Wetland Valuation

Valuation of Environment and Resource

Value is defined as the level of importance man places on the environment compared to other market goods.

The economic value of any good or service is generally measured in terms of what we are willing to pay for the commodity less what it costs to supply it.

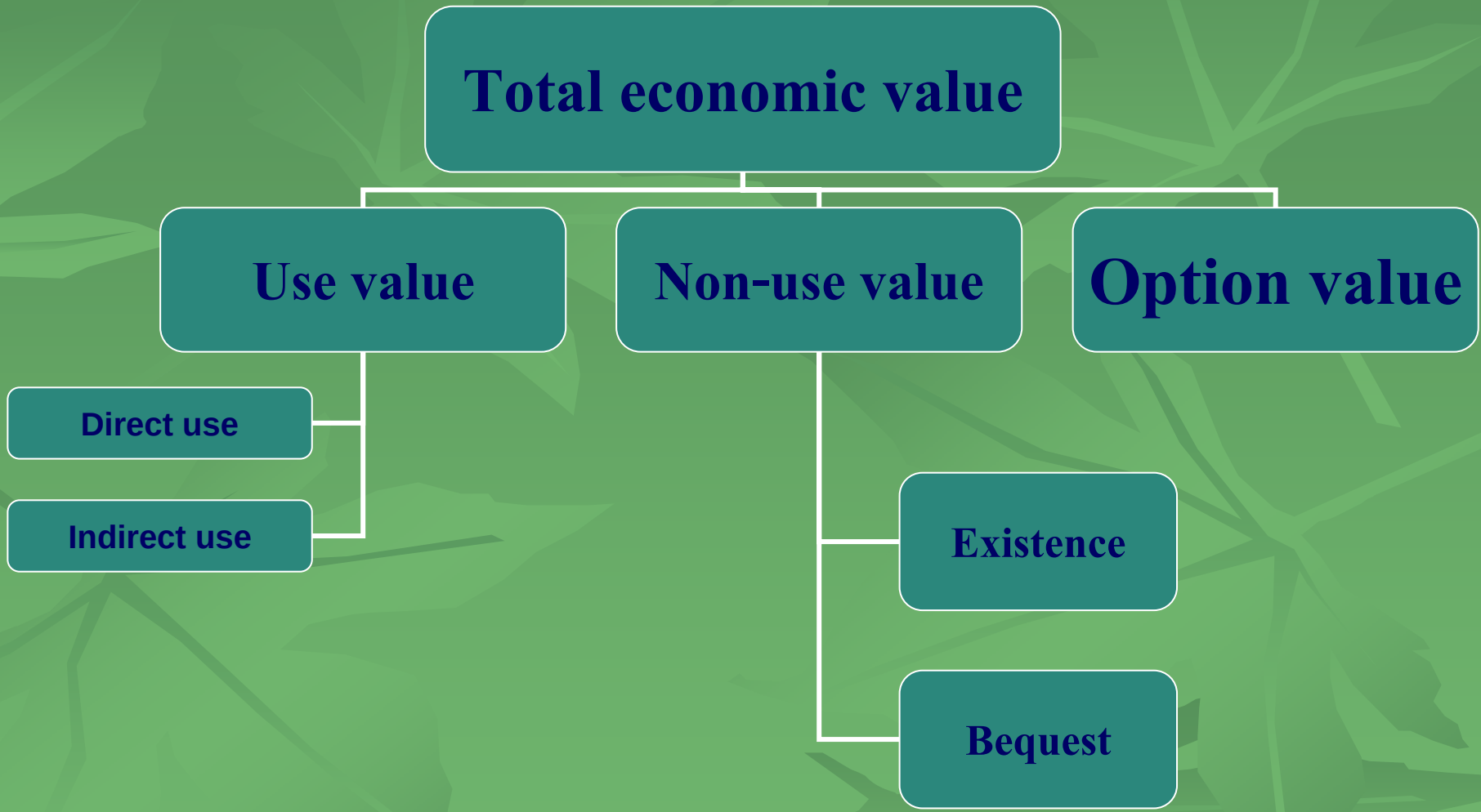
Basic concepts and issues

- The use of natural resource is not optimal
- It rotates between gross overuse to misuse mainly because these resources have no price or a very nominal one attached to them
- Efficient use of natural and environmental resources requires knowledge of the value of these resources in various uses
- Market prices do not always reflect full social cost of resource use and thus many uses cannot be valued in market place because of incomplete or non-existent markets

- Market price method would be the easiest way, but unfortunately this is not always possible because for some wetland products there is simply no market or some wetland values are intrinsically non-marketable
- These market failures occur when markets do not reflect the full social cost or benefit of a good
- Market failures related to ecosystems include the fact that many wetlands
  - provide services that are public goods,
  - many wetlands services are affected by externalities, and
  - property rights related to ecosystems and their services are often not clearly defined.

There are at least two good reasons for evaluating wetland services and goods.

- An important tool for environmental managers and decision makers to justify public spending on conservation activities and wetland management.
- Provides objective evidence of monetary and non-monetary benefits of wetlands to managers and public, and gain their support for conservation.


Total economic value
Use value
Non-use value
Option value
Direct use
Indirect use
Existence
Bequest

Direct use values – ecosystem goods and services used directly by human beings

- the value of consumptive use : harvesting of food products, timber for fuel or construction, and medicinal products and hunting of animals for consumption
- the value of non-consumptive uses : the enjoyment of recreational and cultural activities that do not require harvesting.

Indirect use values are derived from ecosystem services that provide benefit outside the ecosystem itself. Natural water filtration, stream protection, carbon sequestration.

Non-use values refer to the enjoyment people may experience simply that by knowing that a resource exists even if they never expect to use that resource directly themselves. Known as existence value.

TOTAL ECONOMIC VALUE = USE VALUE

+ NON – USE VALUE + OPTION VALUE

USE VALUE = DIRECT USE VALUE

+ INDIRECT USE VALUE

NON – USE VALUE = EXISTENCE VALUE

+ BEQUEST VALUE

Flow of benefits of an ecosystem

- Understanding of the economic value of wetlands does not necessarily favor their conservation and sustainable use, it at least permits them to be considered as economically productive system.
- The total economic value of wetlands is defined as the total amount of resources that individuals would be willing to forego for increased amount of wetland services.
- Instead of focusing only on direct commercial values, it also encompasses the subsistence and non-market values, ecological functions and non-use benefits associated with wetlands.

Quantify wetland values

- How to adequately put a monetary value on wetland products or services ?
- To compare the price of wetland product originating from a well preserved wetland with the price of producing similar goods or services in an environmentally less friendly way
- Series of methods have been developed to try to quantify the monetary values of wetland services and goods

Methods for valuing wetland benefits

- Simplest and straightforward is market price
- But market prices do not necessarily reflect the real economic value of wetlands due to the absence of market for all goods and services provided by wetlands
- Market prices may be inappropriate for valuing wetland services and functions, and subsistence-level use of natural resources

A one hectare mangrove area yields raw materials for 1760 pieces of Nipa shingles per year. Collection and production of 1760 shingles takes 1.5 man-months to complete and the minimum monthly wage in the area is US$ 75. Costs of transport and portage of the shingles is 20 cents per 100 pieces. The price of a Nipa shingle is 50 cents per piece, using the above formula is therefore:

On site Sale Value, Net = (0.5*1760) – {(75*1.5)+(0.2*17.6) US$

= (880) – {112.5 + 3.52} US$

= 880 – 116.02 US$

= 763.98 US$ per hectare per year

Methods for valuing wetland benefits…..

- These categories of benefits typically contribute a large proportion of the total economic value of wetlands, and failing to consider them runs the risk of seriously under-valuing wetlands

- Necessary to find alternative or additional techniques for valuing wetland goods and services, if their total economic value is to be more comprehensively expressed

Methods for valuing wetland benefits…..

- Techniques for quantifying environmental values and expressing them in monetary terms have moved forward over the last decade
- A wide range of methods which move beyond the use of direct market prices are available, and used, for valuing wetland benefits
- These include approaches which elicit people's preferences directly as well as those which use indirect methods to impute people's preferences through their purchase of related goods and services

Commonly-used valuation tools

- Replacement costs
- Effects on production
- Damage costs avoided
- Mitigative or avertive expenditures
- Hedonic pricing
- Travel costs
- Contingent valuation

Effects on production

- Other economic processes often rely on wetland resources as inputs, or on the essential life support provided by wetland services.
- If they have a market, it is possible to look at the contribution of wetland goods and services to the output or income of these wider production and consumption opportunities in order to assess their value.

A mangrove area is known for its production of mud-crab however a portion of the area was converted to a beach resort with a resulting decline in mud-crab production. Over the period 1990 – 2003, prior to the change in use of the area, the average mud-crab gathered was 638 Kg/Ha/year. In 2004 and 2005 the average mud-crab collected in the area was 416.7 Kg/Ha/year. The price for mud-crab for 2005 was US$1.5/Kg.

To calculate the change in value of the mud-crab production the following formula is used:

$\Delta P = [(Qin/N) - Qit]*Pt$

Where Qin/N = is the quantity of the good produced per unit area prior to the change: (638 Kg-ha-yr)

Qit = is the quantity of the good produced per unit area following the change: (416.7 Kg-ha-yr)

Pt = is the farm-gate price of the good (US $1.5-Kg)

Loss in value of the area is therefore

(638-416.7) Kg-ha-yr * US $ 1.5

221.3*1.5

331.95 US$ per year.

Replacement costs

- Wetland goods and services often have alternatives or substitutes that can be bought and sold.

- These replacement costs can be used as a proxy for wetland resource and ecosystem values, although usually represent only partial estimates, or under-estimates.

Damage costs avoided

- The reduction or loss of wetland goods and services frequently incurs costs in terms of damage to, or reduction of, other economic activities
- These damage costs avoided can be taken to represent the economic losses foregone by conserving wetlands

Mitigative or avertive expenditures

- It is almost always necessary to take action to mitigate or avert the negative effects of the loss of wetland goods and services, so as to avoid economic damage.
- These mitigative or avertive costs can be used as indicators of the value of conserving wetlands in terms of expenditures avoided.

A flood mitigation system is to be implemented that will result in the destruction of an estuary. The project costs around US$ 50 million. In order to replace the goods and services provided by the estuary (fish spawning and nursery area, bird habitat, recreational uses) an artificial lagoon is planned to be built. The construction of the artificial lagoon is estimated to be 5 million US dollars.

The total project cost is therefore the actual cost of the project plus the cost of providing alternative goods and services, i.e.

US$ 50 + 5 = US$ 55

Consequently the benefits derived from the flood mitigation project over its' lifespan should not be less than US$ 55 million in order that the cost of the project and cost of replacing services that will be destroyed by the project are offset.

The presence of mining operations in a catchment adjacent to a community places is riverine source of domestic and irrigation water at risk of being contaminated with toxic chemicals and heavy metals discharged from the mine. Suppose that there are two methods to ensure that this does not happen, the first of which costs US$ 50 whilst the second method requires US$ 30.

- If the first method is used then the value attributable to the river is US$ 50 million

- If the second method is chosen the value attributable to the river is set at US$ 30 million.

In a recent paralytic shellfish-poisoning outbreak, caused by a red tide a husband and wife were taken ill. Both were employed, with the husband having a daily wage of US$ 20 and the wife having a daily wage of US$ 25. Both were confined to hospital for 5 days with a hospitalization cost of US$ 10/day. The total cost of medication for each was US$ 30 and the doctors' fee was US$ 50 for each individual. The husband did not require physical therapy but the wife required 3 days of physical rehabilitation with a total cost of US$ 20 an during this period the wife was unable to work.

Cost of Illness = $\sum$ cost of medical expenditures + value of lost time

Cost of Illness (Husband) = medical fee (US$ 50) + hospitalisation fee (US$ 50) + cost of medicine (US$ 30) + value of lost time (5*US$20 = 100US$) = (50+50+30+100) US$ = 230 US$

Cost of Illness (Wife) = medical fee (US$ 50) + hospitalisation fee (US$ 50) + cost of medicine (US$ 30) + cost of rehabilitation (US$ 20) + value of lost time (wife) (8*US$ 25 = 200)

= (50 + 50 + 30 + 20 + 200) US$

= 350 US$

Therefore Total Cost of Illness to Family = $\sum$ (cost of Husband's illness) + (cost of Wife's illness)

= (230 + 350) US$

= 580 US$

Hedonic pricing

- Hedonic methods look at the differentials in property prices and wages between locations, and isolate the proportion of this difference that can be ascribed to the existence or quality of wetland goods and services.

Travel costs

- Wetlands typically hold a high value as a recreational resource or destination; people spend time and money to reach wetlands
- This spending -such as on transport, food, equipment, accommodation, time, etc.-can be calculated, and a demand function constructed relating visitation rates to expenditures made. These travel costs reflect the value that people place on leisure, recreational or tourism aspects of wetlands.

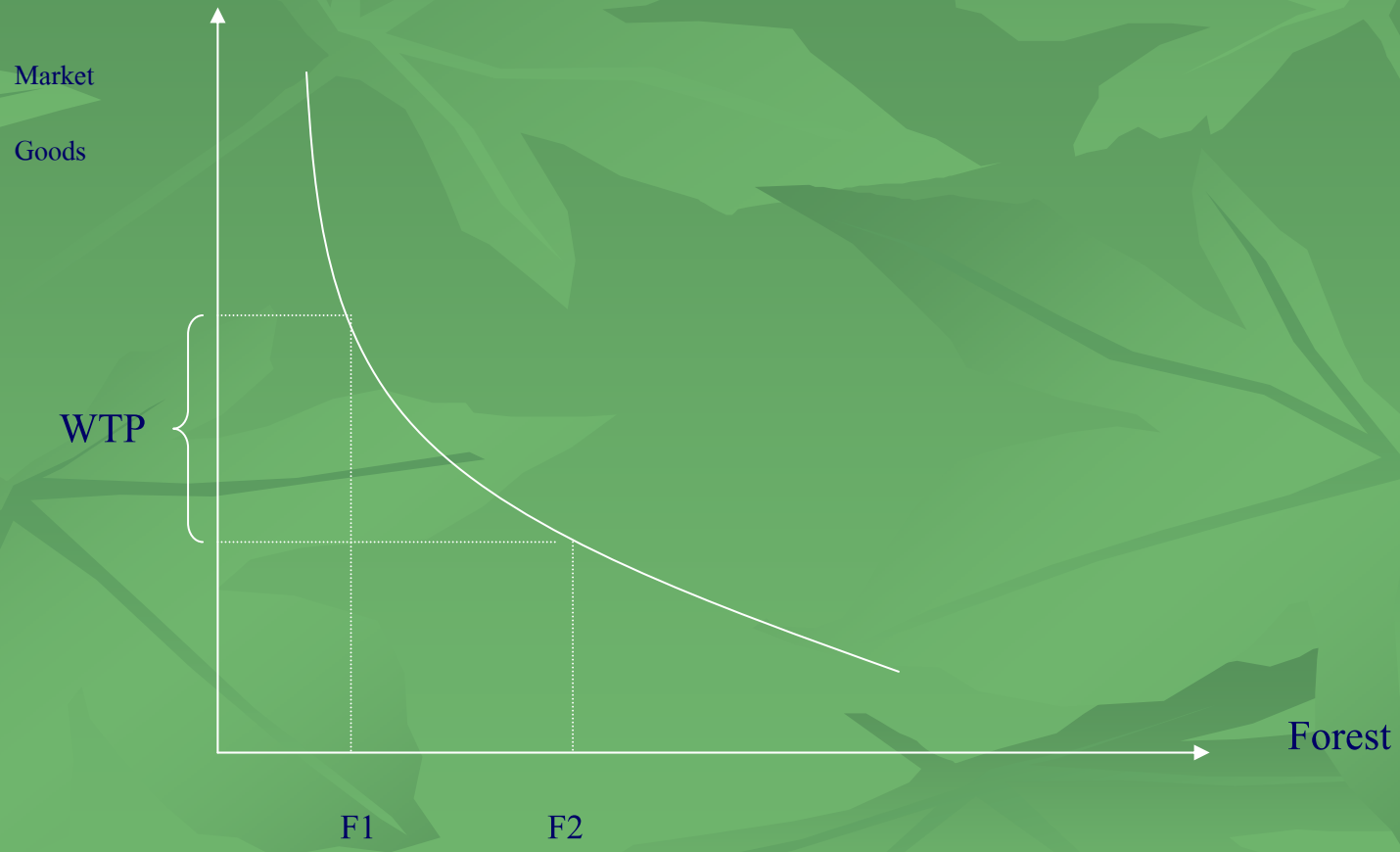
Contingent valuation

- Even where wetland goods and services have no market price, and no close replacements or substitutes, they frequently have a high value to people.

- Contingent valuation techniques infer the value that people place on wetland goods and services by asking them their willingness to pay for them (or willingness to accept compensation for their loss) under the hypothetical scenario that they would be available for purchase.

Contingent Valuation Method : CVM

Willingness to pay : WTP



Defining and valuing wetlands economic costs

Wetlands conservation is not cost free. It is necessary to recognize these costs in valuation, alongside the benefits associated with wetlands. Valuation must take account of the full range of economic costs associated with wetlands conservation. They are :

Management costs

The direct costs of wetlands can be calculated by identifying the labor, equipment, infrastructure, vehicles and other investment and recurrent expenditures required for their management. In most cases these can all be valued at market prices.

Opportunity costs

The three main opportunity costs associated with wetlands conservation are

- cash and subsistence losses arising from curtailing unsustainable wetland resource utilization activities
- income and output which could have been generated by converting wetlands into other land uses
- income and employment foregone by not implementing upstream developments or production processes which would have a negative impact on wetlands.

Costs to other activities

The costs to other activities resulting from the conservation of wetlands areas and species are most often valued using either effect on production or human capital approaches. While the former is particularly applicable to the costs associated with crop and livestock damage from wetlands bird and animal pests, the latter is specifically focused on human health and productivity.

Quantify wetland values…….

- Economic and financial valuation is not a always an answer.
- There are cases where:
  - It should not be carried out. In case of a Ramsar site with a very rare and highly threatened endemic species and with little potential economic benefit to local people, it is evident that the environmental valuation shall take precedence over any economic valuation. The cost of the loss of endemic species is much higher than the benefit derived from this effort.
  - The same logic can be applied to religious values. In some countries, they are above all economic values.

Quantify wetland values…….

- There are cases where:
  - It should not be done in an exhaustive way.
  - In most countries it will be difficult to find qualified economists to carry out an in-depth economic valuation exercise but some of the proposed methods can be used by non-economists.
  - Sometimes, the economic benefits are so important to so many people that a rapid economic assessment would be enough to allow decision makers to take decisions.

- Converting part of a swamp to rice field has caused flooding to 100 households in the area. These households have to spend 5,000 baht on average to repair their properties. Alternatively, the local administration can prevent flooding by constructing flood control system with 8 million baht investment.

- What is the value of swamp service in term of flood protection?

- What can be inferred about desired and foregone net benefit from the land use change of ecosystem?