



Ecosystem Services



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COP28?

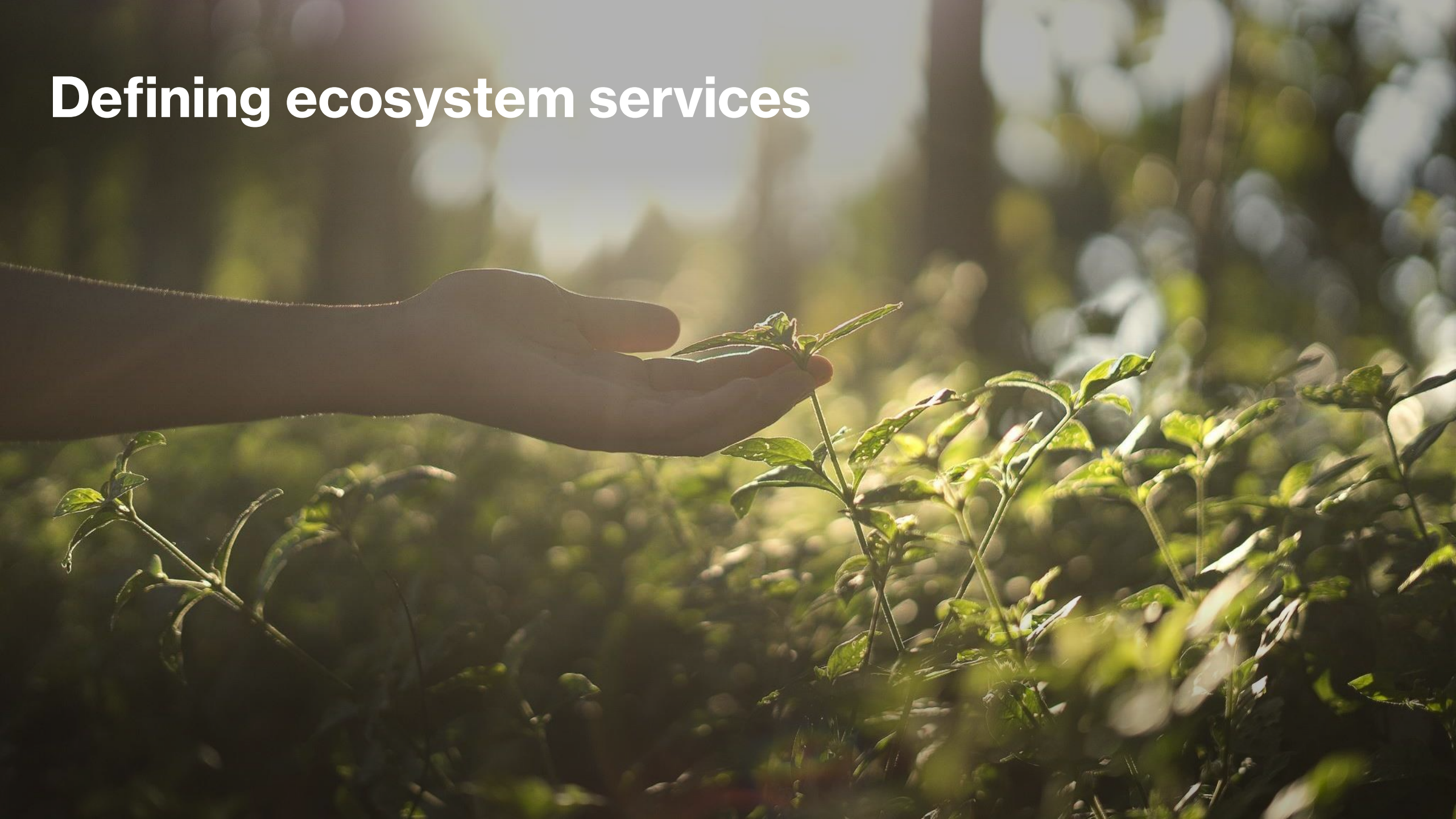
(3) We delivered world first after
world first - YouTube



Lecture Outline

- **COP28 + Oceans Discussion**
- **Ecosystem Services**
- **Digital Tools for Assessment (Activity)**
- Frameworks for Ecosystem Services

Defining ecosystem services



What are ecosystem services?

- *“the benefits people obtain from ecosystems”*

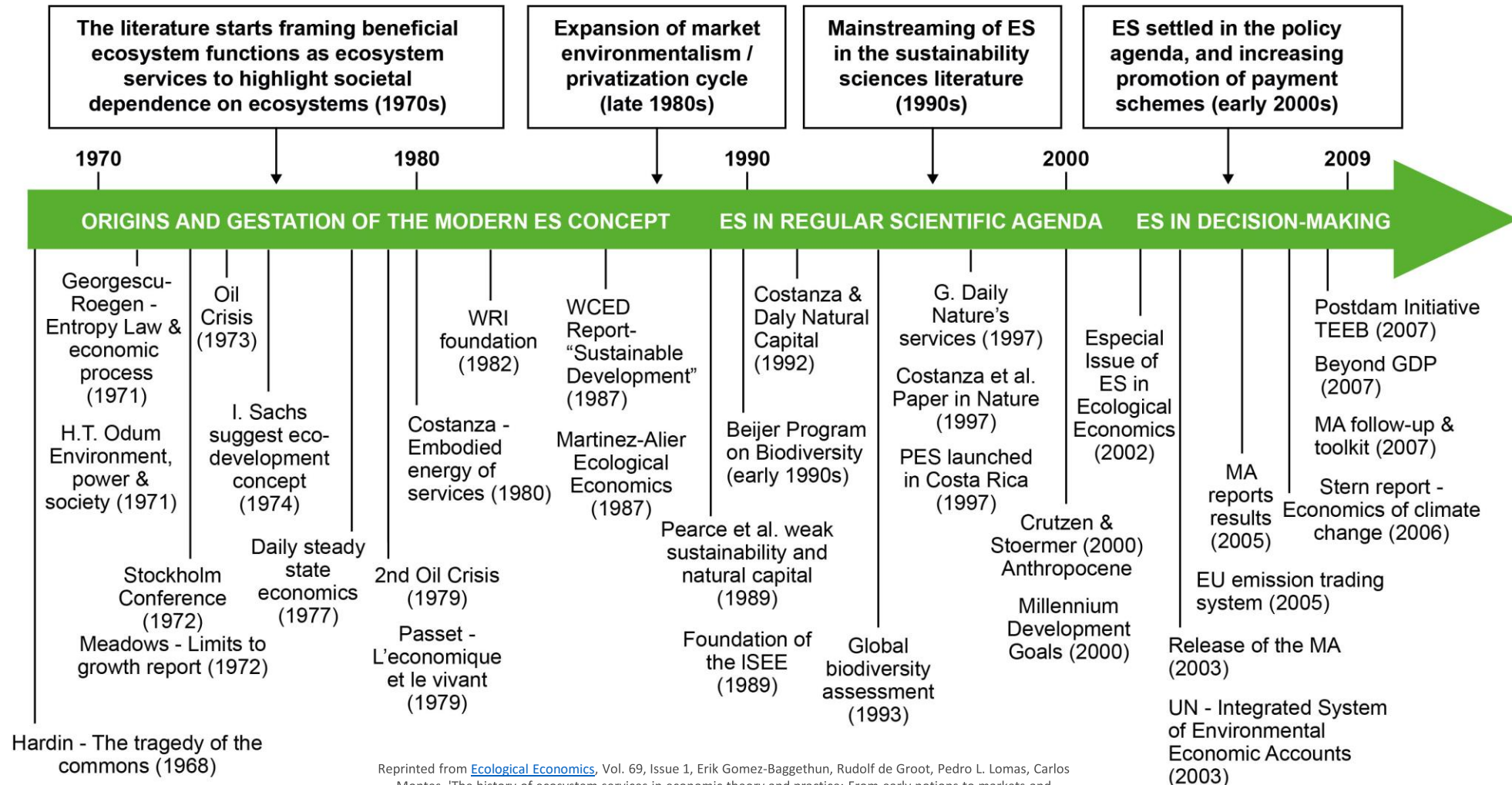
(MA 2005)

Note: that the concept of ecosystem services takes a very anthropocentric perspective



Origin of the Concept of Ecosystem Services

Three stages: (i) Origin and Genesis; (ii) Scientific Agenda; and (iii) Policy Agenda
(Gomez-Baggethun *et al.* 2010)



Millenium Assessment of Ecosystem Services (MA)

- The Millennium Ecosystem Assessment assessed the consequences of ecosystem change for human well-being.
- From 2001 to 2005, the MA involved the work of more than 1,360 experts worldwide.
- Their findings provide a state-of-the-art scientific appraisal of the condition and trends in the world's ecosystems and the services they provide, as well as the scientific basis for action to conserve and use them sustainably.

[Millennium Ecosystem Assessment \(millenniumassessment.org\)](http://millenniumassessment.org)

Millennium Assessment of Ecosystem Services (MA)

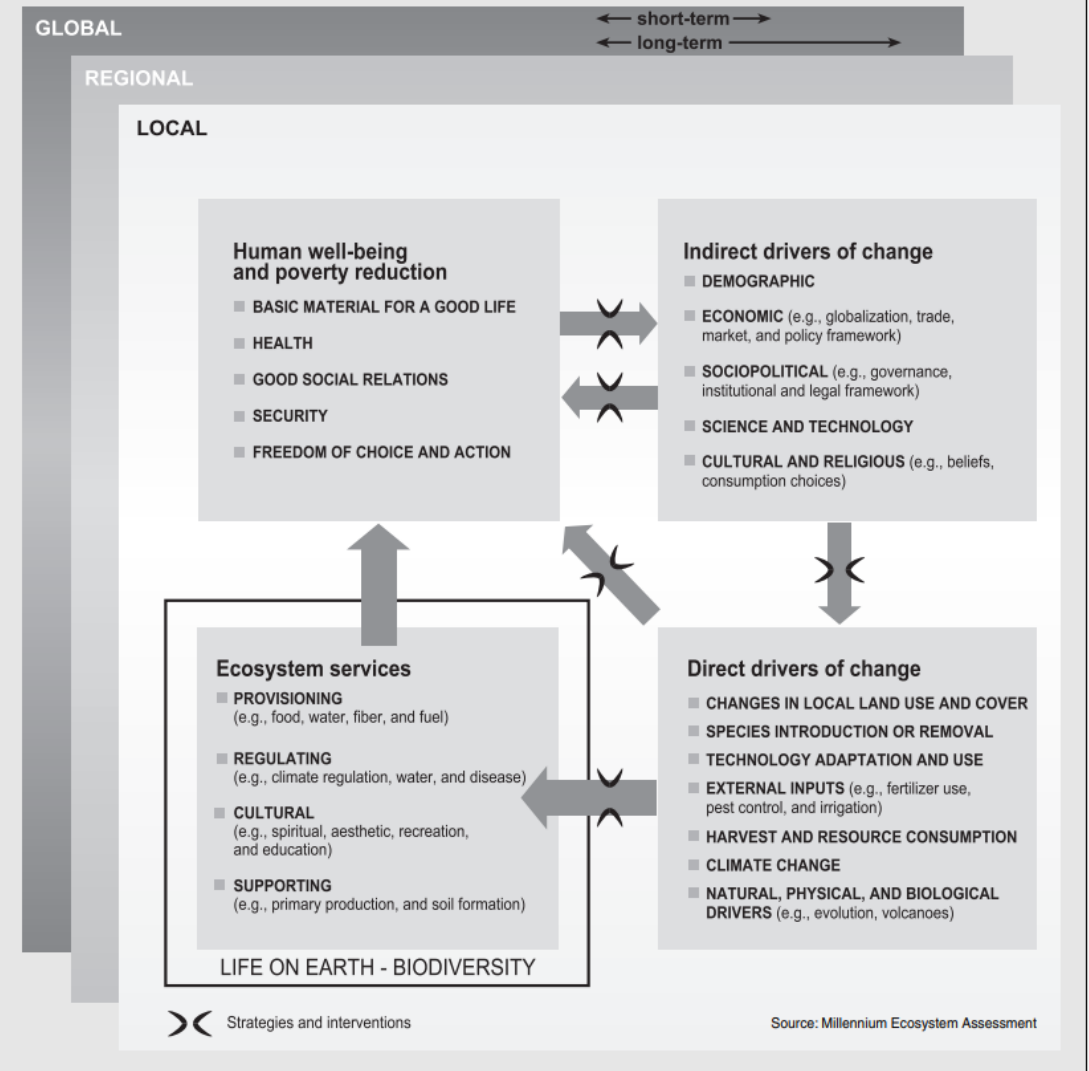
- The MA focuses particular attention on the linkages between ecosystem services and human well-being.
- The assessment deals with the full range of ecosystems—from those relatively undisturbed, such as natural forests, to landscapes with mixed patterns of human use and ecosystems intensively managed and modified by humans, such as agricultural land and urban areas.

BOX 1.2

Millennium Ecosystem Assessment Conceptual Framework

Changes in factors that indirectly affect ecosystems, such as population, technology, and lifestyle (upper right corner of figure), can lead to changes in factors directly affecting ecosystems, such as the catch of fisheries or the application of fertilizers to increase food production (lower right corner). The resulting changes in the ecosystem (lower left corner) cause the ecosystem services to change and thereby affect human well-being.

These interactions can take place at more than one scale and can cross scales. For example, a global market may lead to regional loss of forest cover, which increases flood magnitude along a local stretch of a river. Similarly, the interactions can take place across different time scales. Actions can be taken either to respond to negative changes or to enhance positive changes at almost all points in this framework (black cross bars).



Ecosystem Service categories (MA 2005)

- **Provisioning Services** - food, freshwater, fuel, fibre
- **Regulating Services** - climate and flood regulation, water filtration
- **Cultural Services** - aesthetic, spiritual, educational, recreational
- **Supporting Services** - nutrient cycling, soil formation

N.B. Other categorisations exist, e.g. by Diaz *et al.* (2018):

- Material, non-material and regulating





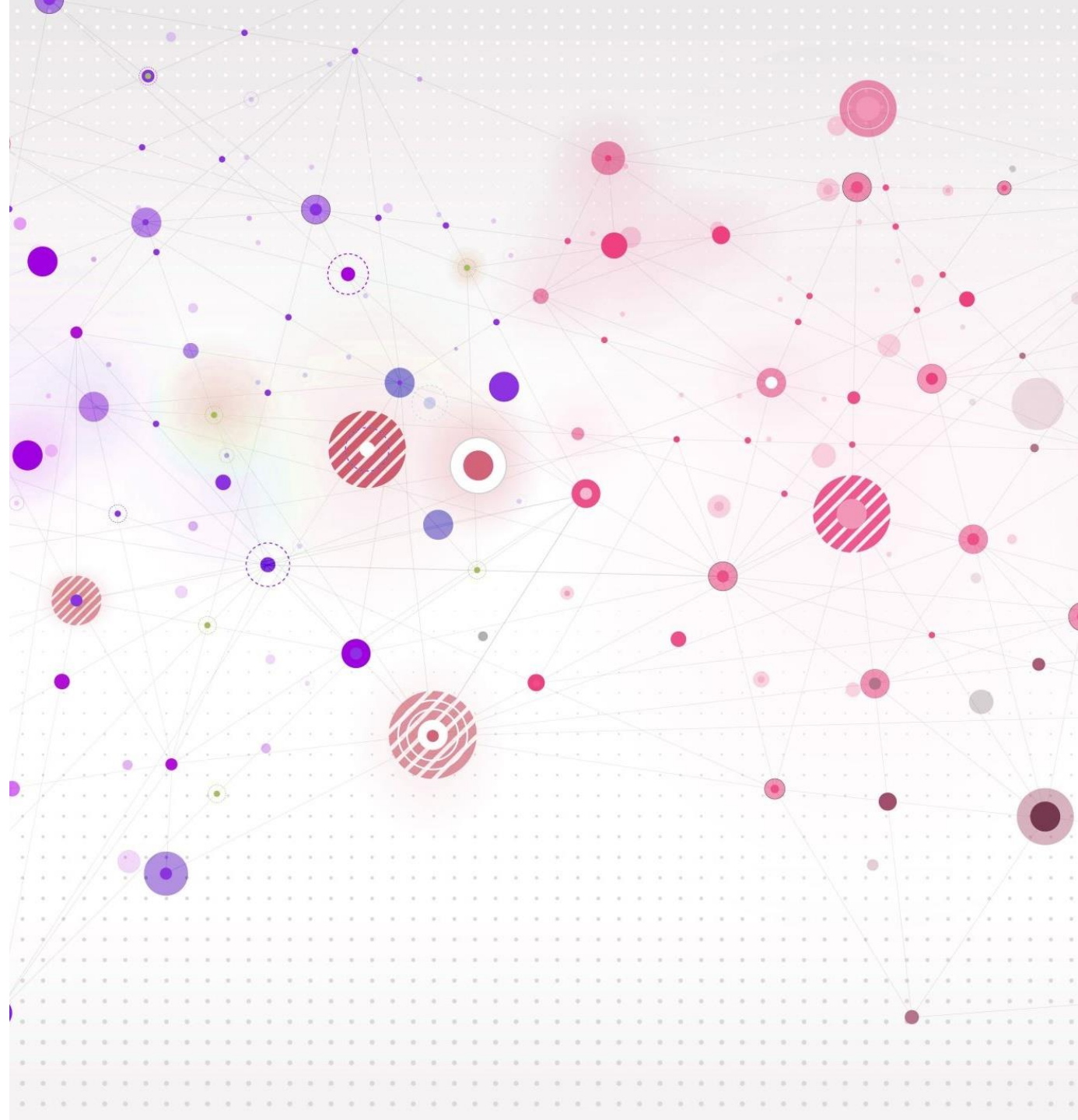
Provisioning Services (MA 2005)

- [Provisioning services](#) are characterised by the ability of humans to obtain products from ecosystems, such as food, water and resources, including wood, oil and genetic resources and medicines.

[Provisioning services | Ecosystem Services & Biodiversity \(ESB\) | Food and Agriculture Organization of the United Nations \(fao.org\)](#)

Regulating Services (MA 2005)

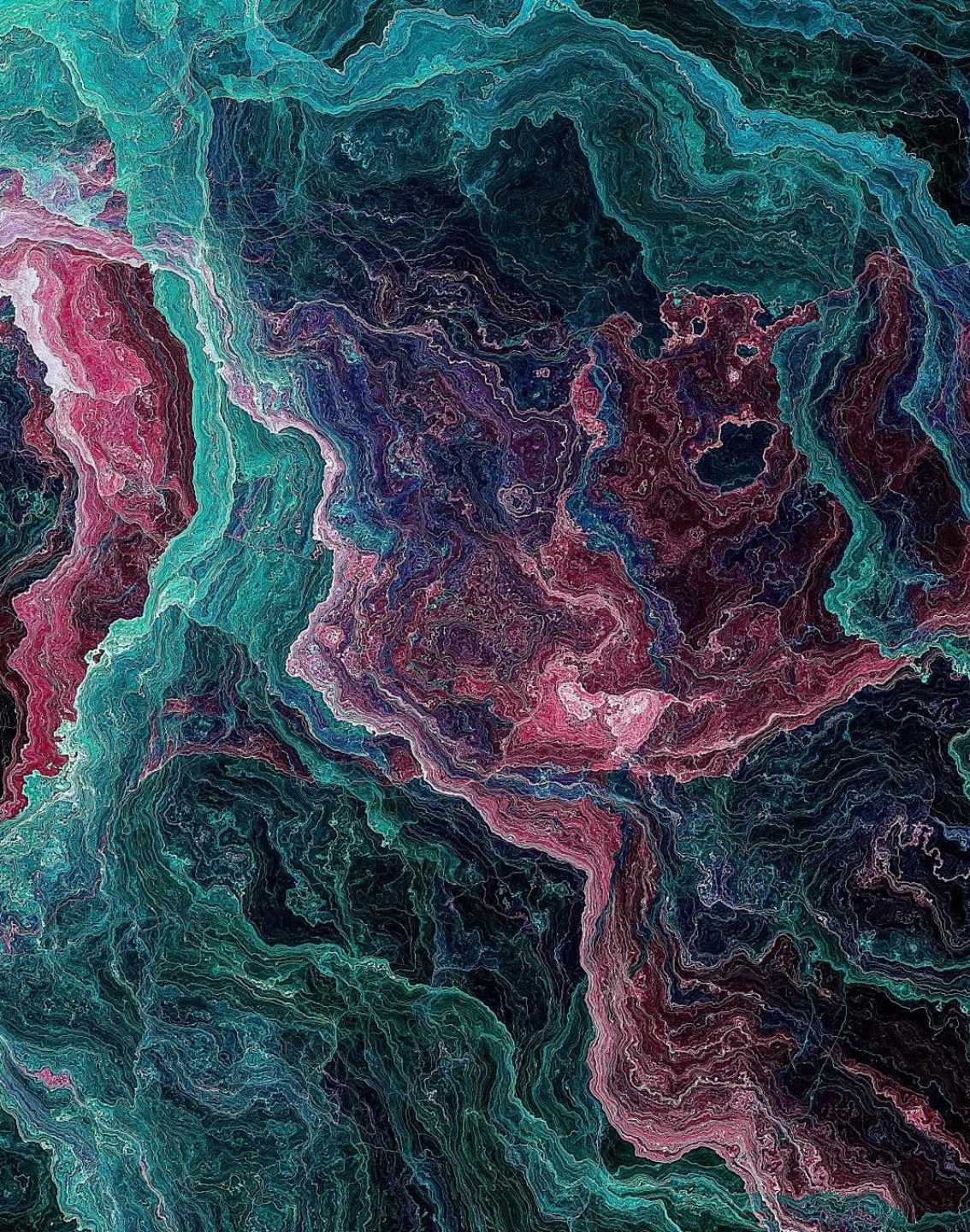
- [Regulating services](#) are categorised as any benefit obtained from the natural processes and functioning of ecosystems. Examples include climate regulation, flood regulation and other natural hazard regulation, pollination, water purification and more. For example, natural water purification services in [Europe are valued at an estimated €33 billion per year](#). Further, pollination by wind and insects is a service that would not be possible without nature, particularly bees, as discussed in [another one of our articles on the climate crisis and bees](#).



Cultural Services (MA 2005)

- [Cultural services](#) include non-material benefits that people can obtain from ecosystems. These include spiritual enrichment, intellectual development, recreation and aesthetic values. These types of services can be hard to monitor and value compared to regulating and provisioning services, but research in this area is growing. For example, [studies have shown](#) that an ability to see or interact with nature, through hospital windows or hospital gardens respectively, increases the speed of patient recovery.

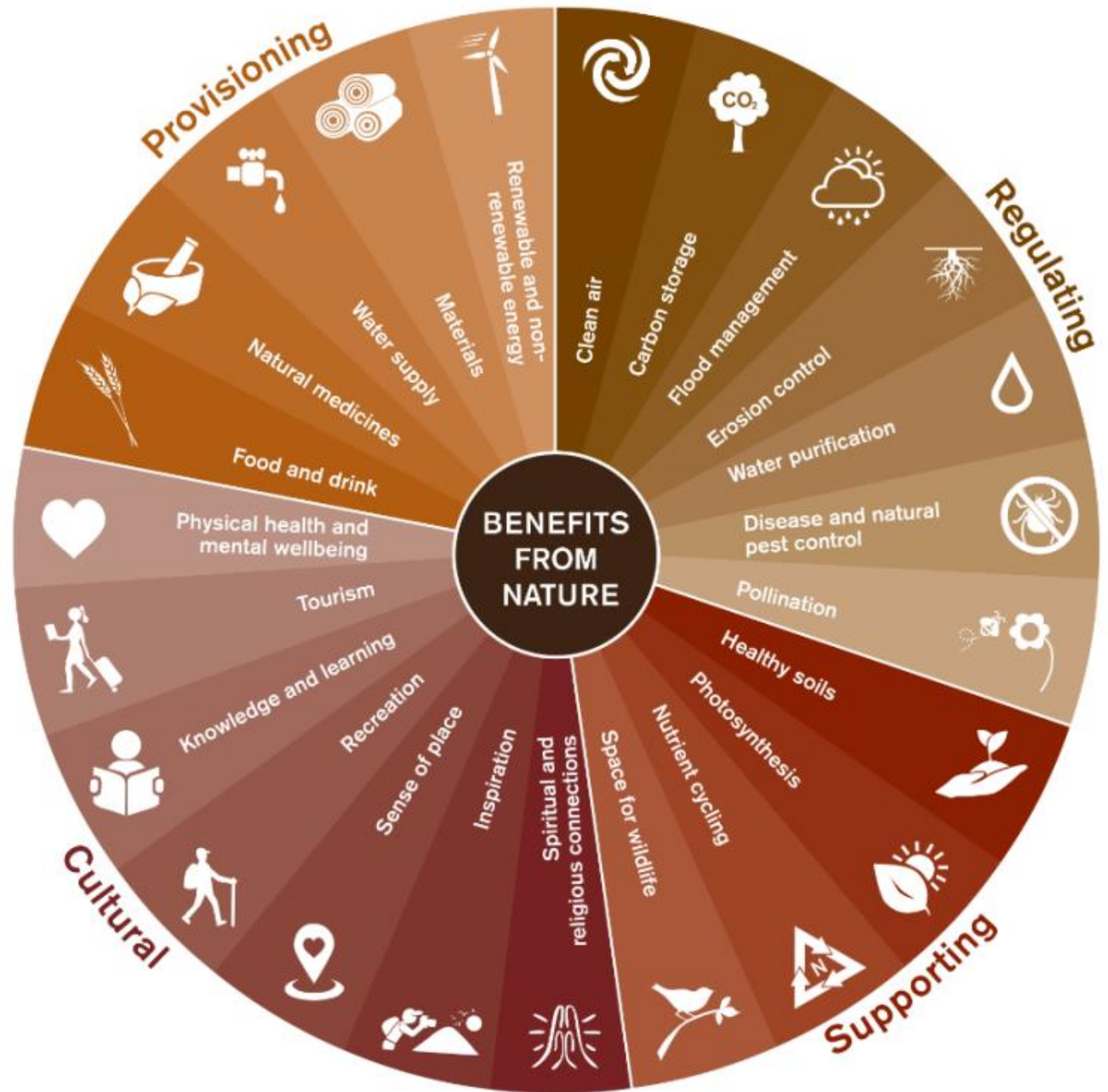




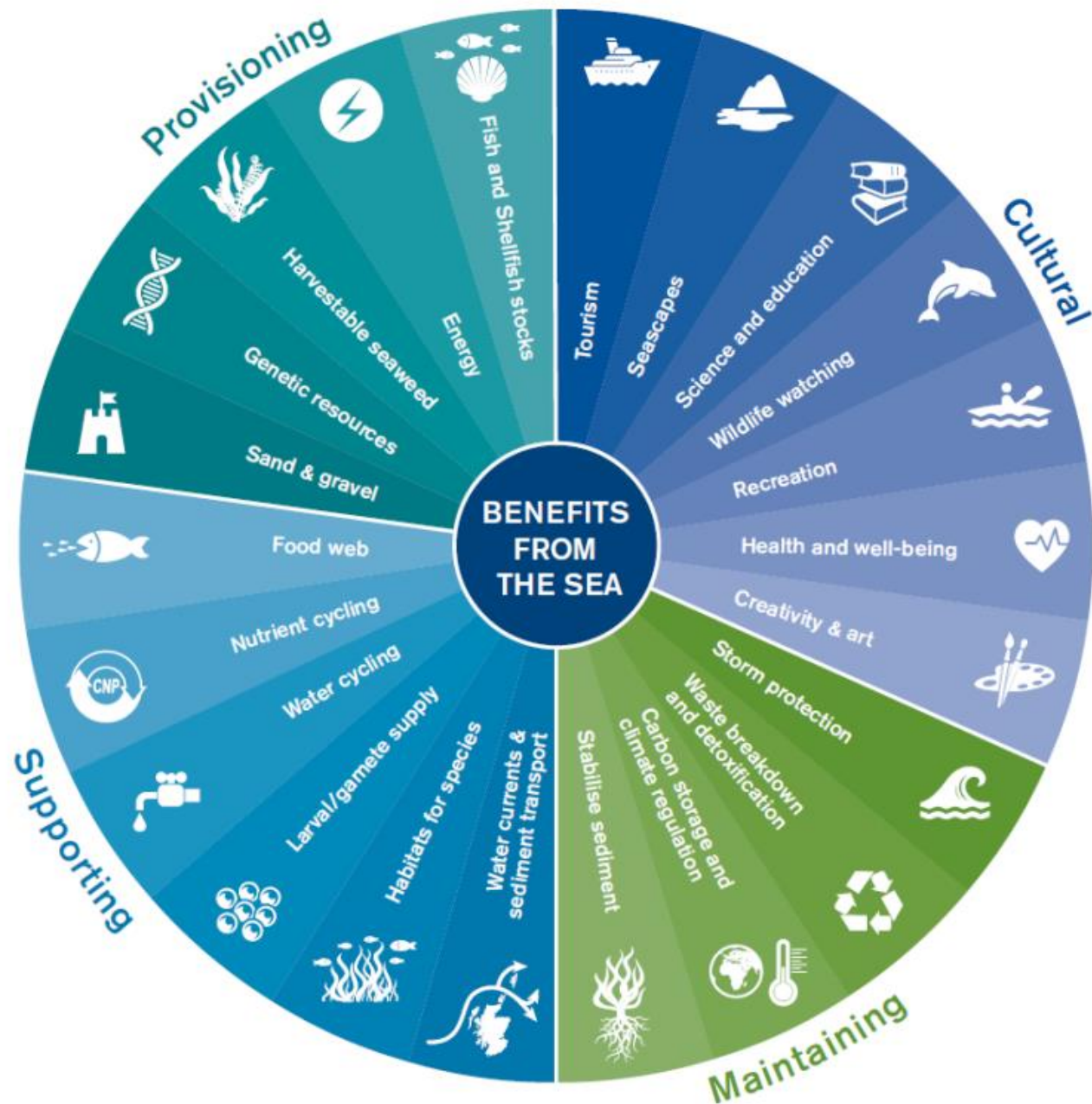
Supporting Services (MA 2005)

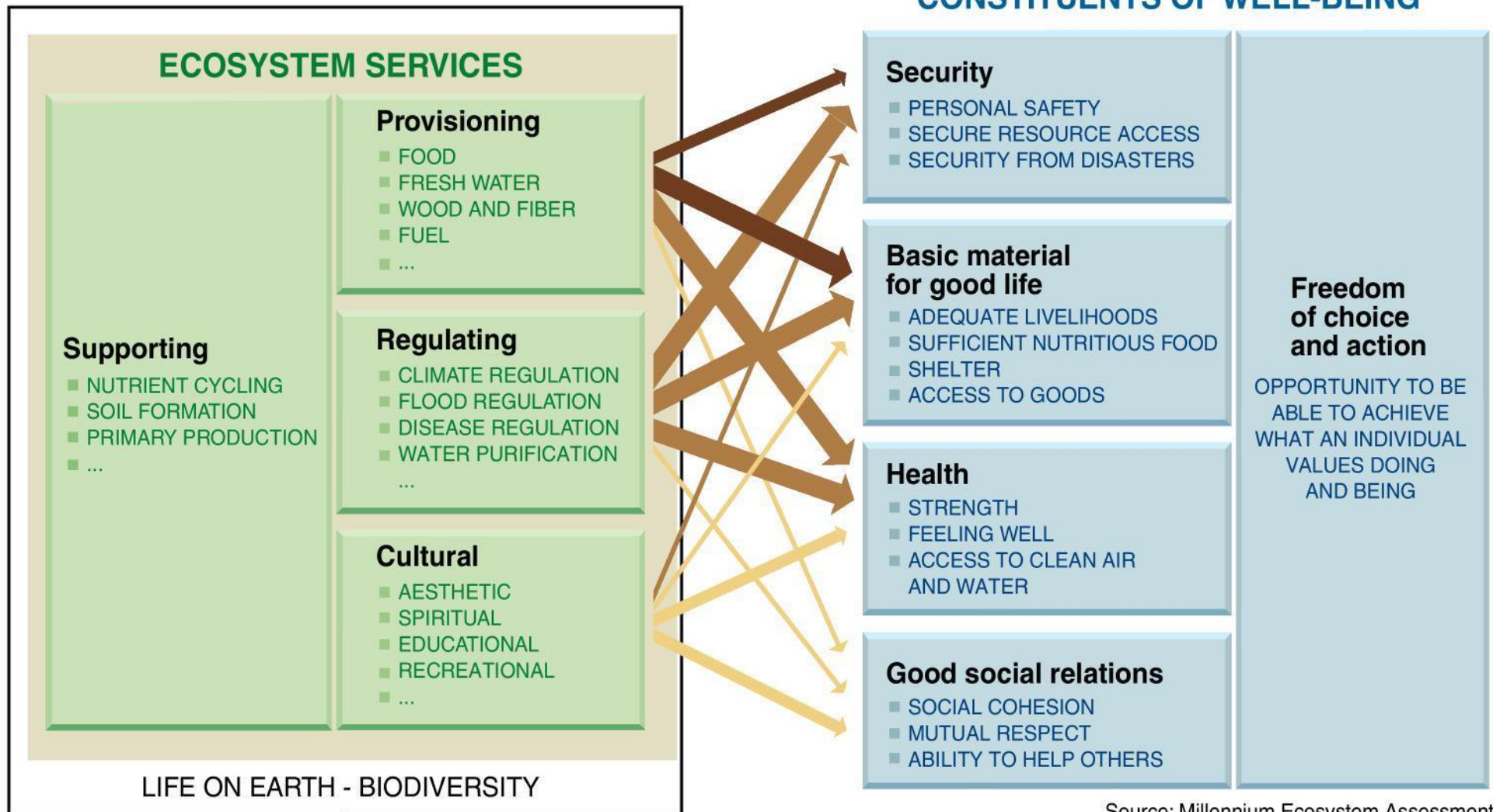
- Finally, [supporting services](#) are those which relate to habitat functioning themselves, and therefore influence survival. For example, photosynthesis, the water cycle and nutrient cycles are the basis of ecosystems, which in turn allow us to support ourselves. This type of ecosystem service also goes down to the genetic level, such as the maintenance of viable species gene pools.

Ecosystem Service categories

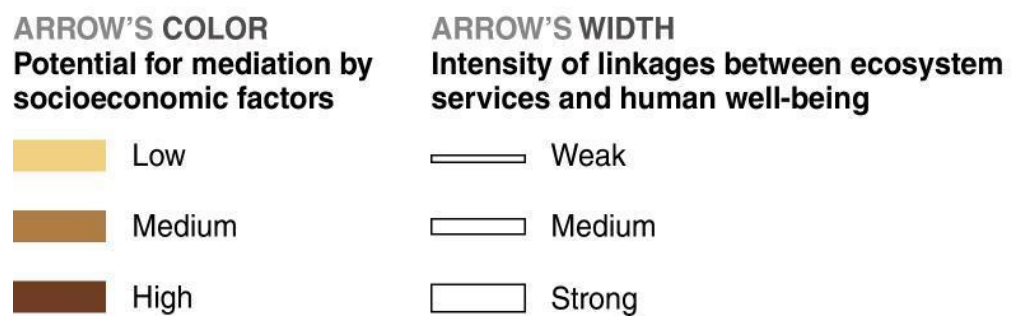


Ecosystem Service categories





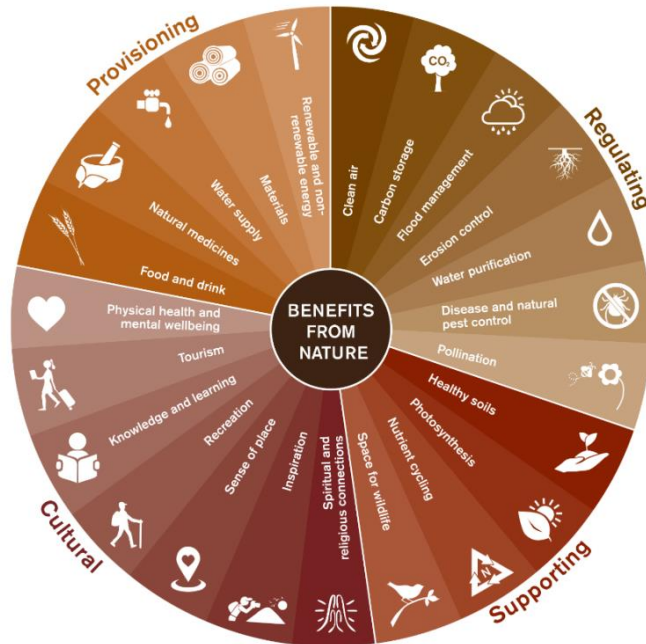
Source: Millennium Ecosystem Assessment





Ecosystems Services Activity

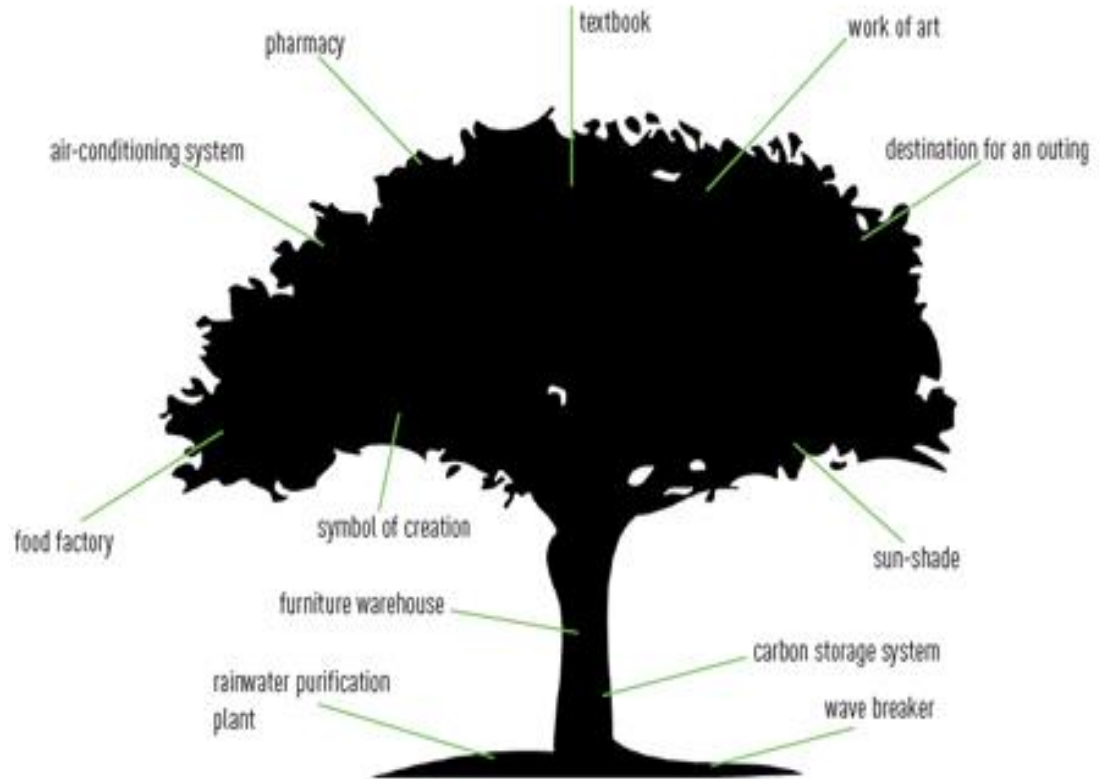
- Choose an environmental aspect from this list:
 - Grasslands
 - Trees
 - Rivers
 - Wildfire
- Create a wheel to demonstrate the provisioning, regulating, cultural and supporting ecosystem services (20mins)



Two main issues

1. **Valuation:** how can we assess the relative value (importance) of various ecosystem services?
2. **Incentives:** how can we provide rewards for providing ecosystem services?

The tree – a service station for human beings



Other digital tools

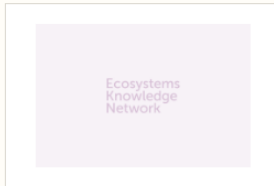


- [Tool Assessor - Ecosystems Knowledge Network](#)
- Tool Assessor is a free service that provides summary information about ways that show the value of the natural environment in society. This includes, for example, the role of natural features in reducing flood risk, improving health and storing carbon.

[All Tools - Ecosystems Knowledge Network](#)

Resources > Tool Assessor > [Expressing values in monetary terms](#)

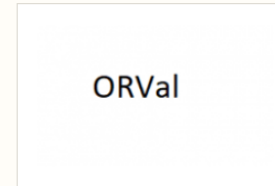
Expressing values in monetary terms



Natural Environment Valuation Online (NEVO) Tool ☆

NEVO is a freely accessible online tool that allows users to select...

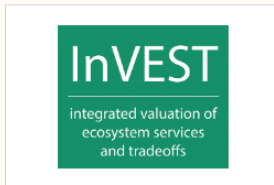
[View tool →](#)



ORVal (Outdoor Recreation Valuation tool) ☆

ORVal is a freely accessible web-based tool that predicts the number of...

[View tool →](#)



InVEST (Integrated Valuation of Ecosystem Services and Trade-Offs) ☆

InVEST (Integrated Valuation of Ecosystem Services and Trade-offs) is a suite of open-source software models for mapping...

[View tool →](#)



i-Tree Eco ☆

i-Tree Eco is a software application designed for urban forest assessment. It uses...

[View tool →](#)



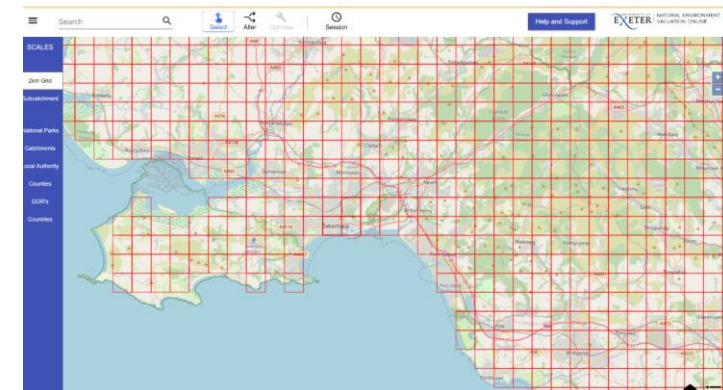
Green Infrastructure Valuation



Co\$ting Nature ☆

ES Digital Activity

- Visit: [Tool Assessor - Ecosystems Knowledge Network](#)
- Choose a tool to explore, summarise its purpose and utility for the group.
- **How is it useful to quantify ES?**
- **What data can you find for Wales or Swansea that can help characterise Welsh ES?**





Merry Christmas

Strategic Wellbeing and
ES (January 10th)
