

How many more dams in the Amazon?



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HIGHLIGHTS

- The Amazon basin is an ecosystem of megadiversity.
- The demand for energy threatens this ecosystem.
- Climate, water, forests and floodplain interacts in the Amazon basin.
- Dams in the Amazon basin will impact the hydrological and biological systems.
- Ecohydrological principles and ecological engineering technology are necessary.

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ABSTRACT

The Amazon watershed harbors a megadiversity of terrestrial and aquatic plants and animals. Mechanisms that sustain this biodiversity are the water level fluctuations the fluvial dynamics and the intense gene flux due to permanent integration of climatological, geomorphological and biological components of the system. The construction of hydroelectric reservoirs to support economic development of Brazil and other countries that share the Amazon basin will interfere with the ecological dynamics of this ecosystem changing the hydrological, hydrosocial and fundamental processes. Furthermore the construction of Andean reservoirs can disrupt the connectivity with the lower Amazon ecosystem. Principles of ecohydrologies, ecological engineering and preservation of key river basins, have to be applied in order to optimize energy production and promote conservation practices. Long term planning and integration of countries that share the Amazon basin is a strategic decision to control and develop the hydropower exploitation in the region.

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1. A short review on the Amazon ecosystem dynamics

The dynamic character of the interactions between the terrestrial and aquatic ecosystems in the Amazon Basin and the fluctuating conditions as a result of low and high water levels, is the main factor that turns this basin as an “active center of evolution” (Sioli, 1984; Margalef, 1997). The permanent integration due to the inundation pulse, promotes several dynamic exchanges between the geomorphology, the hydrological cycle and the biota. Isolation of lakes during low water and mixing in the flooding period increase the gene flux and therefore are of high importance for the adaptive radiation and biodiversity. Spatial scales of heterogeneity

that promote biodiversity are all represented in the Amazon basin during low water and high water (Junk, 2000; Jorgensen et al., 2012). The Amazon basin is also a key component of the global carbon cycle storing approximately 120 billion metrics tons of carbon in the biomass.

The extension of the seasonally inundated forests, the tidal forests and the aquatic macrophyte stands promote a high diversity of habitats and substrates in a spatial scale of more than 2000 km as show by Barthem and Goulding (2007).

The fisheries grounds of commercial importance are associated to the high biological production of the floodplain and the estuary of the Amazon. The white water or black water rivers sustain the productivity of the floodplain and the fisheries, of several species of commercial interest that maintain populations of villages and large cities. The total value of fisheries in the Amazon basin is approximately US\$ 200 million annually, for a work force around 200,000 fishermen. Figs. 1 and 2 show the extension of the area

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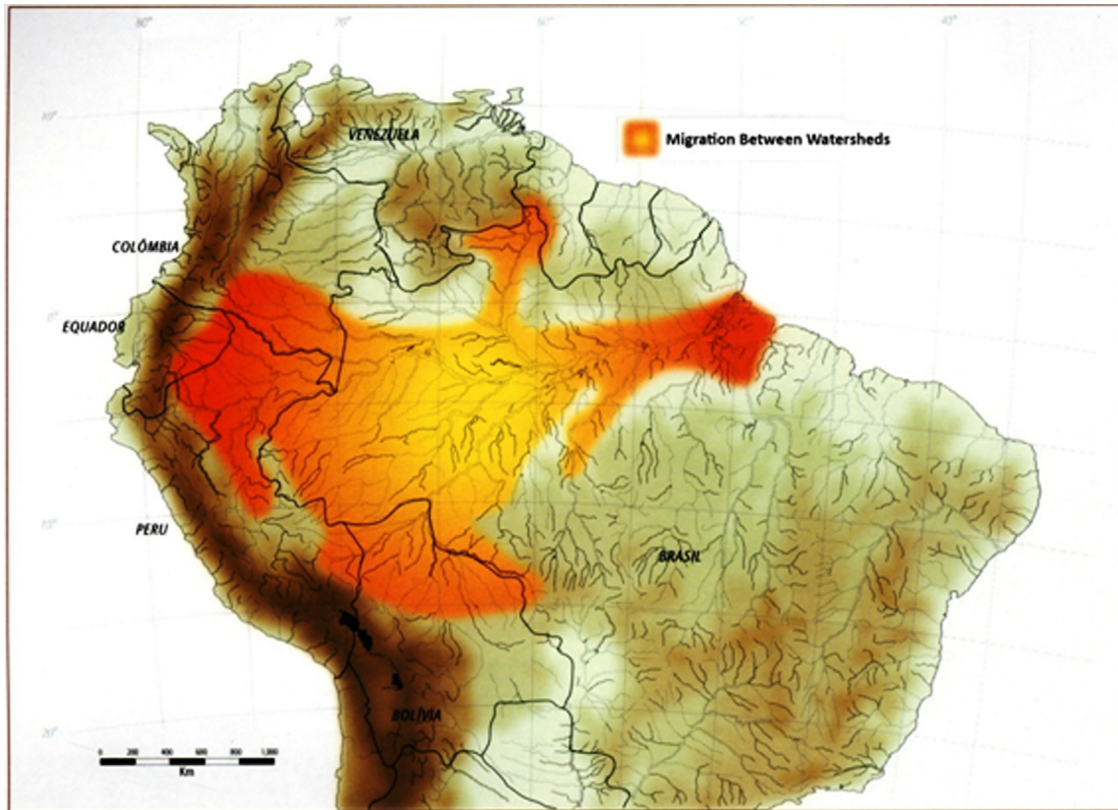


Fig. 1. Area of migration of commercial fishes in the Amazon (Barthem and Goulding, 2007).

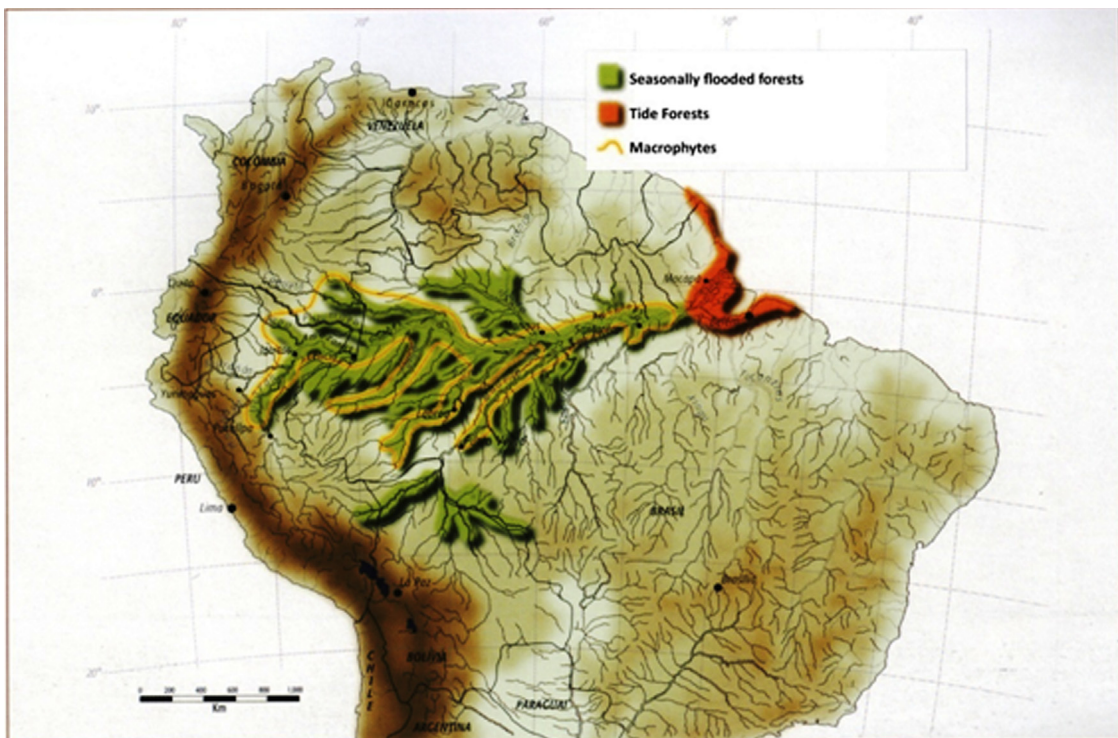


Fig. 2. Extension of seasonally inundated forests, tidal forests, macrophyte stands. (Barthem and Goulding, 2007).

used by the main commercial species of fishes in the Amazon, the inundated forest and aquatic macrophytes associated to the fisheries (Barthem and Goulding, 2007).

Therefore the integrity of the hydroregime that sets up the ecological dynamics of the Amazon watershed is of fundamental importance to maintain this unique ecosystem in the planet

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