CLIMATE ACADEMY®
The Scientific Supplement

Chapter Sixteen

The Climate Academy (2) - The Academy

Ecosystem Services

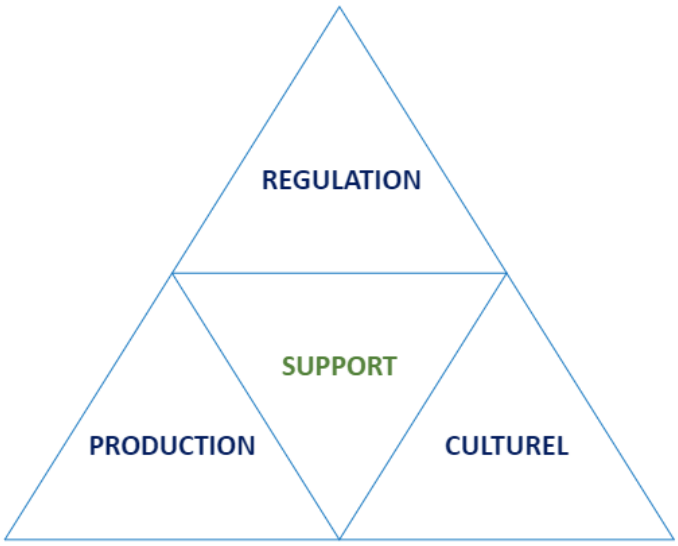
Summary

This supplement explains ecosystem services as the many benefits humans derive from functioning ecosystems. It distinguishes support services, such as nutrient cycling, photosynthesis and soil formation, from the more directly monetisable services of production, regulation and culture. Provisioning services include food, water, raw materials and fuels; regulating services include disease limitation, purification, pollination and erosion control; and cultural services include recreation, beauty, wellbeing and spiritual value. The supplement's strength is that it makes visible how much human life depends on ecological processes that are often ignored or undervalued. At the same time, it hints at the tension in trying to monetise nature, because ecosystems are not simply inventories of useful outputs but complex, interdependent systems. This links well to the chapter's concern with social tipping points: once ecological support functions are weakened, the social and economic consequences can multiply quickly and destabilise human systems as well.

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THE ECOSYSTEMICS SERVICES.

At the dawn of the new millennium, a new concept leaves the confidential circles of scientific research and appears in the environmentalist lexicon for the public: that of ecosystem services. While it is customary to generally define these **ecosystem services** as the benefits that humans can derive from the functioning of ecosystems, many studies agree to identify four main categories [(1)]:



The first of these corresponds to the so-called **support or support** service**.**

Within this category, nothing is directly beneficial to human society, but all biological, geological and climatic functions are grouped together because they provide the necessary conditions for the development of life and therefore ecosystems. The biogeochemical cycles of nutrients, plant photosynthesis allowing primary production, soil formation etc... are the main ecosystem support services.

Representation of ecosystem services

The following 3 ecosystem services correspond to functions that can actually be monetised.

- Thus **production** or supply services include the production of food, textiles, water, various raw materials such as wood, fossil fuels, etc.

- **Regulatory** services represent all the global mechanisms, for example, to limit the spread of infectious diseases, to purify water, soil or air, to ensure pollination, or to regulate erosion phenomena.

- Finally, the last category of ecosystem services consists of intangible benefits such as the enjoyment of aesthetic and recreational natural spaces or the possibility of having areas of well-being. These **cultural** services are also spiritual and religious.

The services have the merit of clearly identifying the subject matter of the study. For when it comes to ecosystems, the interactions that exist between their constituent elements (abiotic factors and biotic factors) make the delimitation of the roles and functions of each of them very complex.

In addition, in the context of a globalised economy, the definition of ecosystem services offers the possibility of assigning monetary value to these natural functions. It must be recognised, however, that the assessment of economic value raises many questions and is subject to considerable disparities according to the authors of this work.

It was in 1997 that a publication in *Nature* proposed for the first time an estimate of the monetary value of all ecosystem services. The same research team led by R. Costanza repeated the work in 2014 and thus proposed an update of the estimates made 17 years earlier. [(2)]

[(1)] Hautereau-Boutonnet, M., & Truilhé-Marengo, E. (2017). Quelle(s) valeur(s) pour la biodiversité ? / sous la direction de Mathilde Hautereau-Boutonnet et Ève Truilhé-Marengo.

[(2)] Costanza, R., De Groot, R., Sutton, P. C., Van Der Ploeg, S., Anderson, S., Kubiszewski, I., Farber, S., & Turner, R. C. (2014). Changes in the global value of ecosystem services. Global Environmental Change-human and Policy Dimensions, 26, 152-158.

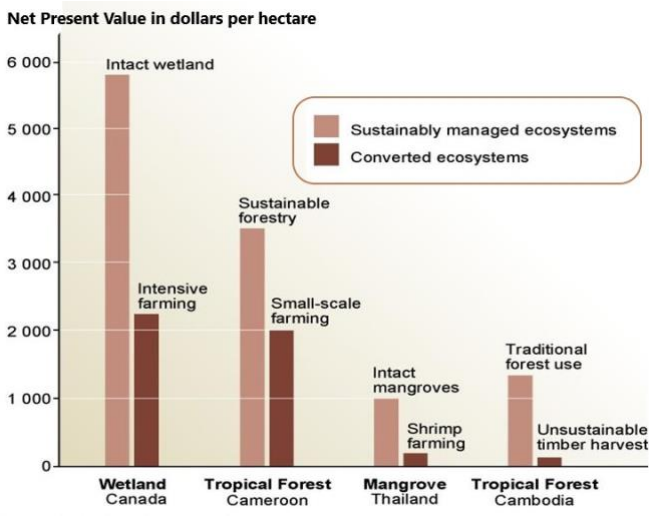
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The 1997 study considered at the time 17 different ecosystem services present in 16 biomes. The authors resulted in an estimate of $33 trillion (thousands of billions) for 1995. When they were updated, they showed an increase of more than 170 % of this value. Indeed, for 2011, they reached the dizzying sum of 125 trillion dollars. Recognising, however, that the accuracy and reliability of the data available in 2011 were far greater than those available in 1995, the authors forced themselves to make more accurate comparisons, taking into account in particular the evolution of the areas of the 16 biomes.

By including this latter parameter, the authors concluded that if the 2011 ecosystems had operated in the same way as in 1995, then they should have generated a value of $145 trillion, or 20 trillion more than what they actually produced.

In other words, the $20 trillion represents the value of the annual environmental degradation between 1997 and 2011!

BIOMES		**SURFACES** *Million hectares*			**UNIT MONETARY VALUES** *2007 $ /hectare/year*		
		1997	2011	Evolution	1997	2011	Evolution
Marine Ecosystems		**36 302**	**36 302**	**0**	**796**	**1 368**	**572**
High seas	1 High seas	33 200	33 200	0	348	660	312
Coastal	2 Estuaries	180	180	0	5 592	8 944	3 352
	3 Seaweed Fields	200	234	34	31 509	28 916	—2593
	4 Coral reefs	62	28	— 34	8 384	352 249	343 865
	5 Plateau	2 660	2 660	0	2222	2222	0
Terrestrial Ecosystems		**15 323**	**15 353**	**0**	**1 109**	**4 901**	**3 792**
Forest	6 Tropical	1 900	1 258	—642	417	3 137	2 720
	7 Boreal temperate	2 955	3 003	48	321	4 166	3 845
herbage	8 Pasturing	3 898	4 418	520	20 404	140 174	119 770
Wetlands	9 Marais, mangroves	165	128	—37	13 786	193 843	180 057
	10 Tideages	165	60	—105	27 021	15 681	—1 340
Lakes, rivers	11 Lakes and rivers	200	200	0	11 727	12 512	785
Desert	12 Desert	1 925	2 159	234			
Tundra	13 Tundra	743	433	—310			
Glaciers	14 Ice, rocky	1 640	1 640	0			
Cultures	15 Cultures	1 400	1 672	272	126	5 567	5 441
Urban	16 Urban	332	352	20		6 661	6 661



The table shows that the degradation of tundra and rainforest in favour of agricultural areas does not generate a significant monetary gain

In other words, sustainably exploited natural ecosystems are more economically productive than when converted by humans. [3]

Today the historical study of Costanza and his team is mainly recognised for being the first to quantify the value of ecosystem services. They have thus contributed to strengthening the need to protect all biomes, in order to guarantee humanity a future.

[3] Herrick, J. E. (2016). Unlocking the Sustainable Potential of Land Resources: Evaluation Systems, Strategies and Tools. UNEP.

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Nevertheless, this and many others, which have followed it, highlight the intrinsic characteristics of ecosystem services: they are inherently **utilitarian** and they are based on an **anthropocentric** vision of Nature. They tend to consider ecosystems only through the prism of the benefits that humans can derive from them, while ignoring the inherent "value" of ecosystems.

Undoubtedly, the growing reservations against this divisive vision explain why IPBES refers to the term 'contributions of nature to human well-being' rather than 'ecosystem services'.



Indeed, in the 2019 report [4], reference is made to various contributions of nature to human well-being. We can thus monitor the evolution of these contributions over the past 50 years and note that supply services (framed in red) often progress to the detriment of cultural and regulatory services.

[4] Le rapport de l'évaluation mondiale de la BIODIVERSITÉ ET DES SERVICES ÉCOSYSTÉMIQUES. (2019). IPBES. https://www.ipbes.net/sites/default/files/2020-02/ipbes_global_assessment_report_summary_for_policymakers_fr.pdf

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