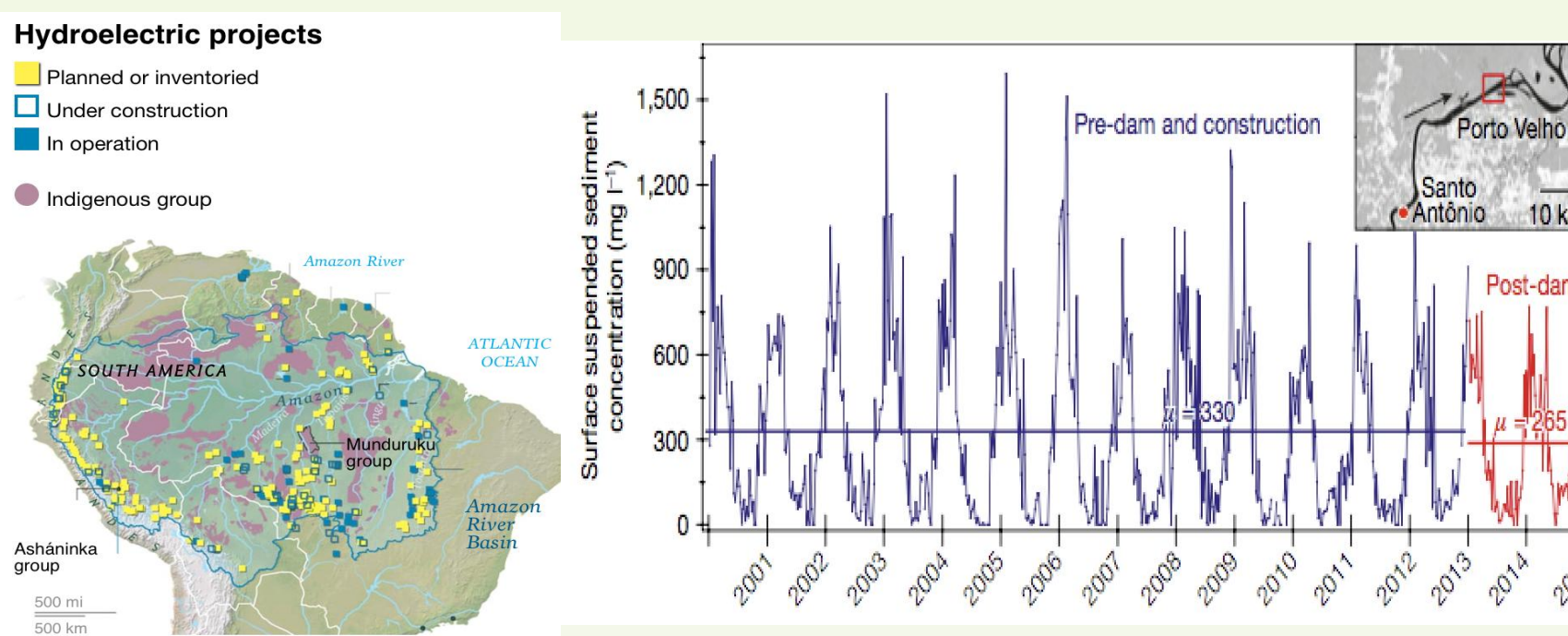


Role of Dams in Depleting Nutrients from the Sediments in the Amazon River

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TOHS AP Research STEM

Introduction

Dams create hydroelectric power by converting kinetic energy from water flow to electrical energy. This is generally thought to be an environmentally friendly means of energy production by limiting the release of fossil fuels. However, dams have potential serious detrimental effect on river ecology that must be considered as well. Currently the number of proposed large-scale dams outnumber existing large-scale dams by a factor of three to one. Dams stop essential nutrient-rich organic sediment from traveling downstream and interfere with the equilibrium of the river.



Research Question

Do dams decrease sediment concentrations downstream leading to increased acidification and release of methane?

Hypothesis

Alternative: Dams decrease the nutrients in the river water Amazon Basin
Null: Dams have no effect on river sediment

Purpose

Identify the effects of Hydropower on sediments in the Amazon River and to research the role sediments play in the Amazon River.

Methods

Research was obtained through systematic lit review, through public publishing of peer-reviewed journals and articles. Research Engines such as Google Scholar, Ebscohost, Nature, and mentors with a Phd were used to collect papers published between 2007 and 2018.

Results

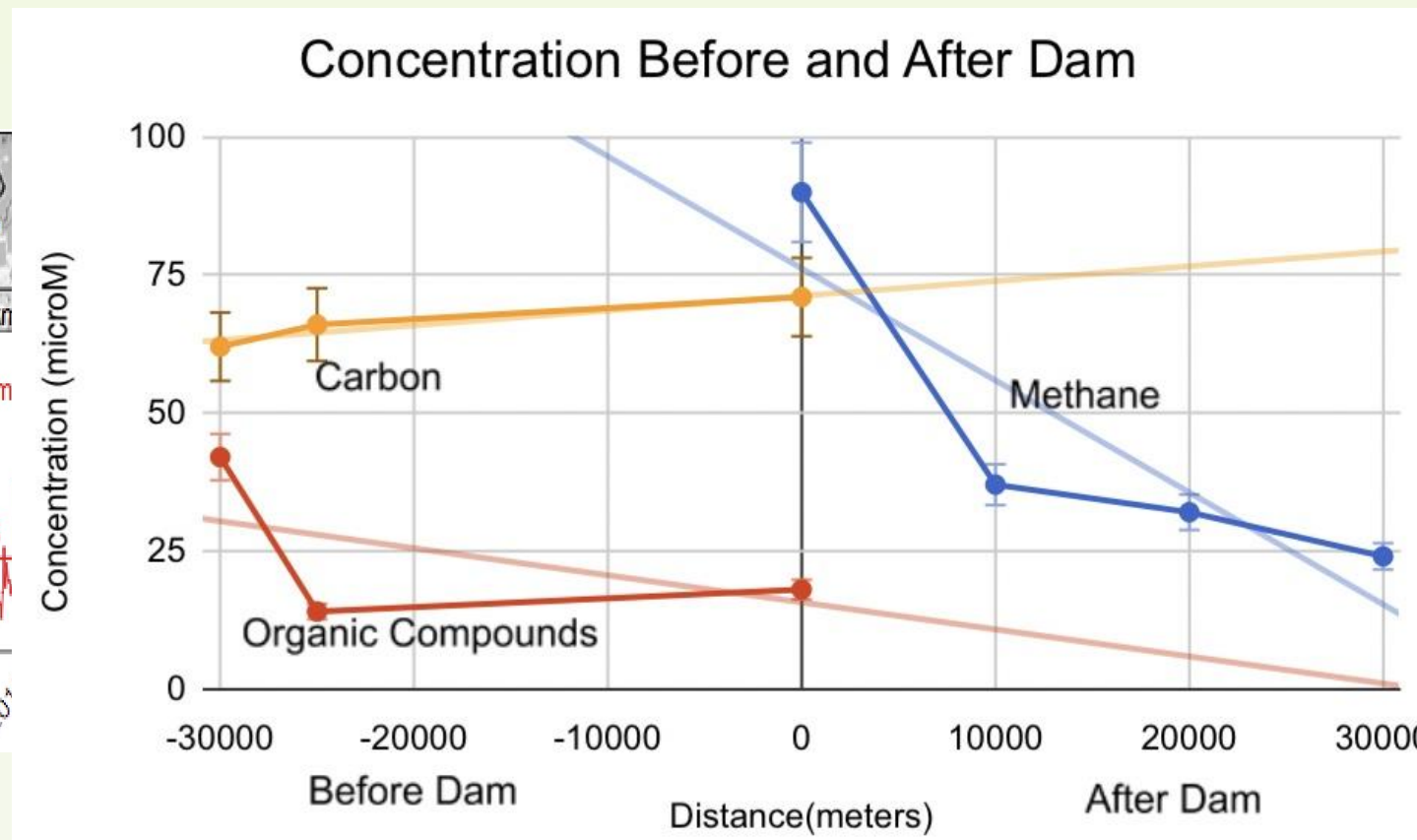


Figure 3 shows the increasing and decreasing concentrations based on distances from the dam

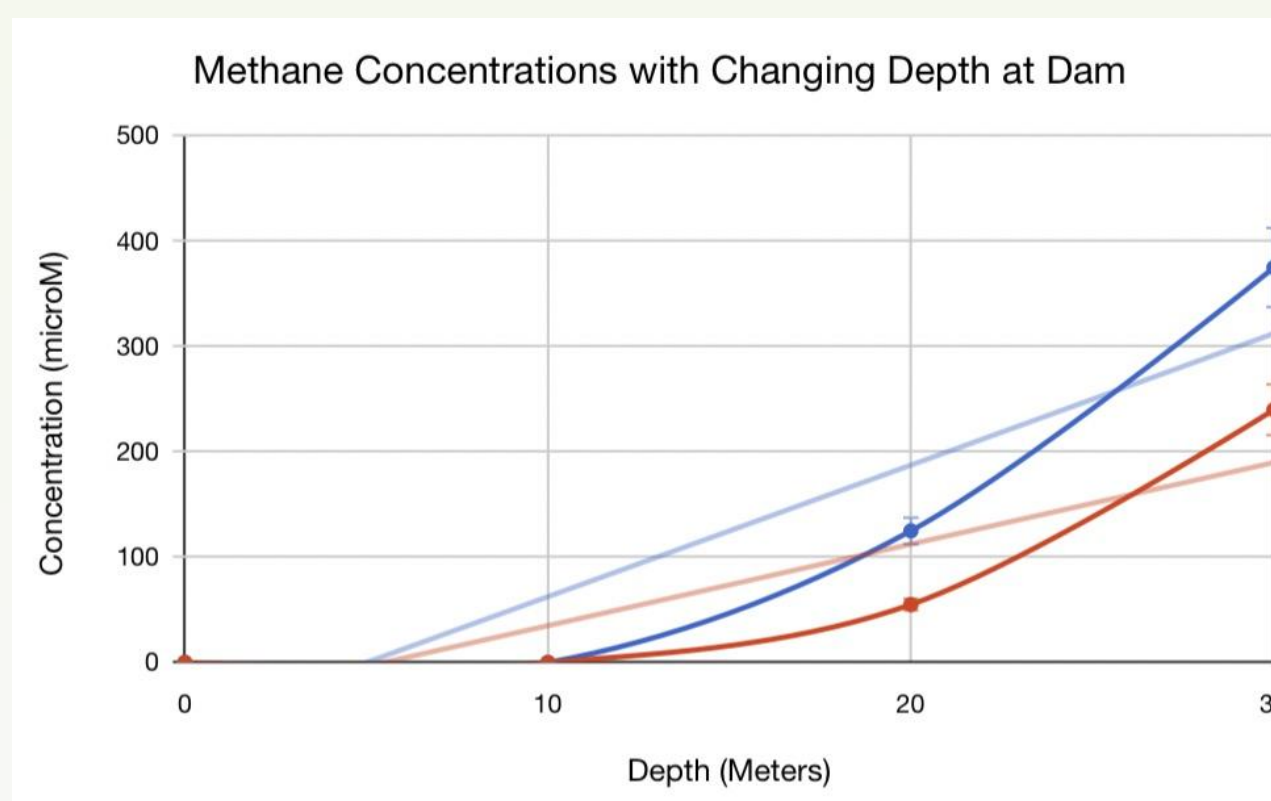


Figure 3 shows the increasing methane concentrations at lower depths

Discussion

Dams lead to a buildup of organic sediments which then decompose, releasing methane and carbon dioxide gas. The organic and carbon compounds, both of which technically are organic compounds, received a change in sediment concentration as they approached 25000 meters upstream of the dam, or around the beginning of the dams' reservoir. Both slopes then at the beginning of the reservoir stabilized and stayed on a constant increasing concentration as the organic compound approached the dam. This increasing organic sediment concentration supports the fact that sediments become blocked at the dam and begin to chemically decompose, releasing methane and carbon dioxide gas. Methane levels decrease as you get further downstream, showing there are less sediments being decomposed and broken down, showing dams reduce the sediment concentration.

Conclusion

In conclusion, the construction of hydropower dams should be reduced because they cause an increased methane release and increased acidification in rivers.

Further Work

The best option to reduce the impact of dams would be to educate people about the destruction of dams, causing them to invest in solar power, tidal power, wind power, or other cleaner sources of energy. In coastal areas with strong currents, hydropower can be used similar to a dam, but without blocking off rivers. The ocean current turns turbines, creating kinetic energy, which then is transferred into electrical energy. Turbines in the ocean would not block the spread of sediments, eliminating one of the main environmental impacts of dams.

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