OVERVIEW OF INTEGRATED RESOURCE AND ENVIRONMENTAL MANAGEMENT CONCEPTS

In the previous lesson a number of pressing environmental issues in the Mekong River Basin (MRB) were summarized. Resources of the Basin were identified and the impacts of human use of those resources highlighted. While particular resource-use activities might be quite different from one another, many of the resulting environmental impacts are similar. Degradation of water quality, for example, can result from a variety of activities, such as farming or aquaculture. Sediment deposition into streams and tributaries of the Mekong River can also result from a number of different land uses activities.

So how can resource management be made more effective, to slow or eliminate adverse environmental impacts? A fundamental shift in traditional resource management may be needed, one that emphasizes management on an ecosystem scale, rather than on the scale of individual resources.

TRADITIONAL ENVIRONMENTAL MANAGEMENT

Traditional natural resource management has a somewhat narrow view of the environment. Resources are viewed individually or by economic sector; environmental components are considered almost entirely in isolation from one another. Water, forests and fisheries are often managed with little thought given to their effect and interdependence on one another. Some additional shortcomings of traditional resource management are:

- Focuses on the individual biotic components of interest, like soil or water, rather than on any ecosystem processes, like the hydrologic cycle or nutrient cycling.
- Targets only specific species of interest, typically those of commercial value.
- Ignores the interdependence of organisms within an ecosystem. Management decisions for one species may cause problems for another species.
- Ignores components that are hard to define or examine, such as groundwater.
- Jurisdictional inconsistencies. One country's management policy may be quite different from another, yet many resources do not fit neatly into a given geographic or administrative boundary.
- Cumulative impacts from multiple stressors are often ignored.

In addition, the overall focus of traditional resource management has been on the maintenance of the status quo, or preventing resource deterioration and decline of yields from whatever average has recently been achieved. Management is thus viewed as a holding pattern against the forces of resource depletion. Traditional resource management seeks to determine and then protect the maximum sustainable yield, or that magic number between resource stock or population size and the sustainable rate of harvest.

INTEGRATED RESOURCE AND ENVIRONMENTAL MANAGEMENT

Integrated resource and environmental management (IREM) is an alternative view of resource management which aims to address the entire suite of environmental and socio-economic elements surrounding a resource management issue. IREM is an ecosystem-based management strategy, focused on the interrelationships among various components and recognizing the dynamic, changing nature of the ecosystem. Table 1 summarizes the major differences between IREM and traditional, or conventional, resource management.

Perhaps the biggest difference between IREM and traditional resource management is that IREM is just as much about prevention as remediation. Where traditional resource management is reactive (i.e., decision making in response to crisis), IREM is proactive (i.e., decision making that strives to prevent crisis).

The benefits of IREM include:

- Long-term protection of the resource
- Enhanced potential for non-degrading multiple use of the resource
- Reduced expenditure of energy and money on conflicts over competing uses
- More rapid and effective rehabilitation of damaged ecosystems.

An effective resource management plan cannot be developed without an extensive and ongoing knowledge of the condition of the systems being managed, including its important components.

Table 1 Differences between IREM and traditional resource management

	IREM	TRADITIONAL RESOURCE MANAGEMENT
SCALE	*Ecosystem-based*: protection and careful management of an entire ecosystem can slow or prevent degradation to all resources within that ecosystem. IREM can focus on ecosystem processes as well as components	*Individual resource-based (species):* often, the species managed is of economic value to humans. Ecosystem processes are often poorly understood, making resource management more difficult
TIME FRAME	*Long-term*: extends beyond artificial political time frames. Considers future generations	*Short-term*: resource management policies can be altered or removed with changes in the political regime
BOUNDARIES	*Natural (geographic)*: boundaries are often drawn along the lines of natural drainage basins. Can address transboundary issues like fish migrations or one country's effluent degrading another country's water quality	*Artificial (political)*: cannot address transboundary issues
STRATEGY	*Pro-active and adaptive:* seeks to anticipate and prevent crises	*Reactive:* tends to develop management policy in response to resource crises. A population may need to 'crash' before steps are taken to protect it

Management should also do more than correcting gross and highly visible deficiencies, like raw sewage flowing into drinking water reservoirs. Good resource management requires early identification of problems and the correction of those problems before they become as serious as a contaminated water supply.

In the past, natural resources have been regarded by many people as 'free goods'. Economists have traditionally viewed natural resources as being unlimited and available in an inexhaustible supply. However, ample evidence from around the world is showing that natural resources are no longer in unlimited supply and that the demands upon them are much greater than they are capable of enduring for long-term, sustainable use. Natural resources are no longer free goods. The challenge is how to manage them to maximize their benefits to society for long-term sustainable use. And just as important, society needs to decide who will pay the management costs.

Adaptive Management

One of the main strengths of IREM is that, when it is practiced well, it is very adaptive. Surprise, uncertainty and the unexpected are the norm. IREM recognizes that humans and ecosystems are in constant motion and that change is inevitable. All change cannot be anticipated and uncertainty will always be present. However, good resource management does not use uncertainty as a reason for inaction. IREM instead is flexible and responsive to change and embraces new knowledge.

Abandoning the 'Conqueror' Ethic

People have been at war with nature throughout our history. In prehistoric times, humans fought being eaten by large predators. In more recent times, humans fight other animals, like rats and insects, for food, to prevent crop damage, and to prevent damage to buildings and livestock. Certain 'pests' have long competed with humans for food and shelter. And humans have developed some largely effective methods to combat these pests.

In addition, humans have put extraordinary effort into channeling and 'taming' the natural forces of the earth to better serve specific human needs. Vast canal networks, hydropower production and heavy addition of chemicals to soil to increase productivity have taken the earth's energy and put it to work for humans.

Although insect, animal and plant pests are far from controlled, technology and machinery have advanced sufficiently to damage nature on a grand scale and with a more devastating effect than ever before in the history of the human species. In addition, we have developed technologies that enable us to fight hard against the forces of nature in an effort to prevent damage to our homes and livelihoods.

While winning every battle with pest species is not possible, humans are 'winning' the war with nature through large-scale destruction of habitat and water quality. This attitude of fighting with nature, rather than learning to co-exist with the natural world, must be discarded.

An experimental approach, or the continued collection of data and new research, is a key component to IREM. Management policy or strategy is adjusted as scientific understanding or socio-economic conditions change. Communication and interaction between and among those who design, choose and live with environmental policies is also important. Decision makers, government agency staff and the general public should all be involved at various stages of resource management policy development. Basically, think of a IREM as a continuous cycle of evaluation, modification and learning. Table 2 outlines a basic protocol for an IREM program.

Finally, adaptive management in IREM views policies as experiments that we can learn from. While we use natural resources in order to live, in truth we often do not understand nature well enough to know how to live within the limits of a region's resources. Adaptive management takes that uncertainty seriously, treating human intervention in natural ecosystems as experimental efforts. Environmental managers and policy makers should be careful to design methods to collect the information and data that they need. The data collected can be used to compare actual ecosystem conditions with expected conditions. Finally, these comparisons can be transformed into learning, enabling correction of errors, improved understanding and appropriate changes to resource management policies.

Uncertainty in IREM

Uncertainty, or lack of knowledge, is expected and acknowledged in IREM. Uncertainty often arises due to the complexity of most environmental problems. A variety of ecological factors are generally involved, such as damage to water quality, loss of topsoil and reduced fish species diversity all being affected by the same land-use activity. Also, most environmental problems are multidimensional, with social and economic concerns being part of the problem.

Frequently, regulatory action is required before adequate scientific knowledge is obtained. A good IREM policy allows for this, for when there are threats of serious irreversible damage, lack of scientific certainty is not an acceptable reason for postponing protective action.

Table 2 Example protocol for IREM

STEP 1	Identification of: • Baseline characteristics of the ecosystem • The geographic boundaries • History, present condition and future uses of the resource
STEP 2	Identification of: • All organizations intending to use the resource • Potential impacts of proposed uses outside the management area
STEP 3	Inform all interested parties, including the general public, of all the organizations wishing to use the resource
STEP 4	Require each organization proposing to use the resource to indicate how their use would affect the resource
STEP 5	Send this information to all proposed resource users and identify conflicting or damaging uses
STEP 6	Develop a method to resolve conflict situations, including activities not compatible with long-term sustainable use
STEP 7	Establish quality control conditions (such as criteria or standards) to ensure that the resource is not damaged by proposed uses
STEP 8	Implement a monitoring program to ensure that quality control conditions are being met