Chapter Six
Valuation of Environmental Resources

"Our environment, the world in which we live and work, is a mirror of our attitudes and expectations"
Earl Nightingale

Objectives

- At the end of this chapter you will be able to know:
  - Definition and importance of environmental valuation.
  - Concept of economic value, **WTP** and **WTA.**
  - Total economic value of natural and environmental resources.
  - Different environmental valuation techniques.
  - Importance of environmental analysis

Definition of Environmental Valuation and Its Importance

- Valuation can simply be defined "**as an attempt to put monetary values".**
  - Accordingly**, Environmental valuation** is the process of putting monetary values on environmental goods and services, many of which have no easily observed market prices. In other words, **Environmental valuation** is:
    - It is a key exercise in economic analysis and its results provide important information about values of environmental goods and services.
      - This information can be used to influence decisions about wise use and conservation of forests and other ecosystems.

- The basic aim of valuation is to determine people"s preferences by gauging how much they are willing to pay (WTP) forgiven benefits or certain environmental attributes e.g. keep a forest ecosystem intact.
  - In other words, valuation also tries to gauge how much worse off they would consider themselves to be as a result of changes in the state of the environment such as degradation of a forest.

- Valuation has an important role to play in environmental planning and management activities because it helps to answer many questions including the following about any given natural resource:
  - ✓ What is the value of conserving a certain natural resource (e.g. forest)?
  - ✓ To whom does the value accrue?
  - ✓ How does degradation and loss of the natural resource lead to costs to different segments of society?
  - ✓ Who gains and who loses when a natural resource is conserved or degraded?
  - ✓ How can natural resource conservation be efficiently and equitably financed?

- ✓ How can people be motivated to take into account natural resource benefits and costs of its loss in the course of their economic activities?
- ✓ How can policy, planning and decision making with regard to natural resources be better influenced?

- ♠ Economic valuation never refers to a stock, but only the change in a stock.
  - o If one speaks of the economic value of biodiversity, then one always means the economic value of a change of biodiversity. It is not a question of determining the „true" value of biodiversity or ecosystems but valuing changes and comparing them with their alternatives.
    - Thus it is non-sense to ask "how much are the Ethiopian National Parks worth?" A plausible question in this case would be: "**Ethiopian wild life and forest agency**" has proposed a new policy to prevent the huge losses of wildlife species from Ethiopian National Parks. What is the monetary value of the benefits of this policy?
  - o Economists, thus, stress that the valuation should focus on **changes** rather than **levels of** biodiversity or ecosystem.
    - But, Non-economists have frequently tried to value biodiversity levels.

Concepts of Value

- ♠ "Value" is not one, but several related concepts.
  - o While many people might consider the natural environment and its component resources to have "intrinsic" value – or value in their own right – the concept of an asset's value which is the most relevant to policy-making is of contribution to human welfare relative to other assets.
  - o In addition, the value concept of interest here is not the value of the entire natural environment but relatively small changes in its quality or quantity.
- ♠ Exchanging goods and services in markets provides a ready-made indicator of value, in the form of price, which also signals how much of input resources should be allocated to production of different types of goods and services.
- ♠ But there are many types of resources which contribute hugely to human welfare which cannot be traded in markets – many environmental resources (such as clean air) and ecosystem services (such as water filtration and flood prevention) are amongst the foremost examples of such "non-market" goods and services.

Willingness-to-pay (WTP) and willingness-to-accept (WTA)

- ♠ Environmental values are measured in money terms through the concept of individuals' willingness to pay (WTP) or willingness to accept (WTA) compensation for alterations in environmental conditions.

- These WTP and WTA represent the two general measures of economic value for an environmental service. These measures of value are what economists would like to estimate so that environmental services and other non-marketed goods can be included in policy decisions on how to prioritize and allocate public monies. These measures are very helpful to make cost-benefit analysis and to guide policies. Of these two, mostly for practical reasons, the WTP approach has become the most frequently applied, whilst WTA empirical studies are relatively rare.

♠ WTP is measured directly, by asking people to state a WTP amount, or indirectly, by assuming that this amount can be inferred by looking at the economic costs afforded to enjoy environmental services or at the costs incurred to acquire service substitutes.

- Although it is beyond the scope of this discussion (class) to go into much detail with respect to the theoretical debate, and existing controversies about the WTP and WTA approaches, it is worth mentioning that the use of WTP rather than WTA was initially justified by an appeal to theoretical contributions which suggested that the difference between the two welfare measures should be negligible.

Total Economic Value

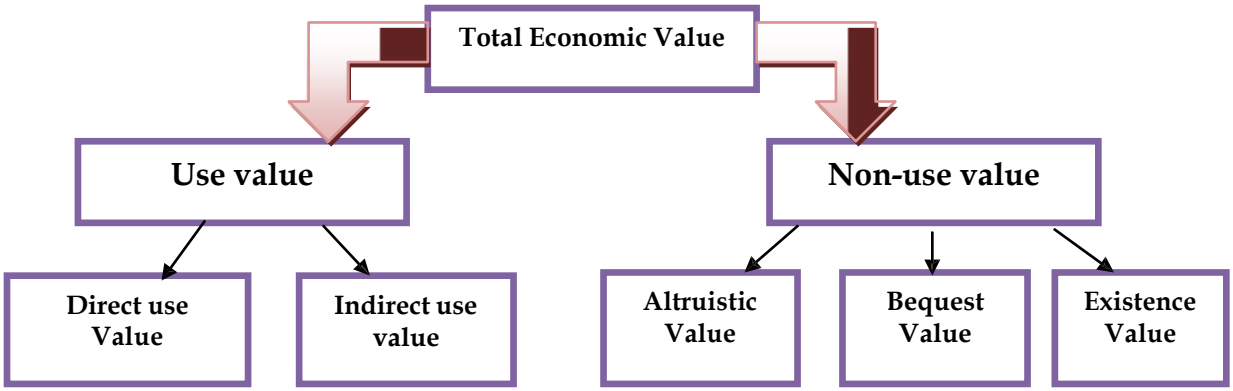
♠ **Economic valuation** methods are based on economic theory and aim to quantify all or parts of the Total Economic Value of an environmental good or service.

- The concept of Total Economic Value (TEV) has proven useful as a conceptual framework for keeping track of the wide range of complex and interrelated physical and value flows involved in valuing the natural environment.
  - It reflects the use humans make of the natural environment (both through markets and informally) and also the value they may attribute to it unrelated to their current or future use.
  - In other words, TEV consists of **use value** and **non-use value**.

1. **Use value**: involves some interaction with the resource, either directly or indirectly:
   - **Direct use value***:* Individuals make use of a resource in either a consumptive way (e.g. the fishing industry and agriculture) or a non-consumptive way (e.g. rambling).
   - **Indirect use value**: Individuals benefit from ecosystem services supported by a resource rather than actually using it (e.g. watershed protection for flood mitigation, cycling processes for agriculture or carbon sequestration).

2. **Non-use value**: is associated with benefits derived simply from the knowledge that the natural environment is maintained.

- By definition, **non-use** value is not associated with any use of the resource or tangible benefit derived from it, although users of a resource might also attribute non-use value to it.
- Non-use value can be split into three basic components:
    - **Altruistic value**: Derived from knowing that contemporaries can enjoy the goods and services the natural environment provides.
    - **Bequest value**: Associated with the knowledge that the natural environment will be passed on to future generations.
    - **Existence value**: Derived simply from the satisfaction of knowing that ecosystems continue to exist, regardless of use made of them by oneself or others now or in future (also associated with „intrinsic value").



Environmental Valuation Methods

- Valuation methods are usually divided into two approaches:
    1. **Direct methods**

       Direct methods seek to infer individuals" preferences for environmental quality directly, by asking them to state their preferences for the environment.
    2. **Indirect methods**

       Indirect methods seek to recover estimates of individuals"' WTP for environmental quality by observing their behavior in related markets.

- Some of the examples of Environmental Valuation techniques are
    A. **Contingent valuation method**
        - The **contingent valuation method** is a direct approach using a hypothetical market. It uses surveys and questionnaires with open-ended or dichotomous questions to reveal an individual"s willingness to accept or willingness to pay for a change in the quality of an environmental amenity.

- It is the only environmental valuation technique that takes into account non-use values. However, using this method can lead to potential biases (values can be under or overestimated). There are also high costs involved as it is expensive to interview people individually.

B. **Travel cost method**
   - The travel-cost method (TCM) was designed and is generally used to value environmental attributes which are exploited to acquire recreation services.
     - The **travel cost method** is an indirect approach based on a real market. The characteristics of a site are evaluated as are the costs (time and money) involved in reaching that site.
       - It is also useful for estimating time costs and their impact on the choice of transport mode. In practice, sample households" travel costs to a site are surveyed. The problem with this method is that it does not take into account multi-purpose travel (i.e. that individuals will visit multiple sites on a single trip).

C. **Hedonic pricing method**
   - Hedonic price valuation tries to measure the value of an **un-marketed environmental service** as a measurable component („attribute" or „characteristic") of a marketed good. The most common applications of the hedonic pricing method (HPM) try to exploit the relationship between property values - often, although not exclusively, residential property values- and environmental attributes of the neighborhood (e.g. air quality, noise levels, access to recreational facilities, visual amenities).

♠ Summary of the above environmental valuation techniques.

Method	Suitable for	Value type	Consumer surplus	Use Vs Non-use value
CVM	Amenities and other perceived attributes of natural sites	WTP/WTA	included	Both
TCM	Recreational value of natural sites	Travel cost	included	use
HPM	Amenities/nuisances related to capital goods	Hedonic price	included	use

Environmental Analysis/Assessment

- **Environmental analysis** (EA) sometimes referred to as **environmental impact assessment** (EIA) is, therefore, the information gathering and analytical process that helps to ensure environmentally sound development.
    - The **EA** process attempts to identify potential problems so that economic feasibility (and environmental impact) of alternative approaches can be assessed. As such, **EA** complements the conventional package of engineering, socioeconomic, and financial and economic analyses and provides practical advice to planners.

- EIA involves description and quantification of impacts of given policy options. However, it does not require full information about costs and benefits; impacts are not expressed in monetary terms.
    - The burden of decision-making is left with policy makers to weigh different impacts against each other.
    - EIA is a very important aid to CBA.
    - EIA is not restricted to or biased to the examination and mitigation of negative impacts alone.
    - EIA can also look into the possible positive issues due to the developmental projects and explore or suggest ways of enhancing them further by carrying out modifications in the project.

- EIA is both an art and a science. Management aspect in EIA is an art, whereas the technical analysis is based on the scientific principles.
- In general, Environmental Impact Assessment is a systematic process that assists to identify predict and evaluate the predictable environmental consequences of proposed development projects, plans and policies.

- In **EIA**
    - **Environment**, in short, refers to the ''surroundings''. In the case of EIA, environment is usually considered to constitute three main subsystems, Physical Environment, Biological Environment and Socio-cultural Environment.
    - **Impact** may be defined as the consequences of changes in the environment but it should not be confused with effect.
        - For example, increase in river pollution due to the initiation of a new project is an effect while consequences of river pollution on human health, flora, fauna, etc., is the impact.
        - The EIA process is concerned with all types of impacts and may describe them in a number of ways; Intensity, Direction, Spatial extent, Duration, Frequency, Reversibility and Probability.

- **Assessment** is assembling, summarizing, organizing and interpreting pieces of existing knowledge, and communicating them so that an intelligent but inexpert policymaker will find them relevant and helpful in their deliberations.

Objectives of EIA

♠ The objective of EIA is to foresee and address potential environmental problems/concerns at an early stage of project planning and design.

EIA systematically examines both beneficial and adverse consequences of the project and ensures that these effects are taken into account during project design.

♠ The immediate objective of EIA is to inform the process of decision-making by identifying the potentially significant environmental effects and risks of development proposals.

♠ The ultimate or long term aim of EIA is to promote sustainable development by ensuring that development proposals do not undermine critical resource and ecological function or the wellbeing, lifestyle and livelihood of the communities and people who depend on them.

Benefits of EIA/EA

♠ Reducing the burden of environmental impacts is necessary if development is to become sustainable. The benefits of EIA can be direct or indirect. Specific benefits may include:

- Better environmental planning and design of a proposal.
- Ensuring compliance with environmental standards.
- Savings in capital and operating costs.
- Reduced time and costs of approval of development applications.
- Increased project acceptance by the public.

EIA and the project cycle

- Project cycle is the process in which a project passes through its inception (idea) to implementation. There are numerous places within the project cycle where environmental and resource concerns may be injected. The conventional project appraisal criteria, as we know, do not take in to account the environmental costs. The reality is, however, that it is important to include the issue of environment into project cycle.
  - The project designers must work in multidisciplinary team to design projects that consider a variety of goods and services-economic, social, environmental at the same time.
  - **EA** identifies potential problems and opportunities and is thus an **essential part of the project cycle**. By itself, however, it is insufficient for decision making.

- The contents of an impact assessment should cover the following topics:
    a) Description of the project, focusing on possible sources of environment impacts;
    b) Description of the environment situation before the implementation of the project;
    c) Analysis and prediction of environment impacts resulting from the project;
    d) Comparison / evaluation of environmental conditions with or without the project (eventual project alternatives); and
    e) Out coming of mitigation measures needed to minimize adverse impacts.

Steps of EIA process

- The eight steps of the EIA process are:
    1. **Screening**: First stage of EIA, which determines whether the proposed project, requires an EIA and if it requires EIA, then the level of assessment required.
    2. **Scoping:** This stage identifies the key issues and impact that should be further investigated. This stage also defines the boundary and time limit of the study.
    3. **Impact analysis:** This stage of EIA identifies and predicts likely environmental and social impact of the proposed project and evaluates the significance.
    4. **Mitigation:** This step in EIA recommends the actions to reduce and avoid the potential adverse environmental consequences of development activities.
    5. **Reporting:** This stage presents the result of EIA in a form of a report to the decision-making body and other interested parties.
    6. **Review of EIA:** It examines the adequacy and effectiveness of the EIA report and provides information necessary for the decision-making.
    7. **Decision-making:** It decides whether the project is rejected, approved or needs further change.
    8. **Post monitoring**: This stage comes into play once the project is commissioned. It checks whether the impacts of the project do not exceed the legal standards and implementation of the mitigation measures are in the manner as described in the EIA report.

EIA: Misconceptions and counter arguments

- When the concept of EIA was first made a legal obligation it had encountered resistance on the part of many planners and engineers throughout the world.
    - EIA is still severely criticized in some parts of the developing world as being inappropriate for application there.
    - Following are some of these fears and misconceptions pertaining to EIA.

1. "EIA is too complex"

   This is not true. EIA is a simple process. Sometimes, however, the potential impacts can be complex and therefore difficult to quantify.

2. "EIA is too expensive"

Costs of EIA are commonly around 1%, sometimes up to 5% in complex cases of project costs, often within normal variability of project costs.

3. "EIA will be misused to stop development"

   There have been cases where EIA has been misused to stop development. A properly carried out EIA process is much more likely to generate support for development.

4. "We are too poor to afford EIA"

   No country is "too poor" to do its planning properly. Bad planning means failing projects and these are often projects paid for by the country through development loans.

5. "EIA doesn't produce useful results"

   Often this has been true. This can be due to lack of a practical focus, and/or poor training of practitioners. When carried out properly, EIA is a valuable part of project planning.

6. "EIA delays projects"

   If carried out properly, EIA should no more delay projects than any part of the planning process. It should be done in parallel with other activities.

Making EIA Effective

- EIA is undertaken early enough to affect project design.
- Mitigation and monitoring developed in the EIA process is implemented.
- The full EIA study must consider real alternatives
- Impacts must be assessed honestly.
- The EIA products must be clear and accessible to key actors.

♠ In relation to making EIA effective, International Association for Impact Assessment (IAIA, 1999) and others have developed guiding principles for EIA/IA.

♠ The principles listed below are a selection of some of the documented ones.

- Participative and Interdisciplinary
- Certainty and Credibility
- Practical and Relevant
- Transparency and Accountability
- Cost-effectiveness
- Focused and Integrated