



GENIALG

e-Learning course

SUSTAINABLE SEAWEED FARMING PRACTICES

Module 2 - Ecosystem Services of Seaweed Cultivation

LESSON 1

Ecosystem Services and Nature Contributions to People from Seaweed Cultivation

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HUMANS AND BIODIVERSITY



- Ecosystem provide a wide range of goods and services of value to people: **ecosystem services**
- Human activities affect ecosystems and the services they provide
- The value of ecosystem services is usually not factored into important decisions that affect ecosystems
- Distortions in misinformed decision-making could damage the value of ecosystem services, making human society and the environment poorer



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ECOSYSTEM SERVICES



Goods and Services that people obtain from ecosystems, that arise from the interaction between **natural and human capital**. Ecological characteristics, processes or functions that directly or indirectly contribute to human wellbeing:

- **Ecosystem processes** - biophysical relationships that exist regardless of whether (or not) humans benefit
- **Ecosystem services** - processes and functions that contribute to human well being



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ECOSYSTEM SERVICES



PROVISIONING SERVICES

Products obtained from ecosystems

REGULATING SERVICES

Benefits obtained from regulation of ecosystem processes

CULTURAL SERVICES

Non-material benefits obtained from ecosystems

SUPPORTING SERVICES

Services necessary for the production of all other ecosystem services. Contribute indirectly to humans



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1.1 MARINE ECOSYSTEM SERVICES



- Food;
- Fresh Water;
- Wood and fiber;
- Fuel;
- ...

PROVISIONING SERVICES

REGULATING SERVICES

- Climate regulation;
- Flood regulation;
- Water purification;
- Disease control;
- ...

- Aesthetic;
- Spiritual;
- Educational;
- Recreational;
- ...

CULTURAL SERVICES

SUPPORTING SERVICES

- Nutrient cycling;
- Soil formation;
- Primary production;
- ...



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1.2 FRAMEWORKS TO DESCRIBE ECOSYSTEM SERVICES



- There are different frameworks to describe Ecosystem Services:
 - Common International Classification of Ecosystem Services (CICES)
 - The Economics of Ecosystems and Biodiversity (TEEB)
 - **Nature Contributions to People (NCPs)** from Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)
- There are now a number of different ways of classifying ecosystem services in the user community. Some people use the set defined in the Millennium Ecosystem Assessment, others prefer the list devised by TEEB.
- At national scales, other systems have also been designed, as in the case of the UK National Ecosystem Assessment (UK NEA).



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1.3 CLASSIFICATION OF ECOSYSTEM SERVICES - CICES



- In order to help people navigate between these different systems, a **Common International Classification of Ecosystem Services** has been developed. It is not intended to replace these other classification systems but to allow the easy translation between them.
- CICES was developed as part of the work done in Europe on ecosystem accounting. It has also been taken up by the European working group on Mapping and Assessment of Ecosystem Services (MAES).



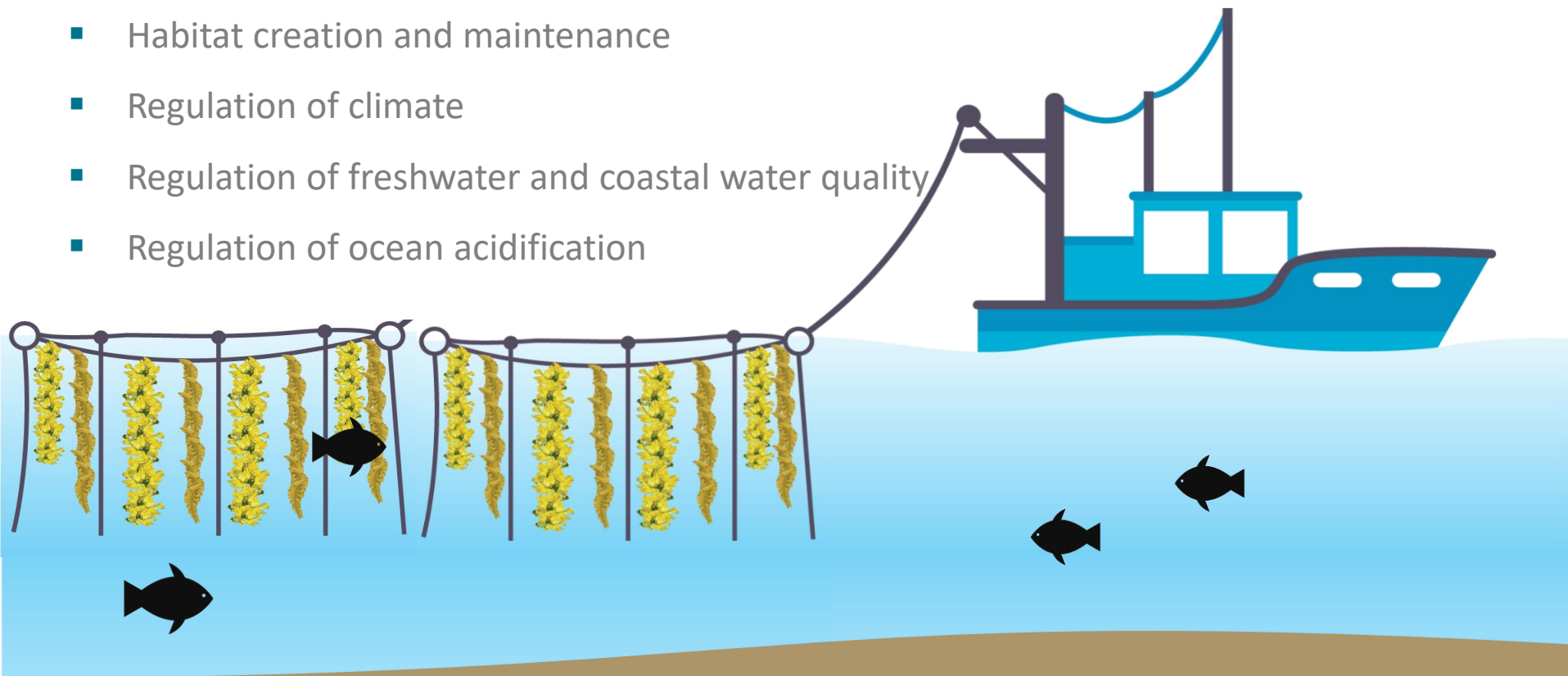
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Nature Contributions to People (NCP) from Seaweed Farming:



- Habitat creation and maintenance
- Regulation of climate
- Regulation of freshwater and coastal water quality
- Regulation of ocean acidification



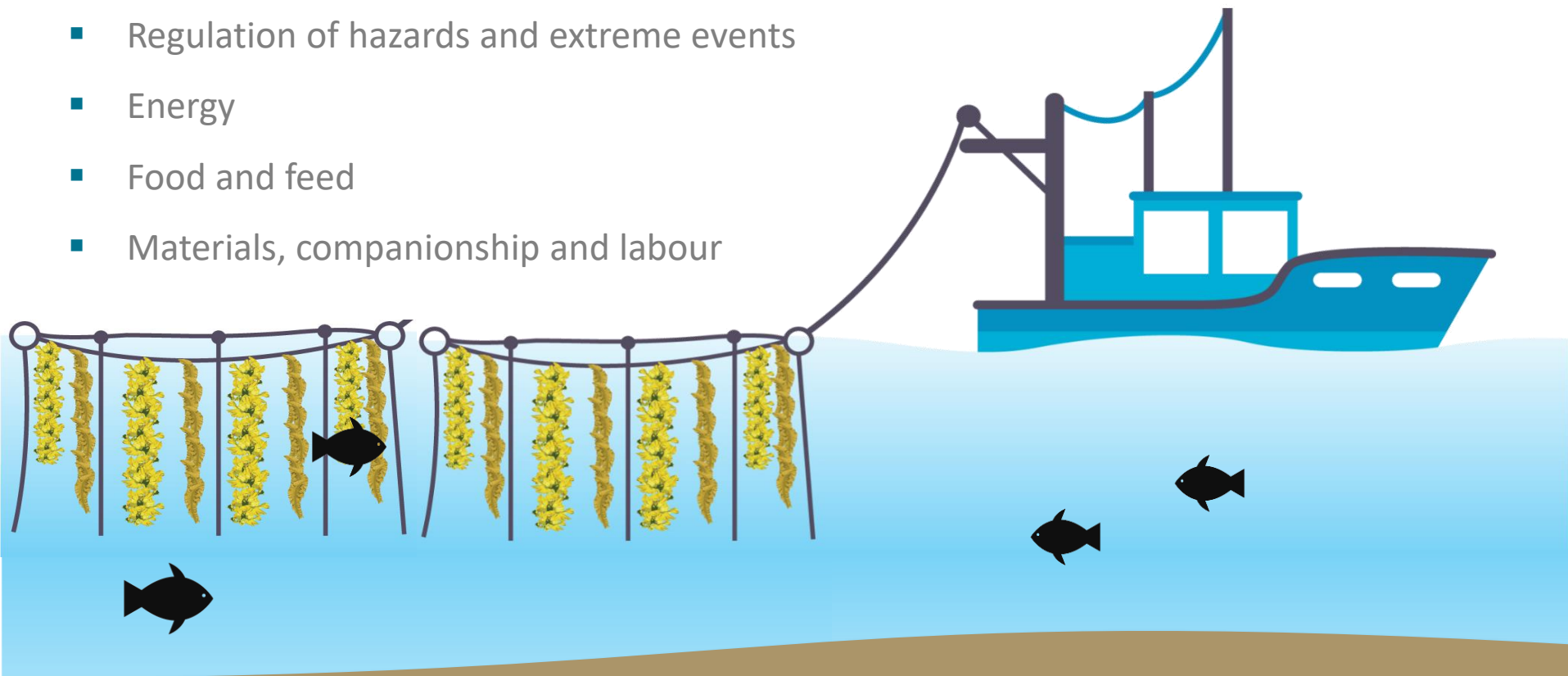
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Nature Contributions to People (NCP) from Seaweed Farming:



- Regulation of hazards and extreme events
- Energy
- Food and feed
- Materials, companionship and labour



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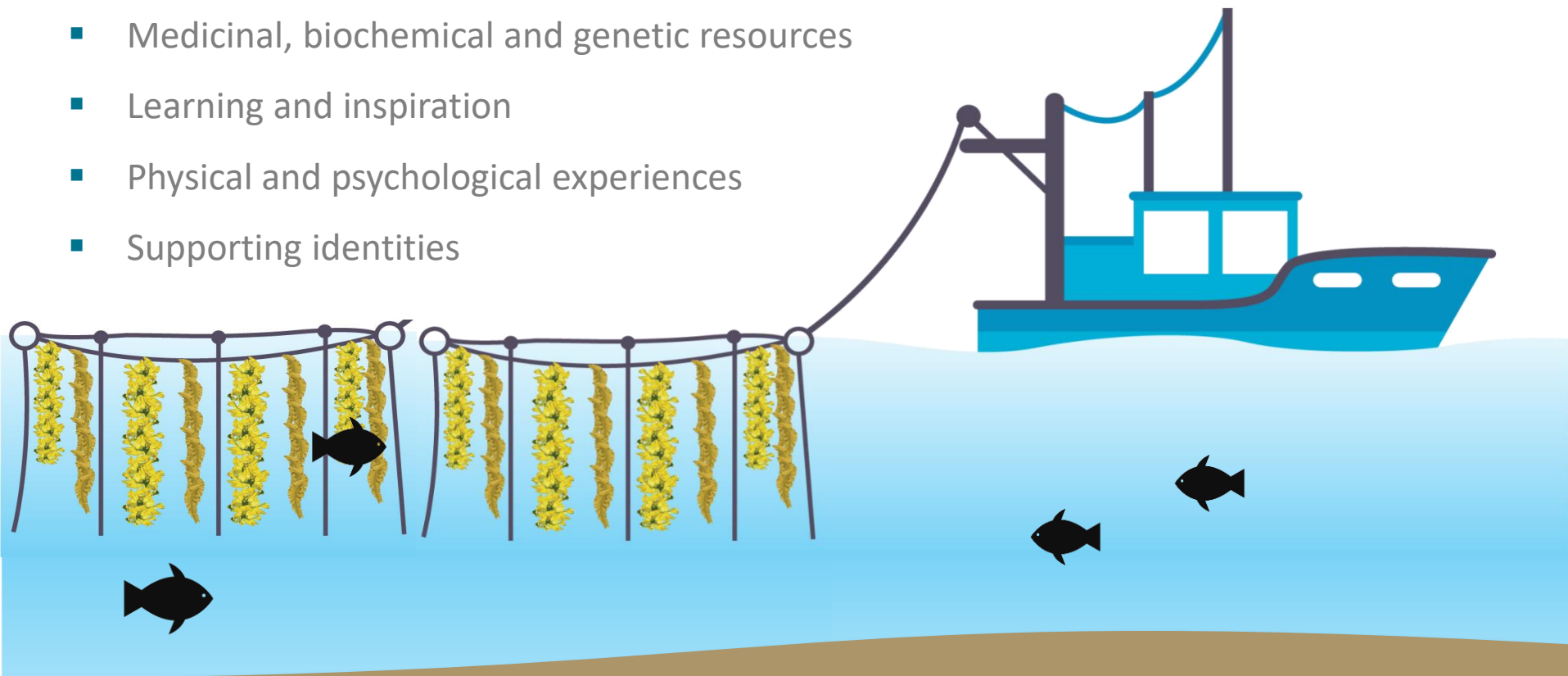
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Nature Contributions to People (NCP) from Seaweed Farming:



- Medicinal, biochemical and genetic resources
- Learning and inspiration
- Physical and psychological experiences
- Supporting identities



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Nature Contributions to People (NCP) from Seaweed Farming:



- **Habitat creation and maintenance:** seaweed cultivation support high primary and secondary productivity, and a three-dimensional habitat structure for a diverse array of marine organisms, including fish and crustaceans
- **Regulation of climate:** Seaweed cultivation can potentially serve as a carbon sink and play an important role in the marine carbon sequestration
- **Regulation of freshwater and coastal water quality:** seaweed cultivation play an important role as a nutrient-removal system to alleviate eutrophication problems. It has potential for bioremediation of nitrogen (N)
- **Regulation of ocean acidification:** seaweed cultivation could potentially benefit its immediate environment by stabilizing the pH of the surrounding water and by releasing oxygen during photosynthesis.



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Nature Contributions to People (NCP) from Seaweed Farming:



- **Energy:** it is technically possible to produce various biofuels such as methane, ethanol and butanol from seaweed biomass by biochemical and thermochemical technologies **Food and feed:** seaweed has a role as a novel and added-value dietary ingredient in formulated diets for fish. There is an increasing culinary interest in seaweeds
- **Medicinal, biochemical and genetic resources:** extraction of alginates, diverse bioactive compounds and chemicals with applications in the pharmaceutical and medical industry



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Nature Contributions to People (NCP) from Seaweed Farming:



- **Learning and inspiration:** seaweed cultivation has the potential to contribute to science and education through the development of know-how for industries. There are also opportunities for communities to prosper through education, acquisition of knowledge and development of skills for well-being and seaweed farming industry development
- **Physical and psychological experiences:** provision; by seascapes free of fishing ships, habitats or organisms; of opportunities for physically and psychologically beneficial activities for tourism or relaxation. Enhanced by the biodiversity they might enclose in the farming area



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Nature Contributions to People (NCP) from Seaweed Farming:



- **Supporting identities:** by providing an opportunity for people to develop a sense of place, belonging or connectedness with the natural provisioning processes of seaweed farming. As a source of satisfaction derived from knowing that a particular production system exists, and also pride in having those types of cultivation systems



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2 NATURAL CAPITAL



- We have our natural capital, which includes biodiversity and nature. Some ecological functions that come from this natural capital produce what we call Ecosystem Services
- A stock that yields a flow of ecosystem services over time - interactions with manufactured, human and social capital



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3 HUMAN WELL-BEING



Human well-being is a state where the following constituents are fulfilled:

- Basic material for a good life, such as secure and adequate livelihoods, enough food at all times, shelter, clothing, and access to goods;
- Health, including feeling well and having a healthy physical environment, good social relations, including social cohesion and mutual respect;



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3 HUMAN WELL-BEING



- Security, including secure access to natural and other resources, personal safety, and security from natural and human-made disasters;
- Freedom of choice and action, including the opportunity to achieve what an individual values doing and being.



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Ecosystem services method

- Based on the assumption that there's a link between human well-being and the state of the environment and the services that it can provide
- Tries to shed light on these different services but it also provides a conceptual framework.



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Ecosystem Services have become a common and useful tool for decision makers. Measuring the economic linkages and values associated with biodiversity and ecosystem services is often regarded as a key argument to make the case for conservation investments






**LESSON 1 OF
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