

Module I : Introduction to the Course

Centre for Biodiversity and Ecosystem Services
(CBES), Land Resources Division

1 hour

Valuation of Ecosystem Services

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Module Outline

1. Introduction and objectives of course

2. Basics of Ecosystem Services

3. What is Ecosystem Service Valuation

4. Importance of Ecosystem Services

5. Need of Valuating Ecosystem Services



About the Course

Ecosystem services provide substantial benefits to human well-being and sustainable development. The failure to recognize the value of the ecosystem is the primary cause of ecosystem mismanagement. The benefits and costs associated with their conservation and degradation have been largely excluded from the policies, markets and prices that affect people's production and consumption patterns, investment choices, land uses and resource management practices. Many decisions have been made based on partial information, leading to ecosystem degradation and economic loss.

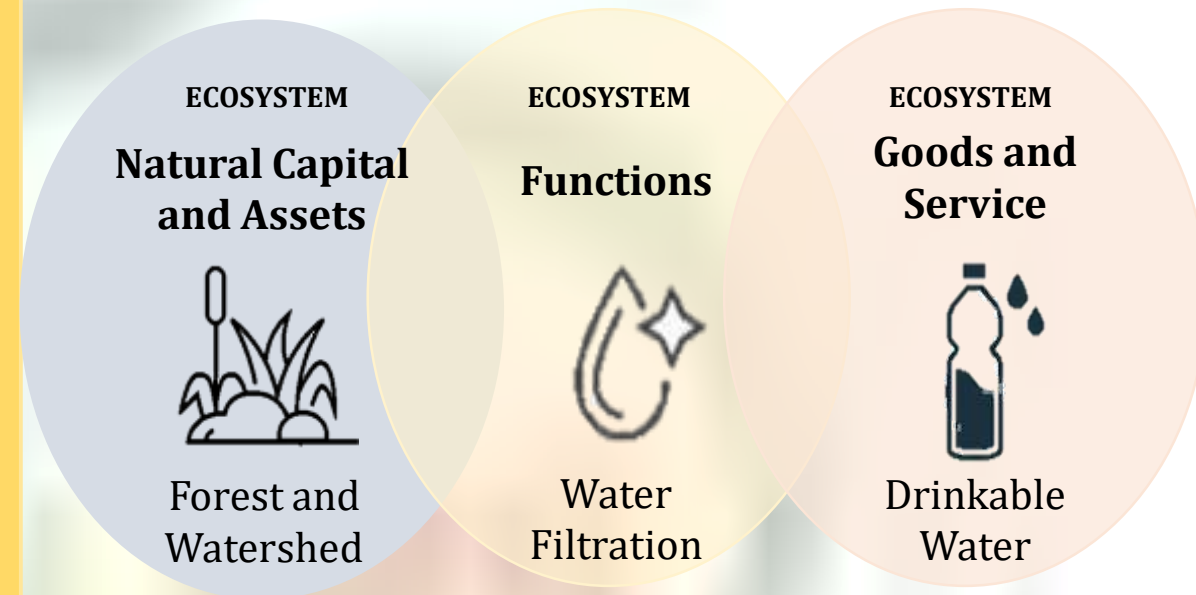


Global efforts like *Millennium Ecosystem Assessment*, *Intergovernmental Platform on Biodiversity and Ecosystem Services*, *The Economics of Ecosystems and Biodiversity*, etc. have recently emphasised the need of valuing ecosystem services in decision-making for sustainable development and biodiversity protection and conservation. The reasoning underlying ecosystem valuation is to identify the linkages between the socio-ecological connections, to understand how human decisions would impact ecosystem services.



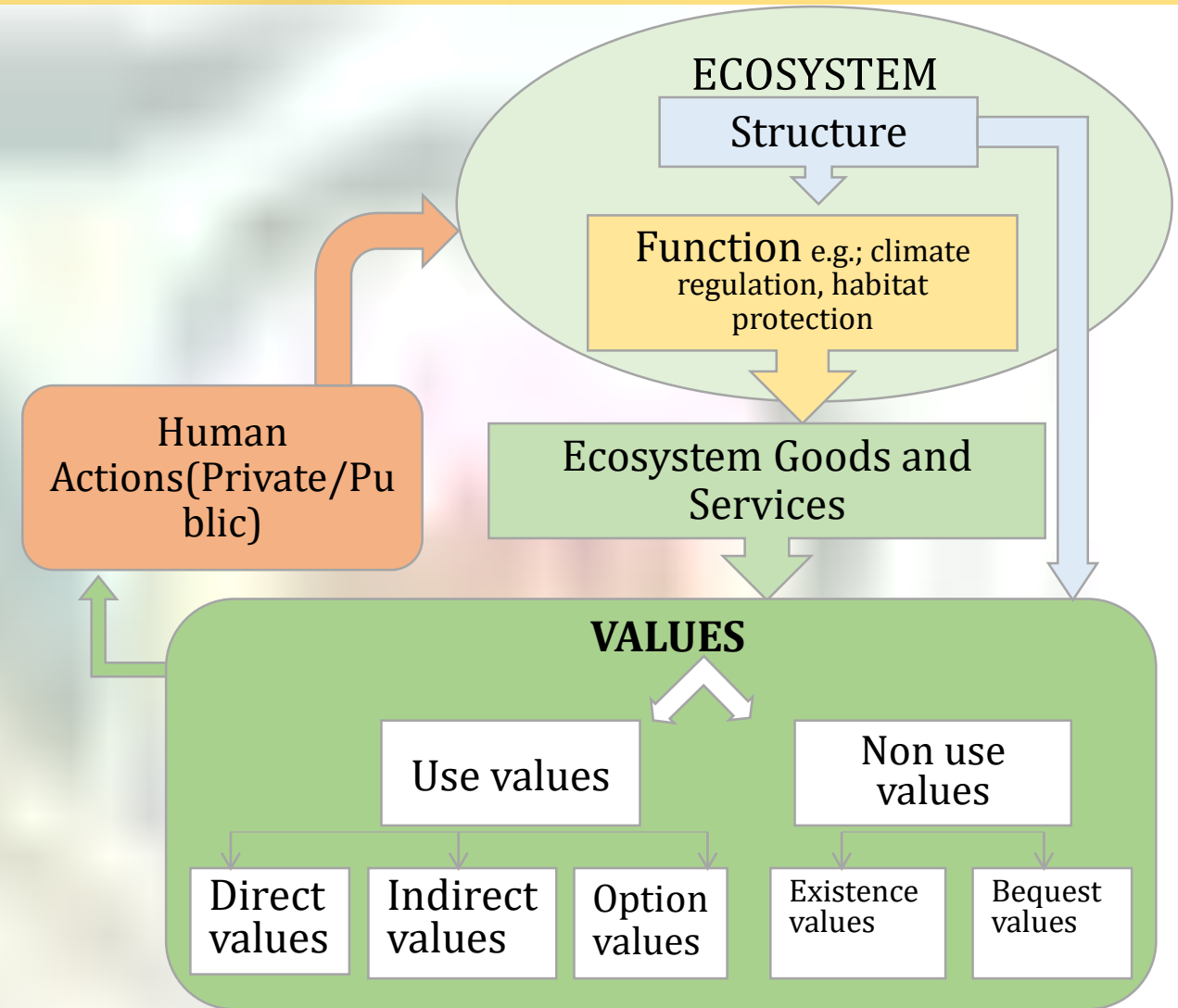
Besides, an appropriate institutional framework and a more plural approach to valuing nature are needed to improve decision making in different social contexts. Additionally, there are major significant challenges for valuation, associated with defining and quantifying ecosystem services, with their uniqueness and distinctiveness according to different contexts, and with the appropriateness of valuation methods in each case.

- Natural assets have long been referred to as natural capital. The concept of natural capital is used as an economic metaphor for the limited stocks of physical and biological resources found on earth.
- A complex web of biological, chemical, and physical processes generate ecosystem goods and services that flow like interest or dividends from those stocks, supporting all life on earth and deeply influencing the quality of human life.
- Ecosystem goods are the products from natural assets such as food, fibre, clean air, and water; while ecosystem services are the less tangible but no less significant benefits from ecosystem processes such as nutrient cycling, water purification and climate regulation, and non-material benefits such as recreation, aesthetic and cultural benefits.



- There are many varying definitions of natural assets, but all revolve around the main theme of the stock of renewable and non-renewable natural resources that includes land, water, atmosphere, minerals, plant and animal species, and all living things.
- The concept of natural capital intentionally references the familiar economic notion of financial capital. “The term ‘capital’ has been borrowed from the financial sector to describe the value of the resources and ability of ecosystems to provide flows of goods and services such as water, medicines and food.
- Flows of goods and services that benefit people are called ‘ecosystem services’. Much as an investor will use financial capital to generate profits, a stock of forest or fish will provide a future flow of timber or food, which if used sustainably will provide long-term benefits to people.”

- Ecosystem functions include the flow of goods or services which occur naturally by ecological interactions between biotic and abiotic components in an ecosystem is often referred as ecosystem goods and services.
- These goods and services not only provide tangible and intangible benefits to human community, but also are critical to the functioning of ecosystem.
- Thus, ecosystem goods and services are the process through which natural ecosystems and the species that make up sustain and fulfill the human needs (Newcome et al. 2005).
- Ecosystems are thus natural capital assets supporting and supplying services highly valuable to human livelihoods and providing various goods and services (MEA 2003; Daily and Matson 2008; Gunderson et al. 2016).



1

Contribution to human well-being

Ecosystem services directly contribute to human well-being by providing food and shelter, but also supporting our health, joy, spiritual inspiration, and cultural identity.

Input to regional economies

In many places, Nature is the single most important input to regional economies, providing materials, clean water and good environmental conditions for industry, agriculture and the services sector.

2

3

Efficient natural solutions

Nature secures much of our fresh water, protects against erosion and droughts, and provides many other benefits without charging for them. If carefully planned and managed, ecosystem-based solutions can work more effectively and efficiently than solutions based on 'built infrastructure'.

Future Challenges

Maintaining well-functioning natural ecosystems is an excellent strategy to deal with future pressures and threats, for example, those linked to climate change.

4

Ecosystem Services

They are multiple benefits provided by ecosystems to humans and the direct and indirect contributions of ecosystems to human well-being.
 The concept of ecosystem services relates to both our dependence on nature and the impact of our activities on it.
 From an economic perspective, ESs has been described as the “contributions of the natural world which generate goods which people value”.

ECOSYSTEM SERVICES

Food, Shelter, livelihood
 Disaster Risk Reduction,
 Aesthetic value,
 Spiritual enrichment



Constituents of well-being

Security

- Personal safety
- Resource access
- Security from disasters

Health

- Feeling well
- Access to clean air & water

Freedom of choice and action

Opportunity to be able to achieve what an individual values being and doing

Basic material for good life

- Adequate livelihood
- Sufficient nutritious food
- Access to goods & shelter

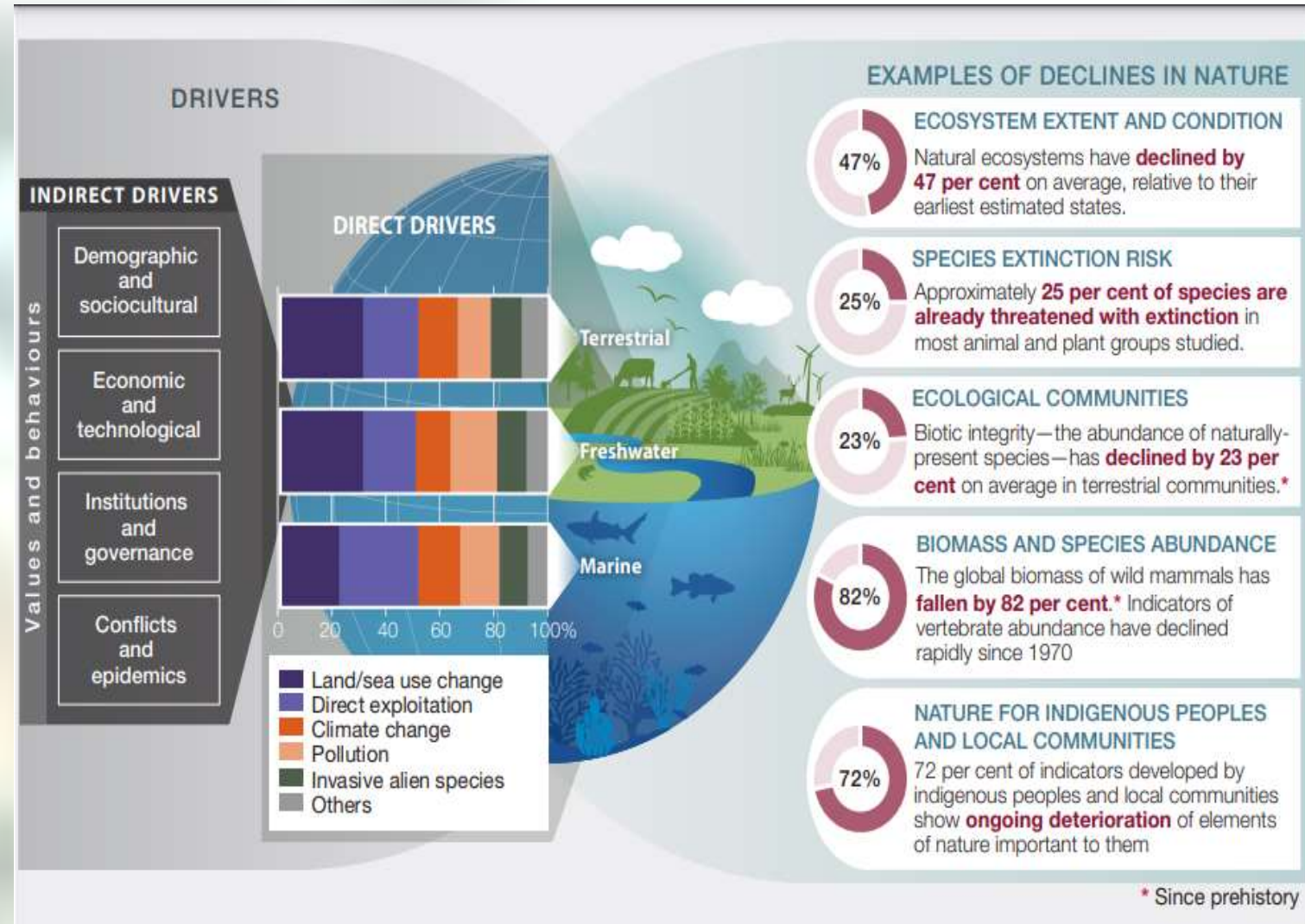
Good social relations

- Social cohesion
- Mutual respect
- Ability to help others

Source: MEA, 2005

Impact of Direct and Indirect Drivers on Nature

- ❖ The direct drivers (land-/sea-use change; direct exploitation of organisms; climate change; pollution; and invasive alien species) result from an array of underlying societal causes .
- ❖ These societal causes are termed as Indirect Drivers, they can be demographic , sociocultural, economic, technological, or relating to institutions, governance, conflicts and epidemics.
- ❖ The color bands in the figure represent the relative global impact of direct drivers on terrestrial, freshwater and marine nature, as estimated from a global systematic review of studies published since 2005.
- ❖ Land- and sea-use change and direct exploitation account for more than 50 per cent of the global impact on land, in fresh water and in the sea, but each driver is dominant in certain contexts.
- ❖ The circles illustrate the magnitude of the negative human impacts on a diverse selection of aspects of nature over a range of different time scales based on a global synthesis of indicator



Economic Importance of Ecosystem: Examples

Ecosystem Valuation

- Economic valuation of ecosystem services refer to the assignment of monetary value to ecosystem assets, good and services, where the monetary value has a particular and precise meaning.
- Economic valuation of natural resources aid in wise-use and sustainable management by quantifying and comparing the various benefits of resources.
- Economic valuation method captures the output of ecological production function to arrive at economic values.
- Ecosystem service valuation utilizes various methods and approaches to estimate the value of ecosystem services.

The importance of coral reef ecosystem services

Although just covering 1.2% of the world's continent shelves, coral reefs are home to an estimated 1-3 million species, including more than a quarter of all marine fish species (Allsopp et al. 2009). Some 30 million people in coastal and island communities are totally reliant on reef-based resources as their primary means of food production, income and livelihood (Gomez et al. 1994, Wilkinson 2004).



Tree planting enhances urban life quality in Canberra, Australia

Local authorities in Canberra have planted 400,000 trees to regulate microclimate, reduce pollution and thereby improve urban air quality, reduce energy costs for air conditioning as well as store and sequester carbon. These benefits are expected to amount to some US\$ 20-67 million over the period 2008-2012, in terms of the value generated or savings realized for the city (Brack 2002).

Conserving forests avoids greenhouse gas emissions worth US\$ 3.7 trillion

Halving deforestation rates by 2030 would reduce global greenhouse gas emissions by 1.5 to 2.7 GT CO₂ per year, thereby avoiding damages from climate change estimated at more than US\$ 3.7 trillion in NPV terms. This figure does not include the many co-benefits of forest ecosystems (Eliasch 2008).



Recognizing Value

- Recognizing value in ecosystems, landscapes, species and other aspects of biodiversity is a feature of all human societies and communities, and is sometimes sufficient to ensure conservation and sustainable use.
- This may be the case especially where the spiritual or cultural values of nature are strong.
- For example, the existence of sacred groves in some cultures has helped to protect natural areas and the biodiversity they contain, without the need to place a monetary value on the 'services' provided.
- Equally, protected areas such as national parks have historically been established in response to a sense of collective heritage or patrimony, a perception of shared cultural or social value being placed on treasured landscapes, charismatic species or natural wonders.

- Demonstrating value in economic terms is often useful for policymakers, in reaching decisions that consider the full costs and benefits of a proposed use of an ecosystem, rather than just those costs or values that enter markets in the form of private goods. For Example include calculating the costs and benefits of conserving the ecosystem services provided by wetlands in treating human wastes and controlling floods, compared to the cost of providing the same services by building water treatment facilities or concrete flood defenses.
- A variety of economic valuation methods have been developed, refined, and applied to biodiversity and ecosystem services in a range of different contexts. It needs to be stressed that valuation is best applied for assessing the consequences of changes resulting from alternative management options, rather than for attempting to estimate the total value of ecosystems. In practice, most valuation studies do not assess the full range of ecosystem services but focus on just a few services. Moreover, not all biodiversity values can be reliably estimated using existing methods.
- Therefore, it is important to identify all significant changes in ecosystem services even if it is not possible or necessary to monetize all of these changes. Decision makers also need information about who is affected and where and when the changes will take place. The demonstration of economic value, even if it does not result in specific measures that capture the value, can be an important aid in achieving more efficient use of natural resources. It can also highlight the costs of achieving environmental targets and help identify more efficient means of delivering ecosystem services.

Demonstrating Value

Capturing Value

- Capturing value, the final tier of the economic valuation, involves the introduction of mechanisms that incorporate the values of ecosystems into decision making, through incentives and price signals. This can include payments for ecosystem services, reforming environmentally harmful subsidies, introducing tax breaks for conservation, or creating new markets for sustainably produced goods and ecosystem services . It needs to come along with reinforcing rights over natural resources and liability for environmental damage, In many cases, explicit valuation of the ecosystem services targeted by such mechanisms can help to ensure they are economically efficient.
- The challenge for decision makers is to assess when market-based solutions to biodiversity loss are likely to be culturally acceptable, as well as effective, efficient and equitable. The approach to valuing ecosystems and biodiversity is one that acknowledges the limits, risks and complexities involved, covers different types of value appreciation, and includes various categories of response at the level of public policies, voluntary mechanisms and markets.
- Valuation can act as a powerful form of feedback, a tool for self-reflection, which helps us rethink our relation to the natural environment and alerts us to the consequences of our choices and behavior on distant places and people. It also acknowledges the costs of conservation and can promote more equitable, effective and efficient conservation practices.

Importance of Valuation

Valuation is not intended to displace the broader factors already present in environmental decision-making frameworks, and most commentators agree that its application to ecosystem services should be regarded as a complementary, rather than sole, component in decision making.

However, valuation can be used to: ☐

- ❖ Understand the contribution that an ecosystem makes to an area and the dependencies between the different ecosystem services arising from it.
- ❖ Determine whether a policy intervention is justified and any losses or gains in ecosystem service benefits. ☐
- ❖ The costs and benefits for different stakeholders from how an ecosystem is managed. ☐
- ❖ Justify the need for financial resources to sustain, restore or enhance ecosystem services.



Video Reference



[Pavan Sukhdev: Put a value on nature!](#)

• Additional Resources:

- Pavan Sukhdev's TED talk on the value of nature emphasizes the economic and ecological importance of preserving and valuing the natural world. He discusses how understanding the monetary worth of nature can drive conservation efforts and sustainable development, ultimately benefiting both the environment and humanity. Sukhdev advocates for incorporating the value of nature into our economic systems to ensure a sustainable and harmonious future.

THANK YOU



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