The Amazon Basin

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Introduction

The Amazon Basin is the largest drainage basin on the planet with an area of approximately 6.1 million km$^2$; it is located within seven South American countries, Brazil, Bolivia, Peru, Colombia, Ecuador, Venezuela, and Guyana. It is home to the Amazon River, which starts in the Andes Mountains, and drains into the Atlantic Ocean (through Brazilian territory) with an average annual flow of 209,000 m$^3$/s, which represents around 15% of the fresh water entering the oceans each day. It is also home to the largest rainforest in the world.

Background

The Amazon Basin is not a cause of major dispute between the countries that occupy it, partly because 69% of its territory belongs to Brazil (3.85 million km$^2$). The Amazon River, in its majority, is located in Brazilian territory until reaching the Atlantic Ocean, thus Brazil can exploit its water resources without limiting other countries’ use of them.

Even though most of the Amazon Basin is located in Brazil, agreements exist between the seven countries to protect it. One of these treaties is the Treaty for Amazonian Cooperation (TCA). This treaty was signed between the seven countries mentioned above plus Suriname, since it is part of the Amazon Region/Dominion, but not the basin itself. The treaty emphasises the need to improve the quality of life of the Amazonian people, and the importance of preserving the natural environment of the region at the same time that economical development takes place.

The Amazon Basin has an extremely interesting hydrological cycle that controls the local climate, which is able to sustain all the biodiversity within the region, as well as controlling the climate globally. This water cycle is mostly due to the Amazon’s topography.
The Amazon Basin acts as a water vapour sink for the moisture coming from the Atlantic Ocean. The humid air produces precipitation, and convective clouds with large climatic variability within regions, for example the north-western part of the Amazon obtains the maximum precipitation with no dry season, while the Atlantic coast of the Amazon presents another precipitation maximum with dry season periods from September to November.

**Issues**

Preserving the hydrological cycle in the Amazon Basin is important for the biodiversity of the area, the local climate, and the continuing use of its water resources. Unfortunately, it has been threatened by human induced activities, the most important of which are deforestation, and climate change.

Deforestation does not only consist of cutting down trees, but also the burning of their respective biomass. Depending on its spatial distribution, deforestation might provoke irreparable damage in the Amazon water cycle, which may include local climatic impacts, as well as climatic impacts in areas far from the Amazon.

When forests are removed, the retention of humidity of the soil decreases which facilitates the evaporation of the water from the soil, previously retained, and shifts the water balance. This shift brings an increase of temperature, and albedo. Removing forests also results in a decrease in humidity in the atmosphere, as well as leaving behind bare soil that will be more susceptible to erosion.

Large-scale deforestation in the Amazon could lead to a decrease in superficial drainage, an increase in surface temperature, and prolonged periods of drought, which will in turn affect the regional water cycle. Unfortunately, changes in the hydrological cycle are not
the only reason for concern; pollution of the Amazon Basin by chemicals such as mercury can be also related to deforestation.

Climate change has some consequences in the region, such as change in streamflow, increasing drought intensity and occurrence, and increasing temperature. All of these changes induced by climate change might have an impact in the Amazon Basin hydrological cycle. Warmer global climates might also lead to more instances of climate patterns, such as El Niño, which will manifest in the Amazon as extensive periods of drought.

Climate change might also affect other aspects of the Amazon Basin, such as biodiversity, agriculture, and health.

**Conclusion**

The Amazon Basin represents around 40% of the rainforests in the world. Thanks to its hydrological cycle it is able to support a vast amount of biodiversity, as well as sustain human activities. In order to maintain it this way responsible utilisation of its natural resources needs to be employed.

Unfortunately, lack of data makes it difficult to accurately predict the changes in the Amazon Basin due to climate change and deforestation. As regional data becomes more available predictions of change in the Amazon basin will become more accurate.

**Required Reading**


**Supplemental Reading**


**References**


Case, Michael. Climate Change Impacts in the Amazon: Review of scientific literature. WWF Climate Change Programme.


