem indicator

Within their group, address the following questions:

- What is the desired future state of the ecosystem indicator?
- Why is it important to achieve this state (discuss in relation to specific ecosystem services and aspects of human well-being supported)?
- By what year might this desired state be achieved?

Have people use the template below to record their results and discussion.

Table 4.

	Issue #1
General description	
Environmental state variable of focus	
Current State	
Desired Future State (level and year)	
Key ecosystem services and human well-being aspects supported	

Portfolio Planning

The Module 9 slides have content that allows you to present material addressing this topic.

EXERCISE 3: Designing an ecosystem portfolio

Task 1: Ask people to identify ecosystem initiatives with potential to achieve shared vision

Keeping them in the same group as Exercise 2, ask them to discuss and identify two types of ecosystem initiatives that they believe have the potential to positively impact the shared vision identified in Exercise 2.

Task 2 Create outcome chains for each initiative

Have people use create a flipchart to produce a table similar to the one presented in Table 4. Tell them to copy the result of Task 4 in Exercise 3 into the first row for the ultimate outcome (they have already defined the KPI and target at this level in the prior exercise). Now have them start from the bottom level (Activities) describe each of their ecosystem initiatives and the intended outputs (with KPIs and targets). Next, ask them to discuss and complete the desired immediate and intermediate outcomes (with KPIs and targets) for their two ecosystem initiatives. The portfolio idea is very important here; we are offering a collection of scenarios and alternatives. The idea is to offer the participants structure, offer them data or get them to collect or imagine exemplary data, then change the roles and have people work toward a decision.

Once they complete this exercise, they have successfully created an outcome-based planning and reporting framework that can help them adaptively manage improvements in their ecosystem.

Notes

Approach

The Module 9 slides have content that allows you to present material addressing this topic.

Introduce in plenary the deconstruction of the different steps that make up the ecosystem approach in practice. Offer groups guidance on the knowledge and capacities needed to address these steps individually. Introduce tools through case studies to highlight particular key messages. Every key message is related to solving a specific problem or challenge as part of a step-wise ecosystem approach.

You can help people relate the existing tools to their own context through participatory learning in smaller break-out groups. These groups should actively discuss real-world problems and solutions from their own perspective. Encourage participants to reflect upon how to tackle a diversity of problems while being introduced to tools that would help them do so.

Presenting a broad portfolio of cases during plenary is believed to provide better food for thought than in-depth analysis of a single case. The diversity of examples is expected to better prepare for identification of linkages and similarities with personal catchment management situations. However, cases so presented are meant to demonstrate only a specific stage in implementing ecosystem management. Ideally, the content and local facilitator will work together in advance to develop a greater-depth case study that covers all the implementation aspects at once as background material for scrutiny during break-out groups.

Bring participants back into plenary to adapt the lessons learned to their own practical needs through sharing of and commenting on their and others' experiences as expressed in the breakout discussions. Practically speaking, participants will have to answer the following questions throughout the module:

- What is their real-world problem?
- What ecosystem services are needed to solve this problem?
- What actions are needed?
- What governance is needed to enable action?
- Who needs to be empowered to act?
- What incentives and financing are needed?
- What knowledge and capacities are needed?
- How will you know if that is successful?

Box 2: Case studies. Carpathians Environmental Outlook

Carpathians Environmental Outlook (KEO) is a sub-regional report on the state of the environment in the Carpathian Mountains. The report is part of the group of Global Environmental Outlook reports developed by UNEP's Division of Early Warning and Assessment (UNEP, 2010).

The Carpathian Mountain range is the "largest, longest and most twisted mountain chain in Europe" (UNEP, 2007, p. 18). These mountains lie in Central Europe and their territory falls under seven different state governments: Poland, Czech Republic, Slovak Republic, Hungary, Ukraine, Romania and Serbia (Figure 3). "The region, including the surrounding lowland plains represents a centre of extensive biological diversity and at the same time a unique and well-preserved cultural heritage in a locale that, while in the heart of the European continent, remains relatively under-developed and 'unspoiled'" (UNEP, 2007, p. 2). However, recent political and socioeconomic changes have brought new challenges for the ecosystems of the Carpathian Mountains (e.g., surging tourism, construction and infrastructure development, as well as exploitation of water, mineral and timber resources).

The last 20 years have brought significant turbulence to all seven countries of the Carpathian region. Before the 1990s, the region was under communist rule—either under the Soviet Union, Yugoslavia, Czechoslovakia or other socialist states of Central Europe. Communist development policies put the ecosystems of the Carpathian Mountains under pressure through collectivization of agriculture, expansion of human settlements, deforestation, extraction of minerals and infrastructure development. Socialist economies were more polluting and resource-wasteful than the Western economies, leading to pollution "hot spots" with various forms of contamination, degradation of the natural environment and human health risks (UNEP, 2007).

The fall of communist rule and the following transition period has brought a chaotic socioeconomic life to these countries. The socioeconomic driving forces have been rather dynamic. For example, all seven economies experienced an economic slowdown and a sharp decrease in industrial output in the beginning of the 1990s. Eventually, economic growth was restored, and in 2005 only Ukraine's economic activity level remained low compared to 1990 (UNEP, 2007). Mining, forestry and agriculture (farming and animal husbandry) are the main forms of economic activity in the Carpathian Mountains today. Agriculture in these countries has been under radical reform: land property restitution, abolition of collective farms, shifts in land use, removal of subsidies. The economic slowdown influenced a decrease in demand for food products and a decrease in the use of agrochemicals; therefore, agricultural outputs have been reduced. Similarly, there have been changes in forestry, including forestry reform, privatization and restitution of property, new legislation on protected areas. Coal mining is steadily decreasing in the region; ferrous and non-ferrous mining still employs a significant share of population in certain regions of Romania, Slovakia and Ukraine and new mining projects are being proposed in the Carpathian Mountains. Tourism is becoming an important driving force, especially in the northern part of the Carpathians. Among societal driving forces, it is important to understand the ageing human demographic and population decrease (due to migration to urban areas and to other countries), increasing economic inequality between rural and urban areas, increasing

poverty and unemployment (UNEP, 2007).

As a result of a socioeconomic and political turmoil in these countries, the pressures on the environment have been complex and multifaceted. The early 1990's decrease in industrial output was followed by a sharp decline in water, air emissions and generation of industrial waste. A significant share of agricultural land was abandoned due to a decreased demand for food products. The use of agrochemicals has declined due to financial difficulties in the agricultural sector and cancellation of agricultural subsidies. Poverty and unemployment create additional pressures on the Carpathian forests with increasing logging rates, illegal logging and widespread application of clear-cutting techniques. Seepages from landfills, mining sites and industrial operations still pollute the Carpathian rivers. Waste generation rates are increasing in the region. Urban sprawl and car use are on the rise in the Carpathian Mountains with increasing traffic, noise, air emissions and construction activities. Proposed road infrastructure expansion within the framework of the European highway system is going to cause additional stress on the Carpathian environment. In 2000, unsafe gold mining operations in Baia Mare led to a major spill of cyanide and heavy metals into the rivers of Sasar, Lapus, Somes, Tisza, Danube and the Black Sea (Regional Environmental Center [REC], 2000). Non-ferrous metallurgical smelters in Romania, Slovakia and Serbia still pollute the environment of the Carpathian Mountains (UNEP, 2007). Illegal hunting and poaching are important threats to biodiversity in some areas.

The state of the Carpathian Mountains is comparatively better than that of other Western European Mountain ranges. As with many other mountain terrains, the Carpathians are considered a biodiversity "hot-spot." There are thousands of native species in the Carpathian Mountains, including 387 endemic plant species (UNEP, 2007). "The Carpathian vertebrate fauna includes 90 species of mammals, 300 nesting birds, 17 amphibians, 12 reptiles and 82 species of fish and lampreys, including some alien, introduced species" (UNEP, 2007, p. 95). "The Carpathians have the richest community of large carnivores in Europe, including all the large European predators (NB–bears, wolves, lynx). Their populations are still vital and numerous" (UNEP, 2007, p. 95-96). In total, 5 per cent of the Carpathian Mountains area is under some sort of protected area status. The UNESCO World Heritage Commission lists 26 objects of culture and nature within the Carpathians. "Young forests and deforested areas constitute over 50% of forested lands, while mature forests account for scarcely 11% instead of the desirable 25%" (UNEP, 2007, p. 62). Previously intensive mining operations have created lunar-like landscapes that are especially evident in the eastern part of the Carpathians (UNEP, 2007). Additional road network expansion together with reforms in agriculture and forestry sector is leading to ecosystem fragmentation.

Among numerous environmental impacts on the Carpathian mountain ecosystems, climate change is expected to have a significant impact on the flora and fauna: numbers, distribution and extinction. As a result of unsustainable forestry and agricultural practices, the occurrence of flooding and landslides has increased in the region. Water quality of the Carpathian rivers has improved significantly since

the beginning of the 1990s for various reasons, including the collapse of industry and reduced use of agrochemicals (UNEP, 2007). The Baia Mare mining accident that wiped out the downstream river ecosystems has tempered and stream communities are slowly recovering (REC, 2000). Illegal waste dumping and mining legacies spoil the aesthetic value of landscapes and inhibit the development of tourism. Abandonment of agricultural land and traditional practices leads to a loss of a unique biodiversity, landscapes, ecosystems and cultural heritage. Tourism brings in invasive species and contributes to habitat destruction and other stresses to biodiversity.

The responses to the threats of the Carpathian ecosystems are numerous and vary widely; this case discusses only the most prominent ones. For instance, the famous case of Baia Mare cyanide spill has caused a huge societal interest, environmental awareness and education campaigns and at least a few legislation changes at the European Union and country levels (UNEP, 2007). As a result, other proposed mining operations in the region are more scrutinized from the outset (Alburnus, 2010). The Carpathian Framework convention promotes conservation and sustainable development in the Carpathian Mountains. This convention is of particular value for the two countries, Serbia and Ukraine, that are not members of the European Union and therefore, benefit from the facilitated relationships with the other Carpathian countries. European Common Agricultural Policy has a major policy influence in the region. In order to mitigate the negative consequences of agriculture to the environment, three policy instruments are in force: Codes of Good Farming Practice, Environmental Cross-Compliance and Agro Environmental Schemes (UNEP, 2007). Some countries, like Romania and Slovakia, have separate laws for mountainous areas that provide economic support and environmental guidance for the residents.

Figure 3. Map of the Carpathian Mountains and KEO geographical scope (UNEP, 2007).

Case Study: Traditional Knowledge as Adaptive Management

Traditional ecosystem management practices that have been developed and implemented by indigenous/local community groups all around the world offer a unique approach to understanding adaptive management. According to Berkes, Colding, and Folke (2000), traditional ecosystem management practices have elements that demonstrate adaptive management (e.g., monitoring, managing ecosystem functions and processes, responding to various ecosystem pressures and building resilience). Traditional ecosystem management practices are a "cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment" (Berkes et al., 2000).

Traditional ecosystem management methods may include, among others (adapted from Berkes et al., 2000):

- Ecosystem monitoring;
- Permanent or temporary protection of species, nature objects or an area;
- Harvest restrictions and cycles;
- Multiple species management;
- Resource rotation;
- Succession management;
- Landscape patchiness or land use zoning;
- Watershed-based management;
- Maintaining resilience and responding to ecosystem bursts; and
- Fire and flood management.

This case study of The Banawa-Marawola region in Central Sulawesi, Indonesia, provide examples of traditional ecosystem management practices that are based on social mechanisms, such as knowledge accumulation, social institutions and regulations, culture, values and religious beliefs (Armitage, 2002). There are several indigenous groups in the case study area: Kaili, Mandar, Buginese, Torajanese as well as the acculturated Javanese and Sundanese. This area, distinguished for its biodiversity and endemic species, is listed as one of the world's most important areas for biodiversity and conservation (Armitage, 2002).

A range of ecosystem management practices can be distinguished among the indigenous groups of Banawa-Marawola region. There are both seasonal and permanent restrictions on the use of resources, habitats, species or places. For example, old trees (like *Ficus*) are believed to host spirits and should not be harvested. The same applies to sites that are suitable for honey harvesting, steep slopes and important catchment areas (Armitage, 2002). Temporary harvesting restrictions are often placed on milkfish catches during the spawning period. Land-uses are zoned to form a temporary and permanent restriction system. Several zones are distinguished: protected zones (as mentioned previously), forested zones, cultivation and fallow zones and settlement zones. "In accordance with seasons, the cyclical patterns of nature, and in response to evolving ecological and social conditions, the spatial framework is modified to promote opportunities for ecosystem renewal and is well suited to dynamic

ecosystem conditions in the region" (Armitage, 2002, p. 84). Zone management is achieved with the help of a fertility assessment ritual that helps to decide where and what to plant. Swidden agriculture is practiced in order to conserve and nourish the soil and to manage so called successional disturbance.

Two institutional mechanisms facilitate the adaptive management approach through learning, adaptation, innovation and decision-making. The first is a community-based collaboration system through which members of the group provide assistance to each other "in order to ensure the success of all members" (Armitage, 2002, p. 84). Members of the community learn from each other and pass on ideas of success. "For example, if any one farmer seems to be particularly successful, the variables that produce that success are more likely to be transferred to others through this mechanism" (Armitage, 2002 p 84). The second institutional mechanism is a traditional decision-making process. In contrast with other official village meetings in Indonesia, this decision-making process is relatively unusual (although not unique) for its absence of hierarchy and its assurance that all community members have equal right to express their views and contribute to the decision. According to Armitage (2002), this is crucially important for social learning, accountability and innovation.

Taboos and religious beliefs are also important for ecosystem management in these tribal communities. For example, large old trees, mountains and other particular sites are believed to host spirits. Another belief discourages abandoning fallow lands. If fallow lands are abandoned in favour of expansion into virgin lands, sickness for the family or group members is foretold (Armitage, 2002). Various rituals also form part of the community's agroecological management. For example, one ritual is used as a soil quality assessment: a chicken is slaughtered and its liver used for fortune telling. If the colour of the liver is black, the area chosen for clearing and planting is fertile (Armitage, 2002). The wisdom of a religious belief to use water properly and as needed also motivates communities to conserve water, even if the supply is abundant.

These restrictions are accompanied by a system of sanctions for violations. The severity of sanctions depends on the type of the violation, whether it was apparently accidental or intentional and on the violator's behaviour (Armitage, 2002). If the violator lies, underestimates the damage or tries to hide the violation, penalties can be doubled. These locally-evolved practices provide the indigenous people with adaptive mechanisms that advance sustainability. The groups of Banawa-Marawola prefer their own indigenous system of justice rather than the formal one imposed by the state (Armitage, 2002).

Lunch
12:30–13:30

Module 10: Human Activities Are Central to Ecosystem Management
13:00–15:00

Module 10 at a Glance

Maintaining and changing various characteristics of an ecosystem uses the concept of ecosystem service valuation. That requires that we ask *valuable to whom*? We use stakeholder analysis to ascribe valuation among competing interests.

- Use Module 10 slides to introduce stakeholders
- As a large group, generate a list of stakeholder groups for the workshop catchment (5 min)
- Break into small groups to use the power/interest grid to identify the location of principal stakeholders, then choose two stakeholders to summarize their position (15 min)
- In plenary, compile stakeholders from small groups to build a plan for communication table (20 min)
- Hold an intimate stakeholder debate (60 min)

Learning Objectives for Module 10

- Understand the relationship between IWRM and ecosystem management
- Understand that there is a wide variety of views involved in management of any catchment, and gain exposure to a series of tools for drawing that range of stakeholders into a discussion about the catchment

As we point out in the *Participant Manual,* stakeholder involvement is locally and culturally contextual. In some catchments, societies and cultures, it is routine and welcome to have open discussion about people's roles and about motivating people to become more engaged and more supportive. In other settings, such a discussion might violate traditional or expected roles. This is a place where the local facilitator can guide the discussion, and perhaps where open discussion among participants might help the material take on new meaning.

Stakeholder analysis

- Identify your stakeholders
- Develop a good understanding of the most important ones
- Work out power, influence and interest
- Use the stakeholder planning tool to plan communication with each stakeholder

Intimate debate about stakeholder involvement

Introduction

Stakeholders are the core of our decision making. All successful managers understand that there is a range of stakeholders that influences every decision on a catchment. The degree to which and the ways in which those stakeholders are informed and involved often controls the success of any management intervention. Nearly all managers would agree that there are many opportunities for seemingly inappropriate involvement (e.g., a person or institution may dominate the conversation to advance their personal best interest to the detriment of others, a manager may invest valuable time and resources in stakeholder involvement but recoup little in terms of better decisions). You may choose to use the positions provided in this module (extensive versus limited stakeholder involvement). If you use these positions, the **Position statements** page at the end of this module can be printed and handed out to workshop participants. Alternately, you could choose to develop position statements of stakeholders in your catchment for the debate.

Break the assembled participants into groups following the matrices below, where each cell represents two to three people. There initially may be more than one matrix of participants; if so, distribute people so that each matrix is full. That is, it is better to have extra members in B2 in one matrix than to have B2 missing in a second matrix.

	A	B	C	D
1	A1	B1	C1	D1
2	A2	B2	C2	D2

15 minutes: Orient the groups horizontally (i.e., four "1" groups and four "2" groups). Provide all members of each "1" group with information that supports *extensive* stakeholder involvement (see below). Provide all members of each "2" group with information that supports *limited* stakeholder involvement (see below). For example, if you have 24 people, there will be 3 people representing each cell. Each sub-group (A1 and B1) has 15 minutes to become familiar with their position. Tell them they are to discuss and become familiar with the position and may take any notes they wish. However, they are not allowed to bring the prepared material that you distributed to the next session.
A word of caution: it is important to insist that participants turn in all typed material after the first step; failure to do so will often result in discussions in which people simply read from the prepared material you offered.
15 minutes: Groups re-distribute vertically following the numbers, so that there are 1s and 2s in Group A, etc. People from original Group 1 (i.e., those supporting *extensive* stakeholder involvement) have seven minutes to convince the other people that extensive involvement results in better decisions. Following that, people from original Group 2 (i.e., those supporting limited stakeholder involvement) have seven minutes to convince the other people that limited stakeholder involvement results in better decisions.
15 minutes: Reconstitute the groups diagonally, such that A1s meet with B2s, B2s meet with C2s, etc. In this case, each small group of three has seven minutes to argue the opposite of their original position. That is, people in A1 learned about extensive stakeholder involvement, took notes about

that position, then argued that it was appropriate. Now they use what they heard in the last session to argue that limited stakeholder involvement is the appropriate model

15 minutes: Return people to their original group configuration (i.e., A1s and B1s are together, C1s and D1s are together). People have 15 minutes to discuss what they have learned and to elect a rapporteur. The rapporteur will report back to plenary, addressing one of the two following questions (depending on their original orientation): *What are the strengths and weaknesses of extensive stakeholder involvement*? or *What are the strengths and weaknesses of limited stakeholder involvement*?

Position statements

Extensive stakeholder involvement

Stakeholders, broadly defined are the people are institutions who have interest in our catchment. These are the interests we must serve. We, as catchment managers, are the management arm of the public. Our role is to understand and interpret the interests of the public, and to carry out management actions that allow our ecosystem services to meet the public needs. The institutions to which we report (e.g., a Ministry, Catchment Council or Provincial Water Management Authority) has control over our resources and, in fact over our professional lives. We are professionals who are hired to listen to stakeholders, translate their priorities into ecosystem services our catchment can deliver, and then carry out actions to deliver those services. Further, it is our mandate to monitor and assess the performance of our management, and then communicate that assessment to our stakeholders. It is critical that we have extensive (i.e., both broad and deep) stakeholder involvement to ensure that we understand the priorities of our stakeholders and to ensure that we communicate our actions clearly to those stakeholders.

Limited stakeholder involvement

It clearly is true that stakeholders are important in any catchment management decisions. However, they are only one of several significant influences, they are easily manipulated, they generally are poorly informed and their engagement requires a huge investment of resources that could otherwise improve management of the catchment. We, as catchment managers, are hired as water-resource or ecosystem-management professionals. We have extensive professional training and experience in this field; the lay public and even the staff of the Ministry represent a great deal of breadth but do not understand the relationships among the variables with which we have to deal. In any catchment, there are dominant interests (e.g., major businesses, industrial or municipal interests) that are well-spoken and can easily dominate the conversation. Further, involving stakeholders intelligently requires extensive investment in public meetings and communication. We all are resource limited; those resources can be much better invested in addressing the important data collection and analysis needs, and the important management needs faced by our catchment every day.

Notes

Box 3: Case study of Public Participation in Biodiversity and Water Governance in the European Union: The GoverNat project

GoverNat (i.e., "multi-level **gover**nance of **nat**ural resources: tools and processes for water and biodiversity governance in Europe") is an interdisciplinary research and training project supported by the European Commission that brings together graduate, post-graduate and senior researchers from various European countries (GoverNat, 2010). The research network aims to analyze the effectiveness of public participation processes in water and biodiversity governance of the European Union (EU). This case study presents GoverNat research findings as a framework for discussion of ecosystem management principles.

"The governance of biodiversity and water in the EU is a complex system; it involves multiple policy levels, from the most local level to the international level. It also has to involve a wide variety of actors from governmental and non-governmental sectors, industry, commerce, civil society and private spheres" (Suskevics et al., 2010, p. 2). European governance structure has multiple levels: (1) international (i.e., Convention on Biodiversity, Ramsar Convention); (2) EU (e.g., Directives of the European Union, framework regulations); (3) national (e.g., various laws passed by the national parliaments); (4) local (in case of federal states, federal laws together with local government regulations). At the European level, the European biodiversity protection and water governance are mainly organized through specific policy documents: Water Framework Directive (European Commission, Directorate General Environment EC DG Environment], 2010a), Birds and Habitats Directive (EC DG Environment, 2010b) and the Natura 2000 network of protected areas (EC DG Environment, 2010c).

Public participation and consultation is foreseen at all levels of water and biodiversity governance. However, participation becomes a serious challenge given the complexity of multi-level governance and the variety of stakeholders. Moreover, the EU level legislation only sets general guidelines for public participation leaving some scope for interpretation (Suskevics et al., 2010). Therefore, implementation and effectiveness of public participation differs from country to country and even from case to case. Five

factors have been identified that could pave the way towards more successful public participation: "(1) managing expectations; (2) adapting to context; (3) interacting with multiple stakeholders; (4) involving bottom-up initiatives; (5) recognizing and sharing benefits and costs" (Suskevics et al., 2010, p 7).

Managing expectations includes being clear and open from the beginning about goals and expected outcomes of the participatory process. There are three policy goals linked to public participation. Participatory processes may (1) improve decision-making quality, (2) secure legitimacy of decisions and (3) facilitate implementation of decisions (Suskevics et al., 2010). Although the three goals are interlinked, each requires slightly different procedures, scope of participation and timing. There also is a considerable degree of variation with respect to political influence in the decision-making process. According to Arnstein (1969), the public in the participation process can have different degrees of influence. At one extreme, public participation could only serve as a one-way information forum, where the main function is "to inform." At the other extreme, participants may become empowered to make the decisions for themselves (i.e., delegated power). In between those two extremes we have consultation, where participants provide feedback on the decision-making process. In this case, however, decision-makers are usually not obliged to take that public input into account. Another type of public participation is partnership, where decision-makers cooperate with stakeholders in decision-making and implementation.

An example of public participation comes from the United Kingdom. National authorities invited amateur naturalists to participate in the Biodiversity Action Plan (BAP) formulation process. It became apparent that the national authorities and amateur naturalists had different expectations of the process. "While the national level stakeholders saw the naturalists' participation mainly as a cost-efficient way of gathering biodiversity information for the BAP, the amateur naturalists expected to have influence also on some of the decisions to be taken" (Suskevics et al., 2010, p. 12). In this case, the legitimacy of the process was challenged and frustrations over the process persisted.

"The cultural and institutional context can play a decisive role in affecting the success or failure of a participatory process" (Suskevics et al., 2010, p. 14). Culture of participation arises from formal and informal institutions (rules) and varies from country to country, in some cases even from region to region within a country. When planning participatory processes, it is important to look ahead and to **adapt to the local context**. First, the need for participation may be understood differently in different countries due to historical reasons. Countries with long democratic traditions (e.g., Western Europe) usually interpret public participation differently than young democracies (e.g., Eastern Europe, some Southern European nations). Other issues to consider include (1) the role of science and related (potentially counter-) position of traditional and local knowledge, (2) the capacity of public participation organizers (i.e., how willing and capable are they to engage in a public participation exercise?) and (3) the perceptions of the public towards participation (i.e., are they ready and willing to contribute?).

For example, in the case of Alqueva water development project in Portugal (which included dams, irrigation systems and other large infrastructure), public participation was limited to public hearings

at a very late stage in project development. The public seemed to be satisfied with that level of participation, even though they were able to influence only minor changes at a very late stage (Suskevics et al., 2010). This case stands in stark contrast with the experiences of the Ribble Valley water basin management project, a pilot project implementing the European Water Framework Directive in the United Kingdom. In that case, the environmental authorities pro-actively engaged a large number of stakeholders in a series of events and eventually formed advisory citizen panels. The stakeholders were dissatisfied with the advisory status of the panels and expected to have more influence over decision making. As a consequence, the advisory panels were dissolved because agreement could not be reached between the stakeholders and the authorities (Suskevics et al., 2010).

"Participatory processes need to be aware of the potentially complementary and/or competing policy agendas at local, national and EU levels" (Suskevics et al., 2010, p. 25). In the EU, "there are multiple levels of authority and policy-making from international to local levels which influence each other mutually" (Suskevics et al., 2010, p. 25). Interacting with multiple stakeholders at those multiple **levels of governance**, carefully balancing their interests, power, resources and responsibilities, and assuring policy coherence is one of the key challenges to successful participation.

For example, in Catalonia, Spain a policy conflict arose between agricultural development policy (i.e., expansion of irrigation) and biodiversity protection policy (under the Natura 2000 framework) (Suskevics et al., 2010). The biodiversity project was designed to strengthen the population of a rare bird: the Little (*Tetrax tetrax*). Constructing the proposed irrigation channel would have counteracted conservation efforts. The controversy escalated at several governance levels. The Spanish government was sued in the European Court of Justice for inadequate implementation of the Natura 2000 framework and improper implementation of the Directive in this specific case of Catalonia (EU vs. national level). The Catalonian environmental authorities did not effectively communicate the new Natura 2000 regulations to the local stakeholders (sub-national vs. local level). Finally, poor coordination among different within the Catalonian government was at some fault: the department responsible for environmental conservation was not informed about future plans of the agricultural development in the area (sub-national level).

Building water and biodiversity governance around existing bottom-up initiatives is likely to strengthen the success of the initiative (Suskevics et al., 2010). In some cases there might be an active local community initiative; a non-governmental organization project; an association of anglers, foresters, farmers, amateur environmentalists or service-providers already working toward the same goals. Ignoring them "could undermine the quality of decision-making, as well as the legitimacy of any outcome and the ease of implementation" (Suskevics et al., 2010, p. 26).

In Ahtialanjarvi, Finland, a freshwater lake ecosystem is being restored through an initiative developed by local, amateur birdwatchers (Suskevics et al., 2010). Flood protection in this area started in the 18th century, but recently the growth of a cane species began to endanger the ecosystem and its

biodiversity. The group of birdwatchers partnered with the local and regional nature conservation society and the municipality for an EU-financed conservation project. The ecological knowledge brought in by the amateur birdwatchers was at the center of the project. The project has been so successful; the area is included in the Natura 2000 network of protected areas in Europe. The continuity of the initiative is uncertain because funding is uncertain and management of the lake ecosystem depends on only a few volunteers. It is apparent, however, that any further biodiversity initiative in this area should build on this network of committed people.

There is a range of **benefits and costs** arising from environmental policy processes. Environmental policy goals usually have related opportunity costs and benefits; environmental policy may restrict access to an area or economic activity (e.g., tourism, transport, construction) and at the same time, may improve the quality of the environment, public health, landscape condition and in some cases, local economics. Public participation and stakeholder involvement in such policy processes brings its own benefits and costs: benefits in terms of better decisions and possibly new opportunities, costs in terms of time and effort. Those benefits and costs should be **recognized and shared** in order to ensure effective environmental policy and participatory processes (Suskevics et al., 2010).

A good case study example for recognizing and sharing the benefits and costs is the Living Sprotte project, a pilot project implementing the Water Framework Directive with the aim of riverbed restoration and conservation. The project involved "constructing fish ladders, re-engineering some river segments and renaturalizing some important sites within the watershed" (Suskevics et al., 2010, p. 36). The complexity of such a task involved dealing with multiple private property owners (in some cases fragmented ownership), farmers, local communities, 14 municipalities and many other interested parties. "Acceptance of the various interventions, and of the new layout of the river basin, was finally achieved through intensive communication efforts as well as a careful planning of all the implementation steps" (Suskevics et al., 2010, p. 37). That included several stakeholder involvement events and platforms. The pilot project was supported by the EU funding. The costs involved (1) re-engineering the riverbed for the implementing public agency, (2) administrative and coordination costs for the implementing agency, and (3) loss of agricultural and recreational land for the landowners and farmers and related monetary and non-monetary costs.

Notes

Break
15:00–15:30

Module 11: Incentives and Tools for Local-scale Management
15:30–17:00

Facilitators should screen the tools in this section and discuss with participants the subset that seems most relevant to the context where the participants live and work.

Module 11 at a Glance

There is a wide range of tools, a full tool-box from which you can choose as you approach management, as you try to control certain properties of the system for societal benefit.

- 30 min Presentation
- 15 min Marine turtle or other case study
- 30 min Groups develop incentives and tools for their catchment
- 15 min Plenary

Learning Objectives for Module 11

- Understand the breadth of tools available for guiding ecosystem management
- Appreciate ways that those tools can be evaluated
- Understand ways tools can be selected, things to consider in their choice

Incentives & Tools That Might Be Useful in Local Landscapes

The Module 11 slides have content that allows you to present material addressing this topic

You may choose to use the case studies provided in this section to illustrate incentives and tools for local-scale management. For our purposes, we defined categories of incentives and tools. Those categories are:

- Advocacy & extension
- Government purchase of services
- Legislation & regulation
- Markets for ecosystem services
- Stewardship
- Community-based natural-resource management (CBNRM)
- Labeling, marketing & targeting
- Micro-credit schemes
- Natural-resource accounting

[1] *Note that this case demonstrates mis-use of fire in a landscape. There are other situations where fire and its management are integral to achieving management goals.*

Box 4: Case Studies. Advocacy Against Burning of Agricultural Residues in the Fields of Lithuania.[1]

If one comes to Lithuania in spring, especially the months of March and April, one will be surprised by the number of fires occurring in rural areas. Most of those fires are not natural but are started intentionally by Lithuanian farmers. This dangerous and harmful habit has persisted for many years, and many state institutions and non-governmental organizations have become active trying to reverse the practice by employing advocacy and environmental education tools together with administrative penalties.

Why do Lithuanian farmers burn their agricultural fields in spring? Burning removes agricultural residues from the last year and kills non-agricultural invasives (e.g., shrubs, reeds). Burning agricultural fields and meadows supposedly also helps to get rid of weeds. However, the overwhelming use of agricultural pesticides demonstrates that fires are not effective for removal of weeds. Further, the majority of agricultural weeds in this area have deep roots that remain vital even after a fire (MoEoL, 2009). The other misconception that farmers have is that ashes fertilize the fields; in fact, fire vaporizes essential nutrients. Finally, burning of fields reduces the need for labour inputs when dealing with unwanted vegetation or residues from the previous year.

What are the economic, social and environmental consequences of agricultural field burning in spring in Lithuania? First, many plants, animals and microorganisms die in the fires: early spring plants, spiders (and other arachnids), insects, amphibians, lizards, birds, rabbits, and soil microorganisms, including endangered species. Land-nesting bird eggs and nests are destroyed. Soil after a fire is more susceptible to wind and water erosion. Its productivity actually decreases due to lost humus and reduced soil microorganism communities. Usually, it takes a several years post-fire for a soil to return to pre-fire levels of productivity and ecosystem composition. During field fires, up to 30 per cent of soil nitrogen is evaporated in the air (MoEoL, 2009). What is more, it is difficult to control the fire and commonly the fire spreads into the neighbouring forests, wetlands, peat-bogs and houses. In 2009, the State Fire and Rescue Department was called 7,000 times to deal with of uncontrolled field burning (State Fire and Rescue Department [SFRD], 2010). Each year, there are cases where uncontrolled field burning causes loss of life and property (MoEoL, 2009). In 2005, six people died as a result of uncontrolled field burning agricultural practices in Lithuania (MoEoL, 2005). Air pollution and smoke are associated problems. Finally, some farmers add wastes (e.g., old tires) to fields to be burned with the grass and residues. As a result, toxic emissions enter the air.

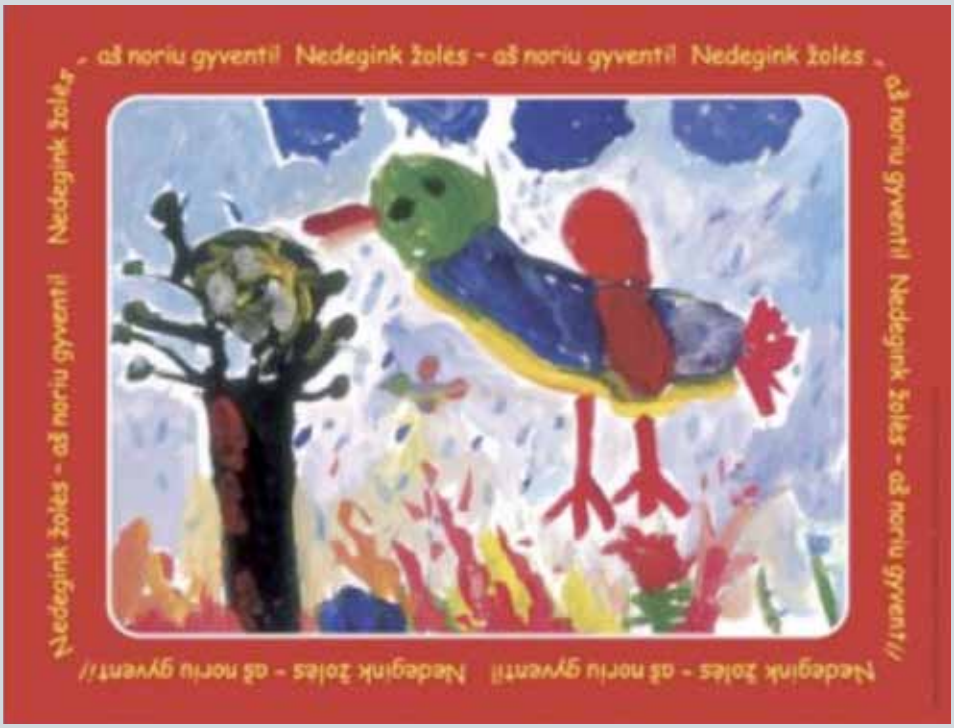
Burning of agricultural fields is considered to be an offense of agricultural practices according to Lithuanian regulations. Every year, the Ministries of Environment and Agriculture together with their representatives in different regions of Lithuania engage in an active public information campaign discouraging field burning as an agricultural practice and explaining its threats to ecosystems and people. The State Fire and Rescue Department has joined the initiative (SFRD, 2010). Fire fighters and environmental inspectors are on full alert during the spring months in Lithuania. The mass media also covers this issue every year.

1 Note that this case demonstrates mis-use of fire in a landscape. There are other situations where fire and its management are integral to achieving management goals.

It has been reported that children and teenagers contribute to the burning of grass for fun (SFRD, 2010). In 2005, an environmental educational campaign against grass/field burning was launched in Lithuanian schools; that has become an annual event with an outreach to thousands of Lithuanian children (Lithuanian Young Environmentalist Centre [LYEC], 2010). School children participate in lectures, excursions, discussions and drawing competitions. Exhibitions of children's work are organized in various towns across Lithuania increasing public outreach. Figure 4 is a child's drawing that was awarded top honours, and later was used as a promotional poster by the Ministry of Environment of Lithuania.

Civil responsibility is foreseen for such actions with administrative penalties and fines for damage to nature. Administrative penalties have been steadily increasing, but the problem still persists. New administrative tools have been introduced to fight this problem. Agricultural subsidies from the European Common Agricultural Policy are suspended if field burning is practiced in the fields of the subsidy receiver (MoEoL, 2008).

Figure 4. This drawing was a winner from the children's competition "I Want to Live," devoted to environmental education on dangers and damage of spring field burning in Lithuania. The Ministry of Environment of Lithuania recreated this drawing, depicting a bird escaping field fire, as a poster for public outreach campaign (MoEoL, 2005).



Case Study: China's Sloping Land Conversion Program[2]

China's Sloping Land Conversion Program is one of the largest, currently implemented conservation projects in the world and arguably the world's largest scheme for implementation of payments of ecosystem services (Uchida et al., 2005). China's unprecedented growth has brought unprecedented environmental consequences. Estimates of economic costs posed by environmental problems range from 3 per cent of China's GDP in 2004 to 10–15 per cent of GDP annually (Wang et al. 2006; Smil, 1996). China's environmental problems include severe pollution of all types of environmental media, various forms of environmental degradation (e.g., deforestation, desertification, erosion), and natural disasters such as flooding and droughts.

In 1997–1998, two major natural disasters related to the largest Chinese rivers attracted the attention of policy-makers (Van den Dool, 2010). In 1997, the Yellow River completely dried up for 267 days causing water shortages and losses to downstream industry and agriculture. Just a year later, severe flooding took place on the Yangtze River, destroying the livelihoods of 15 million people, severe financial losses (estimated at US$20 billion) and the death of 3,000 people.

The Chinese government concluded that these natural disasters were related to deforestation and unsustainable agricultural practices in the upper reaches of the watersheds (Van den Dool, 2010). Watershed conditions in Western China are disturbed due to deforestation for commercial purposes as well as land clearing for agriculture. Moreover, Western China's hilly landscapes are particularly vulnerable to erosion. Clearing the forest from the high slopes and removing most of vegetation from the soil as lands are converted to conventional agriculture leads to increased rates of erosion and landslides. "In the past, a large amount of forestland and grassland in this region has been converted to agricultural land; therefore, the west of China has been identified as an erosion hotspot" (Van den Dool, 2010, pp. 13–14, Figure 3). Erosion contributes to siltation and pollution of rivers and lakes, as well as reduced flood control capacities (Van den Dool, 2010).

Poverty plays a role in these processes. Poor families often have no other choice than to expand into ecologically vulnerable lands. That is a short-term solution because soon people become trapped in the vicious circle of environmental degradation, soil erosion, low productivity and poverty (Xu et al., 2005).

The Sloping Land Conversion Program (SLCP) was announced in 1999; it initially functioned in a pilot and in 2002 began to be implemented on a larger scale. The program has two mutually related goals: poverty alleviation and erosion reduction. The program aims to reforest agricultural sloping land, by offering annual payments to farmers to compensate for foregone revenue and afforestation efforts. Targeted areas are (1) lands with a slope higher than 15° in Northwestern China and (2) lands with slopes over 25° in Southeastern China (Van den Dool, 2010). SLCP employs a variety of policy tools. A scheme of payments for ecosystem services (economic tool) is at the centre of SLCP, complemented

[2] *Reviewed by Annemieke van den Dool; Permission received for use of graphic materials*

by administrative tools (i.e., afforestation standards, ownership rights to planted vegetation, land management rights) and advocacy/educational tools (e.g., mass media coverage, education, awards, and training).

SLCP pays for three kinds of vegetation: grassland, commercial forest (fruit trees) and ecological forest (fast-growing hardwoods, orchards or trees of medicinal value) (Figure 6). The state payments come in three forms: seedlings, grain and cash. Seedlings are received at the beginning of the period, while grain and cash is disbursed after a state inspection that verifies the cropland conversion and quality management. The subsidy is offered for two years in the case of retiring agriculturalists land for the grasslands, for five years for a commercial forest plantation and for eight years for an ecological forest (Van den Dool, 2010). Overall, SLCP favours ecological forests and requires that at least 80 per cent of all retired agricultural land be converted to ecological forest. It is important to mention that land in China is owned either by the state or by collectives. Land in rural areas is usually owned collectively by peasants and can be subcontracted by the members of the community (Van den Dool, 2010).

The implementation of the SLCP is top-down, involving few administrative levels. There are a few organizations working at the national level (Van den Dool, 2010):

- National Development and Reform Commission (state agency for social and economic policy development, responsible for planning and coordination of the SLCP),
- Ministry of Finance (budget issues),
- State Forestry Administration (main implementing agency at the national level)
- State Grain Bureau (management of state grain reserves, supplies grain payments)

Provincial SLCP Management Offices have been established in provincial Forestry Bureaus in order to formulate and coordinate the implementation. They are responsible for SLCP planning and assignment of tasks to cities and counties. Similar SLCP offices exist at a county level and they are directly responsible to the provincial administration. “They are in charge of the formulation of county level plans, identification of priority areas for cropland conversion, implementation, monitoring and evaluation, management of program funds, formulation of specific management rules and provision of seedlings and technical support” (Van den Dool, 2010, p. 18). The lowest tier is township. At this level the work is carried out directly with farmers. Figure 5 illustrates the SLCP implementation scheme.

There are 25 provinces (out of a total of 33 in the country, Figure 6), almost 2,300 counties and 124 million villagers involved in SLCP. Since 1999, 27.7 million hectares of agricultural land were converted to grasslands and forested land (an area greater in size than the United Kingdom); forest cover area is expected to reach 20 per cent by the end of 2010. The government’s accumulated spending on the SLCP since 1999 amounts to approximately EUR22 billion, a cost 2.5 times that of Three Gorges Dam (Van den Dool, 2010).

Figure 5. Erosion in Pingzhang village, Yunnan province, China *(Photo: Annemieke van den Dool).*

Figure 6. Reforestation of agricultural land with fruit trees in Pingzhang village, Yunnan province, China *(Photo: Annemieke van den Dool).*

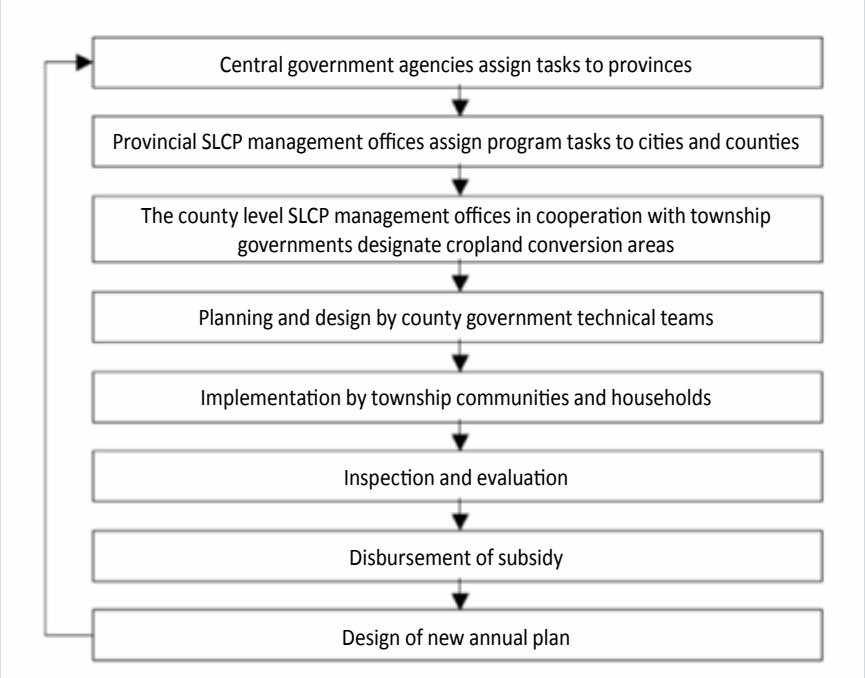


Figure 7. SLCP implementation process (Van den Dool 2010 p. 20)

Figure 8: Geographical scope of SLCP program implementation. Only Tibet and developed coastal areas are exempt from this program (Source: Annemieke van den Dool).

Case Study: Marine Turtle Conservation, Community Livelihoods and Community Well-Being: An example of rewards for ecosystem services

There are seven marine turtle species—three of them endangered and another three critically endangered (World Wildlife Fund [WWF], 2010). Marine turtles are under threat of extinction for several reasons: over-exploitation (i.e., eggs, meat, shell, bone, leather, oil), habitat destruction (both marine and land) and mortality through fisheries bycatch (Montoya & Drews, 2006).

Marine turtles are found in tropical and subtropical coastal areas, most often in developing countries. These species bring notable economic benefits to coastal communities through consumptive (e.g., various marine turtle products) and non-consumptive (i.e., tourism) uses. In fact, the value of non-consumptive income from marine turtles (mainly tourism) is estimated to be significantly higher than consumptive income. "Non-consumptive use generates more revenue, has greater economic multiplying effects, greater potential for economic growth, creates more support for management, and generates proportionally more jobs, social development and employment opportunities for women than consumptive use" (Troëng & Drews, 2004, p. 7). Therefore, marine turtle conservation efforts are compatible with aspirations to increase community well-being.

The mutually beneficial links between community development and marine turtle conservation have become the basis of community-based natural-resource management (CBNRM) initiatives in Panama and Costa Rica (Montoya & Drews 2006). Three local communities—Tortuguero on Costa Rica's Caribbean Coast, Junquillal on Costa Rica's Pacific Coast and Chiriqui on Panama's Caribbean Coast—have announced their own Community Livelihood Improvement Programs (CLIPs) based on marine turtle conservation efforts and visions of a sustainable community. Each of those communities sits next to important marine turtle nesting sites and hosts conservation activities organized by the World Wildlife Fund (WWF), the Caribbean Conservation Corporation and other national organizations. Tortuguero is a well-developed tourist destination; Junquillal is still developing its tourism infrastructure and Chiriqui is a rather remote community without tourism, with very few modern amenities and accessible only to the local population. This case study describes the community at Junquillal and their marine turtle conservation Community Livelihood Improvement Program (CLIP).

Junquillal is located in the province of Guanacaste on the Pacific coast, where tourism is developing rapidly. Junquillal has a population of 220 people (130 households), of which 60 per cent are Costa Rican residents, 18 per cent are other nationals who spend up to nine months per year in the community and 22 per cent are temporary construction workers. Employment opportunities are rather scarce: local men usually work in construction, gardening or security services; most women work in hotels or sales (Montoya & Drews, 2006). Junquillal beach is 5.3 kilometres long and is an important nesting site for leatherback and black turtles. Traditionally, gathering turtle eggs was a rather easy way of earning additional income because there was a market to local people and tourists. Illegal harvesting of marine turtle eggs was considered to be the principal threat to the turtles, followed by construction and artificial lighting on the beach.

Gabriel Francia, a graduate student at the University of Costa Rica, started his research on marine turtles in Junquillal in 2001 (WWF, 2009). In 2005, he launched the Marine Turtle Conservation Project (MTCP) supported by WWF and other international and local foundations (Montoya & Drews, 2006). As a part of the project, a marine turtle hatchery was constructed for protection of eggs from erosion, predators, overheating and poachers. A few local people were trained as turtle patrols to monitor and protect turtle nests. According to Francia, there were several cases where a poacher became a member of the marine turtle patrol (WWF, 2009).

To emphasize the link between the marine turtle conservation and community livelihoods, the community was introduced to local ecotourism initiatives as they were practiced in Monteverde and Tortuguero (Costa Rica). Field trips were organized with various environmental education courses, resulting in great interest among the people of Junquillal (Montoya & Drews, 2006). However, local tensions continued to exist due to economic inequality—hotels and restaurants are often owned by foreign nationals. A quarterly bulletin was begun, with information about the MTCP. In 2005, circulation of the bulletin locally, regionally and internationally reached 1,500 (electronic version and hard copies). A Leatherback Football Championship was organized as a part of MTCP promotion campaign in 2005.

The issue of harmful artificial lighting on the beach was addressed through education as well. Building owners were introduced to the problem by demonstrating the harmful effects (i.e., comparing disoriented turtle hatchlings under white and monochromatic light) (Montoya & Drews, 2006). Some building owners agreed to reduce artificial lighting or switch to turtle-friendly lighting. Negotiations about public lighting and its effects on turtles also took place with the local electricity provider.

In 2006, the local population was surveyed about the MTCP. In general, the community of regarded the MTCP as positive and beneficial (Montoya & Drews, 2006). Gabriel Francia was admired among young patrols and volunteers. Turtle egg poaching decreased to zero within one year of the launch of the project. Through MTCP, local residents got to travel to similar communities, learn about conservation and alternative livelihood strategies, meet with state authorities (ministries, municipalities), and organize community events (football and school festivals). The project has fostered a sense of unity and self-esteem and contributed to development of an active civil society. A primary school has been established in the village, a result of community demand. Yet, access to health services remains poor: the nearest health centre is an hour away. In the framework of the MTCP, 30 per cent of the residents got to see an adult marine turtle or the birth of hatchlings (Montoya & Drews, 2006). Among the benefits mentioned, MTCP also provided employment for a small share of population.

“More importantly, the project is creating the foundation for a community-controlled and turtle-based form of tourism that will give the local community access to this market, in such a way that they may control the onslaught of development present in Guanacaste and continue to protect marine turtles as a central attraction for a more sustainable form of tourism in Junquillal” (Montoya & Drews, 2006, p. 69).

Notes

Day 4: Managing our Ecosystems

Day 4 at a Glance

- We base our work in the plan–do–check model of adaptive management. We will stress that all EM actions are experimental; there are no single, deterministic solutions.
- Need to know who the actors are, what their motivation is, what their capacity is, how we will encourage them to take action and then how we will assess the results.
- As we consider management actions, we need a starting point. We have to have an initial state, a condition of our catchment (our ecosystem) today, so we know what to maintain and what to change.
- Maintaining and changing various characteristics uses the concept of ecosystem service valuation. But that requires that we ask "valuable to whom?" We use stakeholder analysis to ascribe valuation among competing interests.
- But, of course, competing interests means everything is a trade-off. How do we balance stakeholder interests and various expressions of value to develop realistic goals for an ecosystem management approach to managing a catchment?
- Having chosen goals, which of the resources in that tool-box would actually help us attain those goals, and how would we apply those specific tools?

Module 12: Valuing Ecosystem Services
8:00–9:30

Module 12 at a Glance

Choosing among those tools requires setting value on those ecosystem services; that allows us to have a currency, a way of selecting among the choices.

Learning Objectives

- ***Be exposed to ecosystem service valuation and learn to treat it with a cautious eye***
- Demonstrate an ability to think about valuation from several perspectives
- Be able to discuss the various roles of valuation in ecosystem scale decision making

Begin by reviewing the table of tools in Module 12; consider scenarios and then ask participants *What do you do on the ground in this situation?* The idea is to elicit ideas that may parallel what we have in the Module, but are called different things

Economic valuation of ecosystems is a rapidly developing discipline and there are now many different methods available for undertaking different aspects and purposes of ecosystem valuation. Valuation forms one of the many types of ecosystem assessment which can and should be used for different purposes and at different scales in support of ecosystem-wise use, management and decision-making.

What is Valuation?

The Module 12 slides have content that allows you to present material addressing this topic.

Participant Manual, Box 5: Definitions of "Value"

Why is Ecosystem Valuation Important?

The Module 12 slides have content that allows you to present material addressing this topic.

Participant Manual, Box 6: Ecosystem values are often not properly or fully taken into account, or are only partially valued, in decision making, often leading to degradation or even destruction of an ecosystem

When Should Valuation Be Undertaken?

The Module 12 slides have content that allows you to present material addressing this topic.

Participant Manual, Box 8: Restoration Costs of Degraded Wetlands: An example from the Netherlands

The Use of Valuation in Environmental Impact Assessment

How Can Ecosystem Valuation Studies Be Used?

The Module 12 slides have content that allows you to present material addressing this topic.

Intimate debate about prioritizing ecosystem services

Refer to the structure for an intimate debate. The following two position statements offer opposing views about how one might set priorities in a catchment.

A word of caution: it is important to insist that participants turn in all typed material after the first step; failure to do so will often result in discussions in which people simply read from the prepared material you offered.

[3] *Data reported here are fictitious and are based in Kenya (using KES, Kenyan Schillings); they are offered for this exercise alone.*

Maintaining a diversity of Ecosystem Services is most important[3]

The XXX Catchment is diverse; its people and practices are diverse. There is no justification for focusing solely on one type of Ecosystem Service. We have agricultural producers, small-scale farmers, small forestry operations, grazers, fishers, and wildlife enthusiasts. All must be supported if we are to have a sustainable future. We are the XXX WRUA (Water Resources Users' Association) and we are delighted that WRMA (the Water Resources Management Authority) finally has decided to facilitate a process of stakeholder input to decide how to manage the sub-catchment. We strongly argue that a wide range of services (e.g., irrigated agriculture, public water supply, waste treatment, wildlife, tourism, fisheries, and biodiversity and spiritual values) all must be considered and supported.

- Small scale agriculture in this watershed engages a range of men and women, and is economically viable. In fact, data from Bayer Crop Science suggests that the small investment of KES500,000 could improve the lives of 5,000 women and children.
- The City of XXX is a viable and growing economic power, operating as a regional market. Support for water and wastewater treatment should be offered immediately so we can improve business conditions.
- Wildlife viewing is a major tourist activity in Kenya. Building a 1 kilometre forested corridor along the YYY and ZZZ Rivers would increase wildlife viewing opportunities, advance biodiversity and improve the catchment for all people. We request KES500,000 for technical assistance for a practical assessment, and KES5 million for tree planting.
- We have recruited an ecological economist from Economists Without Borders, and she did a Trade-Off Analysis for our sub-catchment. She clearly showed that this diversity of services is the best choice for the betterment of all.

Provisioning Ecosystem Services are most important

Current conditions in the XX Catchment are unacceptable; AAA is a poor country with many poor people. The majority of the people who live in the XXX catchment are unable to sustain their livelihoods. Agricultural productivity is low, water supplies are highly variable and unreliable. People's needs are not being met in a fair way. We cannot have a sustainable future under these conditions. We are the XXX WRUA (Water Resource Users' Association) and we are delighted that WRMA (the Water Resource Management Authority) finally has decided to facilitate a process of stakeholder input to decide how to manage the sub-catchment. We strongly believe that a focus on Provisioning Ecosystem Services will most reasonably advance the needs of all stakeholders in the catchment.

- A cascade of sand dams recharges regional groundwater and controls erosion (http://Saddam.org). We need a plan to increase the number of sand dams by 100 per year over 10 years.
- Shallow bore holes with pumps driven by solar panels provide water for irrigation, allowing us to irrigate more land and feed our families. We request 100 new bore holes be completed in the next three years.

3 Data reported here are fictitious and are based in Kenya (using KES, Kenyan Schillings); they are offered for this exercise alone.

- We have seen the fish productivity farms in the Upper YYY River; we have heard that there soon will be greater fish productivity in the Upper YYY than are harvested from Lake Victoria. We request significant assistance in bringing fish farm technology to XXX. Our Techniacal Committee will visit the Upper YYY to learn from their practices. We request KES500,000 for technical assistance to visit the Upper YYY farmers, and KES5 million for construction of ponds in XXX.
- We have recruited an ecological economist from Economists Without Borders, and he did a Total Economic Value Analysis for our sub-catchment. He clearly showed that this diversity of services is the best choice for the betterment of all.

Box 5: Case Study of the Largest Conservation Battle in Australia: Hydroelectric development and wilderness in South-West Tasmania

The conflict over the South-West wilderness area in Tasmania started in the late 1970s when the Hydro-Electric Commission (HEC) issued a proposal to construct a dam inundating the Gordon and Franklin rivers (Australian National Parks [ANP], 2009). This project was a response to increasing electric energy demand in Tasmania. The planned capacity of the two-phase (dams on the Gordon and Franklin rivers) "Gordon-below-Franklin" hydroelectric project was 330 MW (Dragun, 1983). Socioeconomic benefits expected to accompany the dams included unemployment reduction, economic growth, and road and infrastructure development.

Project designers understood that there would be a range of environmental impacts of the "Gordon-below-Franklin" project. Southwestern Tasmania remains a truly wild and undisturbed area; the Gordon and Franklin rivers cross this area. Inundation of these rivers, as well as tributaries and valleys, would have inundated 117 square kilometers (Dragun, 1983). The resulting reservoir would cover scenery, several gorges and unique geological formations (see picture gallery in National Library of Australia [NLA], 2009). As a consequence, development of tourism such as rafting and canoeing expeditions would be compromised.

This area is also considered important for its biodiversity. Biological research in this area was limited before the project proposal was developed. Even thought there was limited information, Southwestern Tasmania was considered to be a biodiversity "hot-spot" accommodating endemic species of global importance (Dragun, 1983). Inundation would have also flooded the Truchanas Huon Pine Reserve. This flooding would have caused a loss of 35 per cent of the remaining stands of Huon Pine tree, a species that can live up to 2500 years (Dragun, 1983). The wilderness area that was not directly flooded would have been exposed to infrastructural developments that would eventually create further environmental pressures (i.e., increased incidence of fires, invasive species, and transport) in the area.

Southwestern Tasmania is renowned for its archeological sites, which date back 20,000 years (Dragun, 1983). The site remains important to a distinct Tasmanian Aboriginal culture that currently retains

spiritual practices related to this site. They participate in the management of the area and some sites have been returned to ownership by the Aboriginal communities.

The "Gordon-below-Franklin" project proposal sparked a societal conflict that lasted for several years. It is considered to be the largest environmental conservation battle in Australia's history. The Tasmanian Wilderness Society mobilized a large portion of the Tasmanian population and organized "a series of public meetings and street marches, culminating in the largest street march seen in Tasmania" (ANP, 2009). The picture of Peter Dombrovskis (NLA, 2010, Picture No. 20,) has become a symbol of the Tasmanian conservation movement. In light of and perhaps influenced by this huge protest wave, the Australian government decided to propose an alternative hydroelectric development project in the area "Gordon-above-Olga." "In 1981, a referendum was held in an attempt to resolve the issue, giving the Tasmanian people the opportunity to express their support for the construction of either the Gordon-below-Franklin or the Gordon-above-Olga scheme. The option of no dams was withdrawn. An amazing 44 per cent of the electorate cast write-in ballots stating No Dams (ANP, 2009).

International attention was brought to this issue in 1982 with involvement of the United Nations Educational, Scientific and Cultural Organization (UNESCO). The Tasmanian federal government submitted an application to the World Heritage List proposing that a large area of Western Tasmania composed of several national parks and protected areas (20 per cent of the whole Island of Tasmania) be listed as a World Heritage Site (Parks and Wildlife Service of Tasmania [PWST], 2008). The site was included in the UNESCO World Heritage List in 1982 because it "had satisfied more criteria (cf. UNESCO cultural and natural resource criteria) than any other World Heritage Area on Earth" (ANP, 2009). However, the risk of irreversible damage as a result of the hydroelectric dam development still existed.

In 1982, a new Australian government decided to proceed with the hydroelectric development plans in spite of wide protests and UNESCO's recognition as a World Heritage Site. This decisive government action led to the biggest disobedience campaign in modern Australia. More 2,500 people took part in the mass campaign. Participants chained themselves to trees near the headquarters of the HEC in a sign of protest. The government ordered the police to carry out arrests and over 1,000 people were arrested. However, new ones from the campaign rapidly replaced those arrested (ANP, 2009). The government searched for new sites for hydroelectric development in Tasmania, but those were rejected by the public and the federal government. Eventually, construction by the HEC began despite societal protests and changing governmental attitude towards the project (n.b.: there was a change in government during construction). The final word in this conflict between wilderness and development was provided by the High Court of Australia on July 1, 1983 (Sadler & Dragun, 1983). The court ordered HEC to abandon construction and preserve the Tasmanian wilderness area.

No specific ecosystem valuation analyses were performed during the decision-making process over the Tasmanian wilderness and hydroelectric development. However, some researchers did undertake economic calculations. Dragun (1983) compared two energy development options for Tasmania—"Gordon-below-Franklin" and an average thermal power plant. That analysis suggested that the cost differential between the two is AUD9,500,000 (Australian dollars) with a 5 per cent discount rate or AUD1,048,000 with a 10 per cent discount rate. "When the growth-rates of both hydroelectric and preservation benefits are taken into account, such differentials fall drastically to 700 000A$ (at 5%) and 150 000 (at 10%), respectively" (Dragun, 1983, p. 201). HEC claimed the cost differential was AUD17,380,000. These numbers were finally assigned to be the minimum estimate of the value of the Southwestern Tasmanian wilderness. This minimum estimate was compared to the tourism potential of the area, potential that can be considered unlimited in time. When tourist benefits are incorporated (i.e., number of tourists, number of days spent in the area, amount of money spent per day), the cost differential becomes trivial (Dragun, 1983). According to Dragun (1983), the real prices of electricity are likely to decrease over time and the demand for wilderness is expected to increase because the supply of wilderness is decreasing due to development. Therefore, the value of tourism inflates through time, making the valuation differences more apparent.

Communicating Ecosystem Values

The Module 12 slides have content that allows you to present material addressing this topic.

Examples of Total Economic Values and lessons learned

- Wetland values
- Values of ecosystem services of tropical forests
- Other examples

Potential exercise: The Water Footprint Calculator provides two versions of a metric, a short one and a more extensive version, that helps people calculate their water usage and impact. The simple version is based on nothing more than country, average meat consumption and gross income per person. The extended version collects about 10 minutes worth of data. Results can vary more than twofold between the two, resulting in an opportunity for a discussion about values and practices.

Topics you may choose to expand upon in your workshop:

- Assessing the benefits of not converting a floodplain in Delhi
- Valuing the benefits of water provision in New Zealand
- Using valuation to assess levels of compensation and steer policy
- Value for money: Natural solutions for water filtration and treatment
- Ecological infrastructure for protection against natural hazards (Vietnam)
- How protected areas can generate benefits: Selected examples

Notes

Box 6: Case Study of the Role of Women in Ecosystem Restoration: The Green Belt Movement of Kenya

Gender is an especially important factor in ecosystem management of traditional societies across the world. In traditional societies, women and men have distinct roles and household duties that, in turn, have different impacts on surrounding ecosystems. A failure to account for gender in these cases may cause a failure in ecosystem management initiatives. In many cases today, only men take part in various community training, consultation and public participation issues. It is critical to the success of any ecosystem management effort that women be full engaged as stakeholders.

"Throughout Africa, women are the primary caretakers, tilling the land and feeding their families. As a result, they are often the first to feel the effects of environmental damage as vital resources become scarce and even unusable" (Maathai, 2008, p. 25). This scarcity translates to longer searches and walking time for firewood, food and water. As a result, it is mainly women and children's quality of life that is damaged by ecosystem degradation.

Deforestation is one of the most visible threats to African ecosystems and to the well-being of African people. Kenya's forest cover is less than 2 per cent and the country lost 90 per cent of its forest as a result of government policies over the last 80 years (Maahtai, 2008). It is interesting to compare the figures of forest cover and deforestation among the continents of the world. Africa's forest cover loss is third, after Europe and South America. Yet, in terms of current deforestation rates, Africa is the major contributor: 50 per cent of world's annual deforestation occurs in Africa (Maahtai, 2008).

Wangari Maahtai is an African environmental activist, the first East African woman to hold a PhD degree and the first African women to be awarded a Nobel Peace Prize (awarded in 2004). In the 1970s, after several years of overseas education, she returned to Kenya and observed that dramatic environmental and social changes had occurred in her home area. An ancient fig tree forest was being felled, even though it previously had been considered sacred and provided vital watershed services to the community (Brownhill, 2007). Forests were logged throughout Kenya mainly for timber and large-scale export oriented agriculture (i.e., coffee, tea, sugar, cotton, flowers). Forest harvest was promoted by the

international development agencies (Brownhill, 2007). Eventually, export-oriented agriculture took over subsistence plots; there was less land available for subsistence farming, and starvation and malnutrition became an issue. Small-scale agriculturalists started to expand their lands into forests as well.

The associated social and environmental effects of such practices included undernourishment and related diseases, primarily affecting women and children; shortages of food and water; longer times required to fetch wood and water, which are women's duties in most African households; soil erosion, which disturbed watershed services and advanced desertification; more frequent droughts and flooding; changes in regional and local climate and negative impacts from large-scale agriculture (e.g., soil and water pollution).

Seeing the devastating social and environmental effects of the Kenyan government policies then in place, Wangari Maahtai established the Green Belt Movement under the auspices of the National Council of Women of Kenya in 1977. Planting the first trees on World Environment Day marked establishment of the organization. The organization sought to work in two directions: (1) protect the remaining forests of Kenya and (2) restore Kenyan forests and food sovereignty through tree plantations and a return to indigenous agriculture. The organization mainly worked with rural women because they were most affected by the negative social and environmental consequences of deforestation and large-scale farming (Maahtai, 2008, p. 25).

The Green Belt Movement became a centre for civil and environmental education "that educated citizens about the links between the problems they were facing, the degradation of the environment, and governmental policy" (Maahtai, 2008, p. 26). It was especially hard to educate the citizens due to the dependency syndrome (i.e., they believed that solutions to their problems should come from "outside," such as local or national government or international agencies, not from their own actions and decisions). In their educational programmes, the Green Belt Movement taught rural women how to plant trees, how to choose varieties of trees (i.e., fruit, medicinal, ritual, firewood, water catchment and other purposes), soil conservation practices, sources for indigenous seeds and traditional agricultural methods (Maahtai, 2008). Women received monetary compensation if a tree survived more than three years. Eventually, "women began to plant trees on public land including their children's school compounds, church yards, public squares, road verges and other common lands" (Brownhill, 2007, p. 35).

There were over 30 million trees planted under the initiative of the Green Belt Movement since 1977. Now the organization operates internationally (mostly in African countries) and has established a One Billion Tree campaign (Green Belt Movement, 2010).

Break
9:30–10:00

Module 13: Trade-offs and Goals for Ecosystem Management
10:00–12:00

Module 13 at a Glance

Of course, competing interests means everything is a trade-off. This session addresses the question *How do we balance stakeholder interests and various expressions of value to develop realistic goals for an ecosystem based approach to managing a catchment?*

Module 13 structure

- 30 min Introduction, intact and modified ecosystems
  - o Scale and linkage
  - o Scale and jurisdiction
- 20 min Small or whole group develop list of ecosystem services for case study or own area
- 30 min Goals and management questions relevant to goals
  - o Cumulative and multiple impacts
  - o Upstream/downstream access and equity
  - o Opportunities and constraints
- 25 min Small or whole group discuss and develop priority listing of realistic goals for ecosystem services
- 15 min Roundtable discussion and wrap-up

Learning Objectives for Module 13

- Understand the issues of scale and linkage that apply in the context of realistic goals for provision of ecosystem services
- Appreciate the need to consider multiple, current, potential and cumulative uses and management activities in evaluating the extent to which goals are realistic
- Understand the potential of opportunity and constraint analysis in assessing goals for use of ecosystem services

Introduction

The Module 13 slides have content that allows you to present material addressing this topic.

Modification, Linkage, Scales and Jurisdictions

The Module 13 slides have content that allows you to present material addressing this topic.

Notes

Group exercise

Coastal and shallow seas play major roles in providing ecosystem services that define and support the quality of life for coastal human communities:

- Provisioning—seafood
- Regulating—shoreline protection, remediation/cycling of terrestrial waste and nutrients
- Cultural—water-sports, recreation aesthetic
- Supporting—photosynthesis, food chains and habitat

With everyone in plenary, ask participants to develop a list of all ecosystem services that are available in, result from, or are likely to be affected by activities in the exemplary catchment. If sufficient information is not available, this could be completed for a hypothetical area or a specific area familiar to at least some of the course participants. If the facilitator chooses to use more than one area and there are multiple sub-groups, each should report back to plenary. Through that process, accumulate an overall list of services. For the goal setting exercise, discuss briefly whether any of the general services on the list can be ignored when the list is applied to the assigned study area (i.e., the catchment).

This exercise guides participants in revising the scope of ecosystem services and sets the basis for discussing linkages and interdependencies for setting and evaluating goals.

Notes

Goals, Opportunities, Constraints—The context for realistic management

The Module 13 slides have content that allows you to present material addressing this topic.

Goal Setting

The Module 13 slides have content that allows you to present material addressing this topic.

What Are Reasonable or Realistic Goals and Specific Objectives for Ecosystem Services?

Goal-setting relative to ecosystem service delivery requires an understanding of the processes, rates and variability of the:

- Biophysical processes that underpin delivery of a service
- existing and possible human uses and impacts that affect delivery of the service to the proposed point of use
- Biophysical processes that are likely to be affected by use
- Existing and possible human uses at, and downstream of the point of use, that are likely to be affected by the use

Small or whole group discussion to develop priority listing of realistic goals for ecosystem services

The scope of this activity will depend on the nature of the case study. Whatever that may be, it is important for this discussion that the case study encompass all catchment considerations and extend to coastal marine conditions, or to a downstream receiving resource like a reservoir or larger river. It should factor in issues of access and equity for maintenance of the visible and invisible services to remote, downstream communities.

Within the time available, the most effective approach may be for the list of ecosystem services developed above to be divided among sub-groups. Then you might ask those groups to identify conflicts, constraints and opportunities within a holistic management context and justify goals for use of those services in the study area.

For each goal, groups should address:

- How the use of each service will affect ecosystem structure and function
- How ecosystem structure and function interact to deliver each service
- What the likely consequences of ecosystem service use are for the goals of other users of the ecosystem

In developing the goals, it will probably help to consider specific situations. The suggested approach for this exercise is:

- Identify a small number (one or two) of potential new uses, activities or developments
- Consider likely interactions with existing uses and ecosystem services

- Consider locations where and conditions under which the new activity could occur to be opportunities; within those, consider areas and conditions where it should not occur because of social (other existing or potential use and amenity) or environmental (ecosystem service or biodiversity) considerations as constraints.

Constraints and opportunities of where the activity could occur:

- Where could the activity not occur?
- What or who limits the activity?
- How secure is our understanding of ecosystem capacity to sustain the activity?
- What is the social and economic context of the activity?
- What is the predicted environmental impact of the activity?

Environmental questions

- To what extent does/would use of the ecosystem service modify habitat biodiversity or other ecosystem services?
- What are the expected cross boundary and downstream ecosystem impacts?
- How reversible is modification?

Socioeconomic questions

- Is the activity consistent with current management objectives for the area?
- What are the social/cultural values of the area?
- How will the proposed use affect those values?
- How will the proposed use affect existing or other potential uses of the area?
- What is the likely cost of an engineering solution to replace a diminished ecosystem service?
- You may wish to reference and discuss the System for Economic Accounting for Water (SEAW) that has been prepared by the UN Statistics Division and that provides a conceptual framework for expressing water's values.

Political trade-offs

- Political trade-offs should be brought to the fore in this section; there are many political trade-offs that will affect the outcome of management, but that are outside the expertise of the manager.

Management questions

- Can the sustainability of the activity be effectively monitored?
- How reversible is any modification that will be required for the activity to occur?
- What are the likely costs of restoration and/or repair if the activity stops?

Gender and Traditional Ecological Knowledge (TEK)

- Can you identify different roles played by men and women?
- Is there evidence that traditional indigenous knowledge is being considered in decision making?

Notes

Holistic management

In this unit, offer participants scenarios that demonstrate alternative management decisions. Bring participants into a discussion that helps them contrast the benefits obtained, and the costs borne by upstream and downstream users, including groundwater as a downstream user. In this case, "cost" implies constrained decision making (e.g., economic investment, investment of human resources, decisions to use land or water resources in a way that does not allow them to be used in another way).

Notes

Lunch
12:00–13:00

Module 14: Field trip
13:00–18:00

Module 14 at a Glance

We will apply our conceptual model to a local condition, demonstrating that good management practices are currently in place.

Module 14 Structure

- 10 min Define management objectives and practices
- 10 min Identify major drivers and pressures that impact the listed objectives
- 10 min Prioritize up to four practices
- 30 min Define criteria and use those to evaluate the four selected practices
- 30 min Report back
- 30 min Plenary discussion

Learning Objectives

- Develop a more practical understanding of the DPSIR framework
- Understand that the field site, the local catchment is a useful learning tool for this workshop
- Develop the ability to review management practices in a catchment and discuss from that review the apparent goals and priorities that have been established on that catchment

The Module 14 slides have content that allows you to present material addressing this topic.

We recently visited a local catchment and reviewed watershed practices. It was apparent that the people managing those lands and those waters have specific goals for their management. In many cases, it was not explicit, not apparent to us what those goals were. Today, we will review what we saw and learned about on that field trip, and will frame those observations in terms of goals (implicit as well as explicit), practices we see being applied on the ground, and our view about the relationship between those goals and those practices.

To open the session, will divide the participants into groups of three to seven people; group members will discuss what they saw. We will re-convene as plenary and discuss the practices we observed, the implicit goals we believe those practices reflect in the context of relevant drivers and pressures, and the priorities that implies for ecosystem service delivery. We also will discuss criteria we believe would allow us to evaluate the effectiveness of those management practices.

This session represents the "beginning of the end" of the workshop; we are beginning to tie it all together. At this time, we have discussed ecosystems and how they are structured, we have considered ecosystem services as a framework for understanding how people value ecosystems, and we have come to recognize that all actions taken on a catchment reflect the priorities of those making decisions. The DPSIR framework was introduced as a conceptual tool that allows us to understand how ecosystems respond to forces at a relatively fine scale (Pressures) and those at a more coarse scale (Drivers). In this session, we will apply that DPSIR framework to the catchment we visited.

Defining Management Objectives

Ask groups to discuss the management practices they saw on the field trip. Tell them to use those as evidence to define management objectives. They saw management being conducted and they understand that those practices were chosen on the basis of explicit or implicit goals. What do they feel those objectives were? When discussing the objectives, where there any other drivers and pressures that could influence the selection of particular methods? For example, significant deforestation to turn land into crop production will very likely need to be addressed if our objective is to improve soil nutrient content and reduce erosion. Ask them to write down any drivers and pressures they identified, in the context of the identified objectives.

Have them define at least four pressures and/or drivers that the group feels represent decisions that would have guided those practices. Ask them to consider how significantly the selected practices were focused on addressing the objectives and/or addressing drivers and pressures.

Accepting those goals as the framework for what they saw, tell them to describe how the management practices were applied to address the goals. Do they feel that one practice was more effective than another? What evidence would they need to evaluate the practices?

- Have them identify the top four practices (i.e., the four most effective in achieving the goals) and tabulate them in the table below
- How did they decide a practice was effective? What criteria did they use in that judgment and are there other criteria they feel would be useful for such an evaluation? Distribute the table below and have people tabulate their criteria.
- Now have them apply the criteria they have chosen to the practices they observed. For example, if the land manager is planting riparian vegetation, what goal do they interpret that practice to be advancing and how effective do they feel the practice is?
- Have them elect a spokesperson and prepare to return to plenary with criteria and the result of applying those criteria to the practices they observed.

Table 5: Evaluation of Management Practices

Top four practices
1.
2.
3.
4.
Criteria for evaluation
1.
2.
3.
4.

Day 5: Putting It All to Work

Module 15: Selecting Tools for a Local Application
8:00–10:00

Module 15 at a Glance

Having chosen goals, which of the resources in that tool-box would actually help us attain those goals, and how would we apply those specific tools?

Learning Objectives

- Understand how tools for catchment management are selected for a local application
- Be able to express a metric or framework useful for selecting tools for application and for evaluating them after application

Choosing and Applying Incentive Tools to Achieve Specific Outcomes on the Ground

The Module 15 slides have content that allows you to present material addressing this topic.

Rich versus poor

System function

- Land tenure
- Water tenure

Cultural Beliefs and Practices

The Module 15 slides have content that allows you to present material addressing this topic.

Bundling Tools and Markets

The Module 15 slides have content that allows you to present material addressing this topic.

Impact of Perverse Incentives/subsidies

The Module 15 slides have content that allows you to present material addressing this topic.

Environmental Flows

The Module 15 slides have content that allows you to present material addressing this topic.

An exercise in priority setting

Notes

Choosing the Appropriate Tool for Local Conditions

The Module 15 slides have content that allows you to present material addressing this topic

Notes

Break
10:00–10:30

Module 16: Monitoring and evaluation
10:30–12:30

Module 16 at a Glance[4]

How do we know whether our ecosystem management plan is effective in achieving the goals we established for it? Module 16 offers tools to help you clarify the goals you understand society has for your catchment, and monitor and evaluate the effectiveness of your ecosystem management plan as you attempt to meet those goals.

The Module 16 slides have content that allows you to present material addressing this topic

Learning Objectives

- Understand the role of information in decision making
- Understand the ways adaptive management can improve decisions and sustainability, and yet demonstrate that adaptive management requires M&E information

Exercise 1: Previous experience with monitoring and evaluation
In plenary, ask if anyone has had a positive experience with monitoring and evaluation. Request that two or three volunteers briefly share their experiences. Make a list of what made the evaluation experience positive, and use this list in the next steps of designing the evaluation of their EM plans.
Time: 15 minutes

Exercise 2: Constraints
All organizations face constraints in monitoring and evaluation; some constraints are more significant than others and some organizations are more facile in overcoming constraints than others. As participants to work in small groups to point out areas of the EM process where their catchment management organization could face constraints that might limit the effectiveness of monitoring and evaluation. Compile the constraints, putting them on an enlarged IEA process chart for later use.
Time: 20 minutes

Exercise 3: Identify the users
The purpose of this exercise is to identify the primary users of monitoring and evaluation of an EM plan.

- Ask participants to list the names, positions, and departments of potential primary users of the results of monitoring and evaluation
  - Small groups
  - Time: 5 minutes

4 This Module relies heavily on, and is adapted from Deri, Swanson & Bhandari, 2009

- Ask participants to record the interest these primary users have in the monitoring, evaluation and impact data, and what influence they will have in revising the IEA process.
  - Small groups
  - Time: 5 minutes
- Have groups report on their candidates; compare results among groups.
  - Whole group
  - Time: 10 minutes

Total Time: 20 minutes

Exercise 4: Identify the evaluators

The purpose of this exercise is to identify the individuals who will conduct the monitoring and evaluation of your EM plan.

- Ask participants to decide on and justify the types of evaluators they would use for monitoring and evaluation: external, internal or a combination. Ask for suggested names, if possible.
  - Small groups
  - Time: 10 minutes
- Return to plenary for whole group discussions.
  - Whole group
  - Time: 10 minutes

Total Time: 20 minutes

Exercise 5: Design a monitoring meeting

The purpose of this exercise is to design a monitoring meeting that supports learning to improve the EM planning process.

- In groups of four or five, design a full-day monitoring meeting for evaluating and communicating an ecosystem management plan for a catchment.
  - Time: 15 minutes
- One group present their monitoring meeting design and in plenary.
  - Discuss the important elements of monitoring meetings
  - Time: 10 minutes

Total Time: 25 minutes

Lunch
12:00–13:30

Module 17: Completing the Cycle of Strategic, Adaptive Management
13:30–15:00

Module 17 at a Glance

- Introduction and context
- Group reflection and discussion

The Cycle Of Strategic and Adaptive Management for Ecosystems
Facilitator guidance will be important in this section to help the participants follow the material.

The Module 17 slides have content that allows you to present material addressing this topic.

Learning Objectives

- The ecosystem manager who completes this module will understand how to complete the cycle of strategic and adaptive ecosystem management with respect to: piloting a portfolio of ecosystem initiatives; reviewing and learning what works and what does not; and refining the initiatives based on lessons learned and outcomes achieved.

Group Discussion Question: Have you ever been part of an ecosystem initiative that did not go as planned? What happened and why? How might a more formal review process with multiple project stakeholders and additional analysis have helped to anticipate and mitigate the issues encountered?

_____

_____

_____

_____

_____

Piloting a Portfolio of Ecosystem Initiatives

The Module 17 slides have content that allows you to present material addressing this top*ic.*

Reviewing the Portfolio and Learning What Works and What Does Not

The Module 17 slides have content that allows you to present material addressing this topic.

Group Discussion Question: What do you feel are the main barriers to effective monitoring, learning and portfolio refinement? How might they be overcome?

_____

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_____

Portfolio Refinement and Ongoing Implementation

The Module 17 slides have content that allows you to present material addressing this topic.

Notes

Break
15:00–15:30

Module 18: Close Workshop
15:30–16:30

Thanks and good luck…

There should be a closing session in which participants are thanked, awarded any certificate of recognition that is intended, and final synthetic comments are offered and collected.

The Module 18 slides have content that allows you to present material addressing this topic.

Workshop Evaluation
16:30–17:00

We suggest that it is important to understand what the participants sought when the enrolled in a workshop and how they engaged with the experience. Therefore, we suggest offering a closing assessment; this is a summative evaluation. Its purpose is to help UNEP and you, as facilitators improve the next offering(s).

The following offers a draft instrument the facilitators can modify as appropriate print and use for the final evaluation.

UNEP Ecosystem Management: Workshop assessment

We would appreciate your reactions to the structure and flow of the workshop. We, facilitators and UNEP, will consider every suggestion received and make the changes we can to improve the workshop.

The content: Reflect on the content of the *Participant Manual* and the material presented.

- We asked you to complete a pre-workshop questionnaire so we could understand a little about your professional background before you arrived.
    - To what degree do you feel that awareness was woven into the conduct of the workshop?
- Our intent is that you will develop and implement an EM plan for your catchment. We invited you specifically because that EM plan seemed like a reasonable possibility.
    - Now that you have participated in the entire workshop, identify ***two things*** from this workshop that will help you build an EM plan for your catchment.
    - What is one thing we might change in this material to improve the content?

The facilitation**:** Reflect on the ways the workshop was conducted, the interactions within the room.

- Our intent was to engage every person, although we recognize differences among people.
    - How effectively do you feel you were engaged by the facilitators?
    - Can you identify one or more things the facilitators could do to increase engagement?

The facilities**:** Reflect on the workshop setting, the hotel, grounds and local watershed.

- Our intent was to conduct this workshop in a place and way that is locally adapted and that encouraged learning.
    - To what degree do you feel we accomplished that goal?
    - What do you see that we could have done to improve your experience?

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