

# Ocean ecosystem services: Significant impact on human activities

- Oceans provide a wide range of ecosystem services in terms of the benefits and opportunities humans derive from these ecosystems. Ecosystem services are defined as "contributions to well-being provided by ecosystems" (1), ranging from access to essential goods (food...), to security (mitigation of climate change impacts...), to recreation (outdoor activities...).
- The notion of ecosystem services was first explicitly put forward in an article by EHRLICH and MONNEY (2). The concept gained widespread acceptance following the publication of a study commissioned by the UN in 2005 on the Millennium Ecosystem Assessment (MEA).

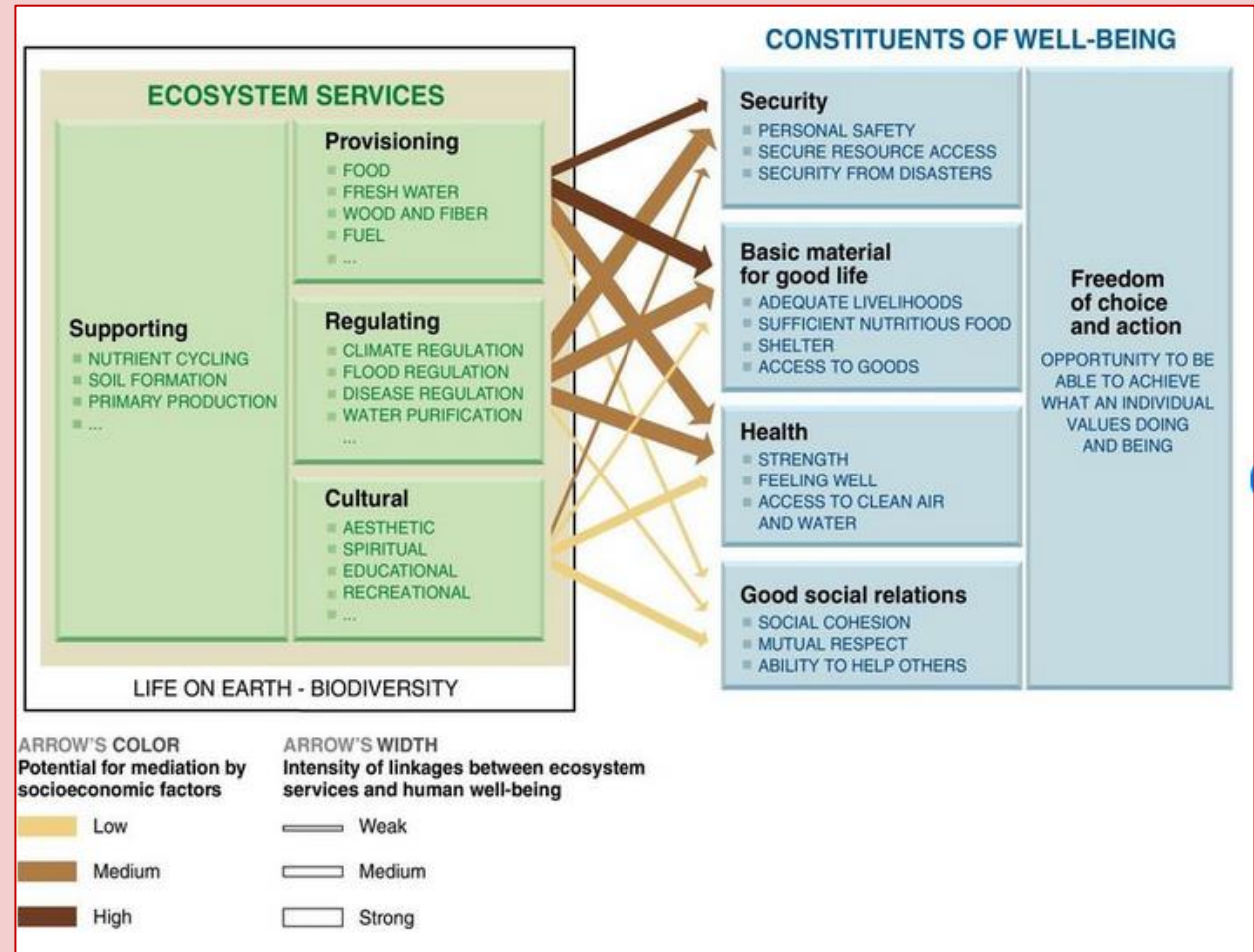
## The ocean provides four categories of ecosystem services (3)

- Services that regulate natural processes (physical, chemical and biological) such as the absorption of carbon dioxide or waste, erosion, wastewater treatment and the maintenance of life cycles for fauna and flora (4). These services maintain hydrological balance and ensure ecosystem productivity and resilience. Thanks to this ecosystem service, effects of eutrophication are mitigated by filtering organisms. Erosion and siltation are regulated by sea grass beds. Oceans and seas play a major role in biochemical cycles and host microorganisms that provide protection from ultraviolet radiation. Global climate regulation is maintained by oceans which stabilize CO2 levels in the atmosphere, thereby regulating local atmospheric temperatures.
- Support services that enable ocean ecosystems to operate properly. These include bioturbation, primary production, nutrient cycling and mineralization, .... Bioturbation is the biogenic conveyance of sediment particles and interstitial water breaking down sediment stratigraphy, as derived from specific benthic invertebrate and fish active in the substrate (spawning, foraging,...). Nutrient cycling and mineralization occurs through gas fixation and decomposition of organic matter by specific biodiversity.

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- **Harvest services** stemming from products generated by marine ecosystems, i.e.: renewable energies produced by swell, marine currents and oil obtained from microalgae, food products generated by fisheries (fish and seaweed resources), as well as construction materials and raw materials necessary for clothing (skins, innards,...). Non-renewable energy sources such as oil and gas deposits, organic fertilizers from algae and fish bones are another example. Lastly, compounds for pharmaceutical products that are derived from renewable or non renewable resources of marine and coastal areas.
- **Cultural services** (5) (intangible benefits) as in tourism, leisure and sports activities (diving). These services are both recreational (outdoor activity) and subjective (spiritual). Indeed, marine and coastal ecosystems provide a sense of well-being. Ecotourism and hiking offer the opportunity to explore rich and diverse landscape biodiversity. Scuba diving offers the opportunity to admire marine biodiversity up close. Marine and coastal biodiversity is essential for reconstructing the evolution of life on Earth.

Ecosystem benefits and relevance to the well-being of humans



Source: IRES\_Millennium Ecosystem Assessment, United Nations, 2005

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## Importance of marine and coastal ecosystems

- A number of marine species contribute significantly to coastal ecosystems, e.g. seagrass beds, coral reefs and mangroves, all of which protect coastlines from erosion (6).
- Moreover, ecosystems play a fundamental role in the carbon cycle by converting atmospheric CO<sub>2</sub> into organic matter via photosynthesis.
- Various coastal environment ecosystem services (regulation, provisioning, support, harvesting and cultural) may account for as much as 43% of all services provided by the biosphere, even though coastal ecosystems only cover 6.3% of the globe's surface (7).

Mangroves



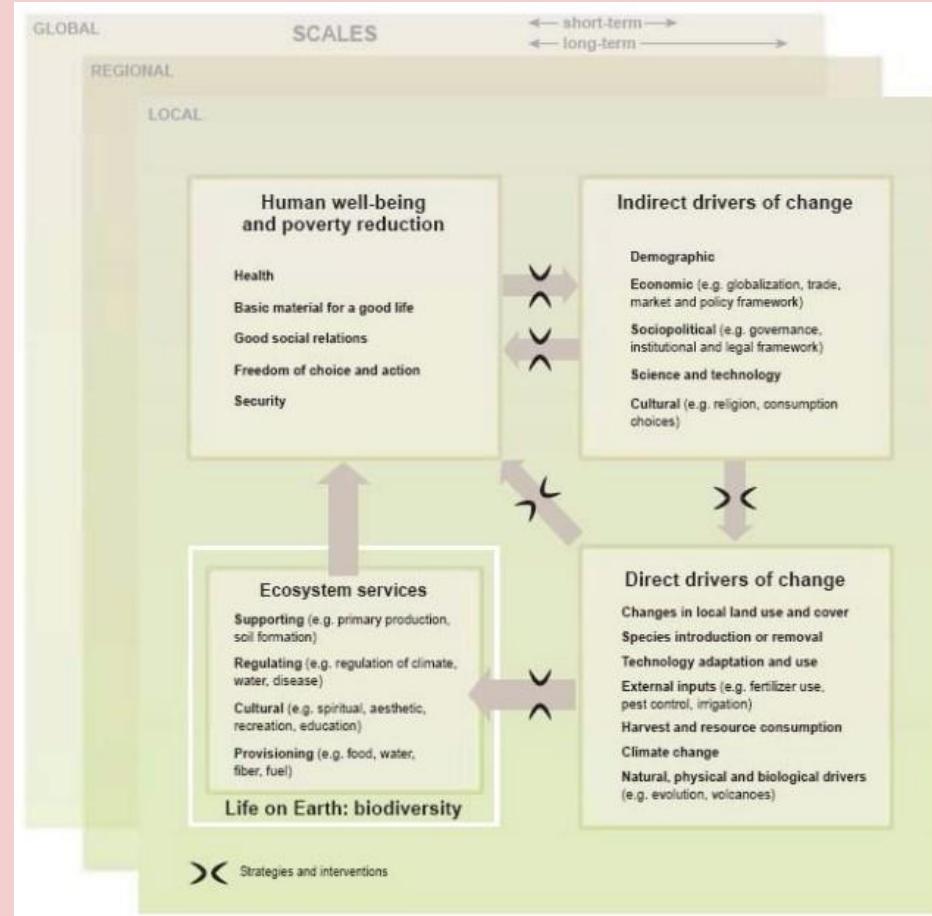
Source : Pure Green

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## Ecosystem degradation impacts (8)

- ▶ Stress on ecosystems increases the risk of accelerated, abrupt, and potentially irreversible changes to those ecosystems.
- ▶ Disease outbreaks, sudden water quality degradation, appearance of dead zones in coastal regions, steep drops in fishery catches, regional climate disruptions, etc., are examples of such changes, with direct and significant impact on human well-being.
- ▶ Across all coastal regions, and particularly in sub-Saharan Africa, the state and management of ecosystem services have a major bearing on the outlook for poverty reduction.

Interaction between biodiversity, ecosystem services, human well-being and underlying forces driving change



Source : Millenium Ecosystem Assessment

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## References

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