



A research project
on impacts of climate change
and land use change in
Amazonia

Factsheet

Issue 6
December 2013

Amazonian ecosystem functions and services and their drivers of change

We identified and contrasted ecosystem services definitions and how these have been used, interpreted, or differentiated when it comes to the Amazonia. We distinguished between the ecosystem services and the benefits they provide, considering both local and regional stakeholders. We highlighted the main ecosystem services of the Amazonia and identified the sort of threats associated with them.

AT A GLANCE

- *Climate regulation and water supply at different scales are relevant services since vegetation is closely related to energy and water fluxes between the land surface and atmosphere³.*
- *Ecosystem services differ from benefits because the latter require other forms of capital⁴.*



Amazalert team discussion about ecosystem functions and services of the Amazonia (workshop October 5th, 2011). Foto: G. Tejada

The ecosystem services concept has been widely used in the last years; however, there is still a wide scientific debate about its interpretations, definition, classification systems, framework, and use at different scales (Hein et al. 2006; Fisher et al. 2009).

The most commonly accepted definition and classification is proposed by the Millennium Ecosystem Assessment (MA 2005), which defines ecosystem services as the benefits people obtain from ecosystems, including provisioning, regulating, and cultural services that directly affect people and the supporting services needed to maintain other services. However, the perception of the benefits of ecosystem services could be different when taking into account local, biophysical, and ecological conditions, as well as the social, economic, and cultural context (Hein et al. 2006; ESPA-AA 2008; Fisher & Turner 2008).

Ecosystem services and benefits perception

The concept of ecosystem services has evolved towards more operational definitions for decision making. Today, this conceptual evolution has made it possible to differentiate between ecosystem services and benefits. The benefits materialize at moment when human well-being becomes directly affected and they can result from one or more ecosystem services and different production factors.

Boyd & Banzhaf 2007; Fisher & Turner 2008; Fisher et al. 2008, 2009, have made an interesting distinction between ecosystem services and the benefits that come from them: ecosystem services are ecological in nature and differ from benefits because the latter require other forms of capital (human, social, and others).



Noel Kempff Mercado National Park, Bolivia . Foto: R. Perez-FAN.

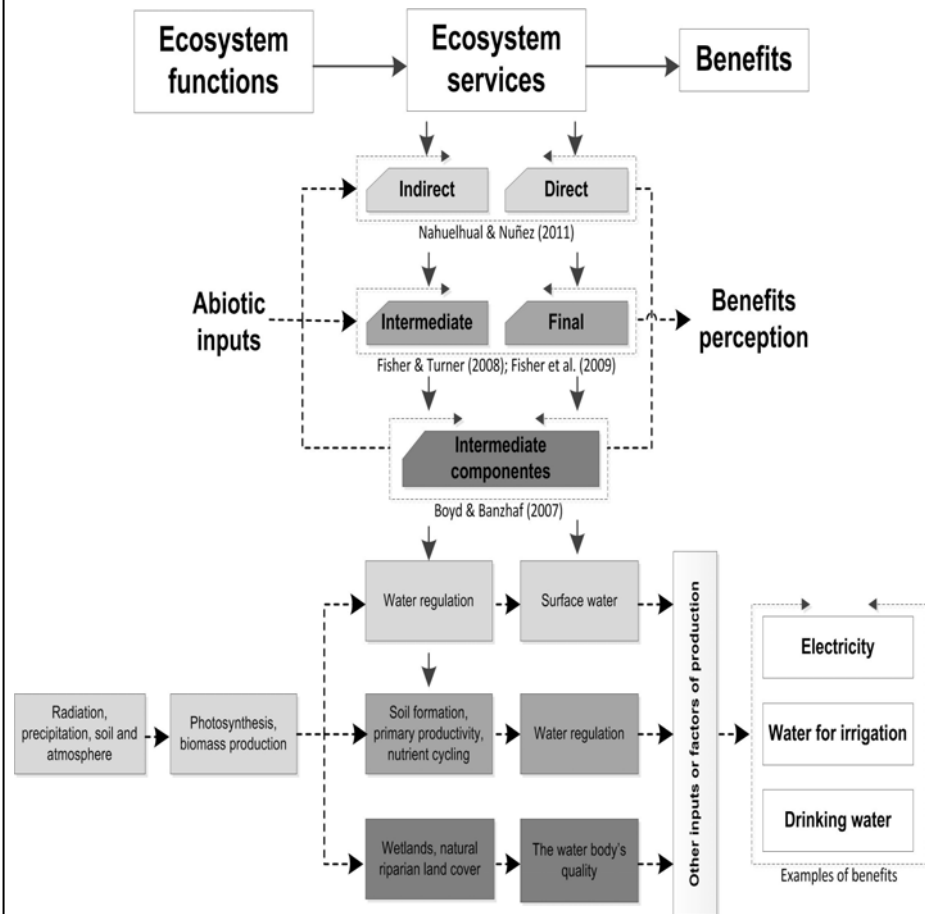
- Carbon sequestration is a global service derived from forests as they remove large quantities of atmospheric CO₂¹.
- Due to deforestation and climate change, Amazon ecosystems and the services and benefits that come from them are at risk^{3, 5}
- About 80% of the deforestation in the Amazon has occurred within 30 km of a paved road².

Rio Grande, Bolivia . Foto: E. Sanchez-FAN.



In addition , Boyd & Banzhaf (2007) and Nahuelhual, & Nuñez (2011) make the distinction between end-products or final services, intermediate products or components, and benefits. Final services or end products of nature are not benefits or final products consumed because they need one or more ecosystem services and production factors (infrastructure, information, etc.) to generate the benefit.

Figure 1. An example based on the water cycle to make the distinction between ecosystem services, intermediate processes and benefits



Main ecosystem services in the Amazonia and drivers of change

Amazonia is the largest tropical rainforest in the world, which represents a potential area for carbon sink with relevance at regional and global scales. The main ecosystems services identified by literature reviewed and AMAZALERT team are: water supply, fishing, carbon storage, climate regulation, providing living space to wild plants and animals, and protection of biodiversity. Among these, protection of biodiversity is the ecosystem service highlighted as the most important by the AMARALERT team.

The key drivers of change identified for this region are land use change and climatic change. The first one related to deforestation and large-scale degradation of tropical rain forest through large scale agriculture production and infrastructure following by slash and burn, wood industry (legal and illegal) and cattle ranching. The second driver is climate change, that involves the possibility of droughts and forest die-back. However, deforestation poses a more direct threat, and may interact with climate change through various feedbacks processes such as fire.

- *The extension of indigenous territories and protected areas represents almost 45% of Amazonia*¹³.
- *Indigenous territories are functioning as the main barrier to deforestation in Amazonia*¹².



Comunidad cero ocho, Beni Bolivia . Foto: D. Quiroga-FAN

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The role protected areas and indigenous territories in the preservation of the Amazon ecosystem services

Indigenous territories and protected areas could be the last reservoirs of pristine forests (and the benefits that comes with them) as well as refugees for biodiversity threatened by accelerated land use change. The extension of indigenous territories and protected areas represents almost 45% of Amazonia (RAISG 2012). Besides, indigenous territories occupy much more territory than national parks or other categories of protected areas and, in general, are located in the proximity of intense intervened areas.

Local people are the most vulnerable to changes in the provision of ecosystem services, due to the high interdependency between them and the natural ecosystems (Finer et al. 2008, ESPA-AA 2008). If ecosystem services benefits are perceived at a local scale, protected areas and indigenous territories can play a fundamental role on amazon conservation.

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