

INTRODUCTION TO ECOSYSTEM SERVICES

Module 1: Foundation of the Blue Economy

Duration: 1 Hour

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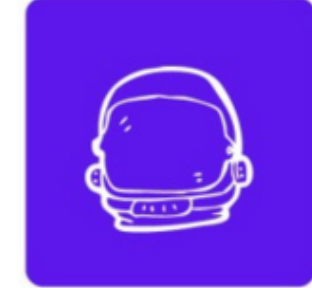
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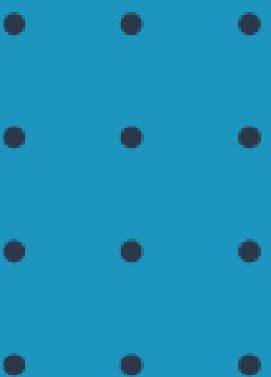


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Learning Objectives

By the end of this unit, you will be able to:

- Define **ecosystem services** and explain their importance to the Blue Economy.
- Identify **four main categories** of ecosystem services.
- Recognize real-world examples of marine and coastal ecosystems providing essential services.
- Understand why ecosystem services are critical for **human well-being** and sustainable development.

Ecosystem Services

Ecosystem services benefit us in myriad ways.

- **Provisioning services:** drinking water, oil, and natural gas
- **Regulating services:** climate regulation, decomposition, and water purification
- **Supporting services:** nutrient cycling, photosynthesis, and soil creation
- **Cultural services:** recreation and creative inspiration

Gross Domestic Product

In 2009, the ecosystem services value (ESV) was an estimated \$149.61 trillion for the entire biosphere. (The world GDP was approximately \$71.75 trillion.)

Marine systems contributed approximately 75.15% of the ESV.

Drinking Water

Plants act as natural water filters, removing pollutants and sediments before they reach reservoirs. Forests and vegetation determine how much water is available locally.

Flood Prevention

By soaking up floodwater, wetlands reduce the height of peak flow and slow the movement of water to mitigate floods, making damage less likely to occur.

Pollination

The total production value of pollination in the United States is estimated to be \$2 billion dollars. In other words, through insect pollination, farmers can save \$2 billion dollars in required pollination annually.

Fishing

From 2008 to 2010, fishing represented a \$4 billion dollar industry in the United States and contributed to 1 million jobs around the country.

Urban Trees

In 2002, field data from 10 US cities indicated urban trees stored 700 million tons of carbon (\$14.3 billion value), with a gross sequestration rate of 22.8 million tons annually (\$460 million).

Recreation

From national parks to your local city park, natural areas provide opportunities for some of the best recreation. Walking, running, and biking, for instance, promote both physical and mental wellness.

Sources: Li, Guangdong and Chuanglin Fang. 2014. "Global mapping and estimation of ecosystem services values and gross domestic product: A spatially explicit integration of national 'green GDP' accounting." Ecological Indicators 46: 293–314.

Nowak, David J. and Daniel E. Crane. 2002. "Carbon storage and sequestration by urban trees in the USA." Environmental Pollution 116: 381–89.

Why Ecosystem Services Matter

- Healthy marine ecosystems are the foundation of **sustainable coastal economies**.
- Ecosystem services are **benefits people obtain from nature** (MEA, 2005).
- Coastal ecosystems like coral reefs, mangroves, and seagrass beds **support livelihoods, food, and coastal protection**.
- Linking ecosystems to economic and cultural values **strengthens conservation efforts**.



Image: The Orca Project

How do ecosystems “work for us” every day, often without us realizing?



What Are Ecosystem Services?

Definition: Ecosystem services are the direct and indirect contributions of ecosystems to human well-being, encompassing provisioning, regulating, cultural, and supporting services (Costanza et al., 1997; MEA, 2005).



Benefits people gain from healthy ecosystems.

Provide goods and services:

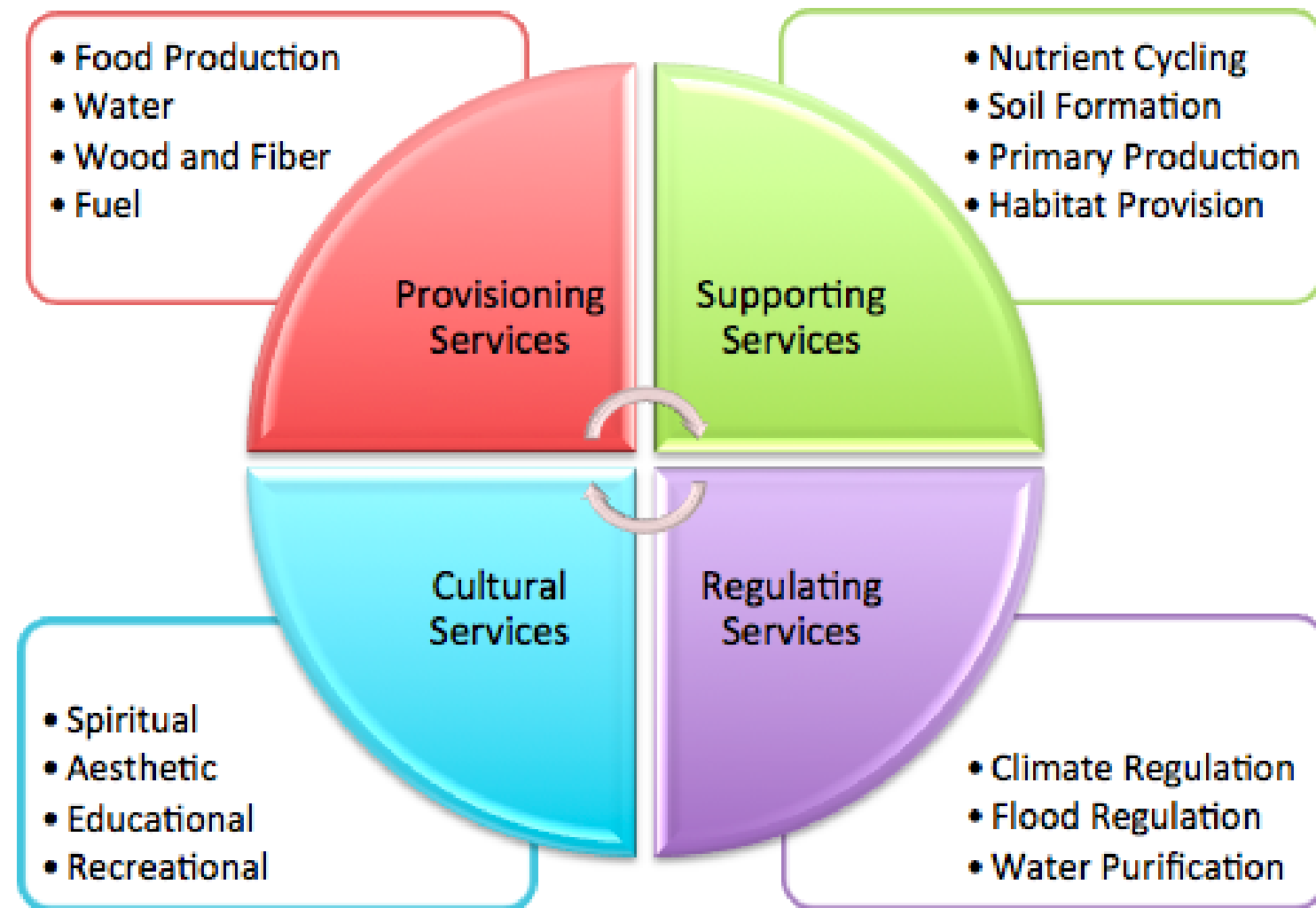
- Food and materials
- Climate regulation
- Coastal protection
- Recreation and tourism

Essential for:

- Economic well-being
- Human health
- Cultural identity



Types of Ecosystem Services



Source: Millenium Ecosystem Assessment, 2005.



Importance for the Blue Economy

Healthy ecosystems underpin:

- **Sustainable fisheries:** Coral reefs, mangroves, and seagrass beds support fish breeding and food security.
- **Tourism revenue:** Marine biodiversity attracts global ecotourism, driving local economies.
- **Coastal resilience:** Mangroves and reefs act as natural barriers, reducing erosion and storm impacts.
- **Carbon storage:** Mangroves and seagrasses store vast amounts of “blue carbon,” mitigating climate change.

Key Takeaway:

Integrating ecosystem services into marine planning is critical to balance conservation with economic growth, ensuring long-term sustainability.

Degradation leads to:

- **Economic loss:** Fisheries collapse, tourism decline, and coastal damage repair costs.
- **Increased disaster risks:** Higher vulnerability to cyclones, flooding, and sea-level rise.
- **Loss of livelihoods:** Millions of coastal communities depend on healthy marine ecosystems.



Example Ecosystem – Mangrove Forests

- Mangrove forests provide **coastal protection, nursery grounds for fisheries, and carbon storage.**
- **Example: Matang Mangrove Forest Reserve, Perak, Malaysia**
 - One of the **best-managed mangrove ecosystems in the world.**
 - Protects coastal communities from **storm surges and erosion.**
 - Supports a thriving **cockle, prawn, and fishery industry.**
 - Tourism activities include **ecotours, boardwalks, and birdwatching.**
- Valuation studies estimate **high economic returns:**
- Approximately **RM 11,000 (~USD 2,600) per hectare/year** in direct and indirect benefits (Ong, 1993; Alongi, 2002).



photos: Conservation International / Troya



How would life in Perak's coastal villages change without mangroves like those in Matang?

Example Ecosystem – Coral Reefs

- Coral reefs support **25% of all marine species** and sustain Malaysia's vibrant tourism and fisheries sectors.
- **Example: Pulau Payar Marine Park, Kedah, Malaysia**
 - Located in the **northern Straits of Malacca**; designated a **Marine Park since 1989**.
 - Home to diverse reef-building corals and **over 36 species of hard corals**.
 - Popular site for **diving and snorkeling tourism**, contributing significantly to **local economies**.
 - Reefs provide **natural wave barriers**, protecting coastlines and fishing villages.
- Estimated reef-related tourism revenue in Malaysia: over **RM 2 billion annually** (WWF Malaysia, 2020).



What would Malaysia's coastal tourism and fishing industries look like without reefs like Pulau Payar?

Activity: Ecosystem Service Mapping

- Select a local ecosystem (e.g., mangrove, coral reef).
- List the services it provides.
- Classify them into provisioning, regulating, cultural, supporting.
- Share with peers on the forum.



Summary

Ecosystem services are the benefits humans receive from healthy ecosystems, like food, coastal protection, and cultural value.

Four main categories:

- Provisioning (e.g. seafood)
- Regulating (e.g. climate regulation)
- Cultural (e.g. tourism, spiritual values)
- Supporting (e.g. nutrient cycling)

Healthy ecosystems are fundamental for the sustainable blue economy.

Integrating ecosystem services into planning and management helps protect resources and support local communities.



References

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Evaluation Answer Key: 1) True, 2) B, 3) False, 4) D



THANK YOU

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