Section Sciences et Ingénierie de l'environnement
Design Project 2022 (semestre de printemps)

Proposition n°34

Water Quality in the Amazon River Basin

Partenaire externe
Raphaël Payet-Burin
rapy@cowi.com Téléphone +4571797272
COWI A/S
Taille de l'entreprise (nbre de collaborateurs) : 7000
Parallelvej 2, 2800 Kgs. Lyngby Copenhagen
www.cowi.com

Encadrant EPFL

Prof. Tom Battin
EPFL ENAC IIE SBER
GR A0 402 – Station 2
1015 Lausanne
tom.battin@epfl.ch

021/ 693 08 37

Descriptif du projet

In the context of a project implemented by The Nature Conservancy (TNC) and COWI A/S for the Amazon River Basin Organization and the Inter-American Development Bank, we are looking for students to work on the water quality aspect of the study. The overall project is developing modelling tools to support an integrated multi-sectoral planning process based on a water-energy-food nexus approach.

Water pollution has been identified as one of the key challenges for the Amazon basin. The main direct causes of water pollution in the Amazon are illegal/informal mining, petroleum extraction, sediment flow interrupted by dams, domestic, commercial and industrial sewage and river transport. This results in important environmental and socio-economic impacts, including loss of aquatic biodiversity, eutrophication, health impacts, social conflicts, decrease in safe food sources, displacement of indigenous communities, increased water treatment costs and loss of income.

Depending on the chosen problematic, a simple single pollutant simulation model should be developed. For example, considering pollution sources (e.g. agriculture, wastewater, natural), and e.g. pollutant dilution and advection. The model is to be used later (probably not within that design project) to assess the impact of external drivers (e.g. climate change, population

growth), policies or infrastructure (example: increased agriculture area increases pollution load proportionally; improved wastewater treatment decreases pollution load by a given factor).

Objectif et buts

The objective of this design project is to model one of the water quality problematics in the amazon river. The final objective is to connect this work to a decision support tool for infrastructure planning in the water-energy-food nexus (https://doi.org/10.5194/hess-23-4129-2019), while this is to be kept in mind, the students do not need to understand the overall framework and make the connection themselves, but will be provided with the relevant information.
At the end of the projects the students will have:
-Identified relevant water quality problematics in the Amazon and selected one specific topic.
-Designed a simple water quality model for the selected problematic.
-Collected some data and implemented them in the model.

Descriptif tâches

We envision the following tasks:
-Literature analysis of the water quality problematic in the amazon river basin.
-Selection of one specific pollutant/dimension (e.g. sediment transport and effect of dams, pollution by petrol extraction, impact of agricultural activities).
-Design a Simple Model that represents the selected pollutant/water quality problematic at basin scale. **OR** It could be that during the project the students identify that is it more relevant to have a more detailed model and restrict their analysis to a specific part of the Basin.
-Collection of data (from online/government data sources, support will be provided for water quality data sources, besides hydrological, agricultural, and various socio-economic data is available)
-Run and validate the model (to the extent of possible)

Divers
-I speak French so meetings can be in French.
-We would appreciate the reports be in English.
-The Technical University of Denmark has hosted several master theses (including from EPFL students) about the water-energy-food nexus model used in this project.
-We are willing to host Internships (at COWI) or Master theses on related topics (in partnership with the Technical University of Denmark).