Developing a nature-based adaptation toolbox

Confidence Duku, Xuezhen Guo, Linder van Mobi, Wil Henen, William Riley III, Liza Genke, Anna Abatayo, Andries Richter, Sen Suphi, Parveen Kumar

Motivation and Objectives

- The need to understand how NBS affects society and livelihood
- The need for tangible and actionable information
- Lack of dedicated rapid assessment tools and methodologies

Develop methodologies for

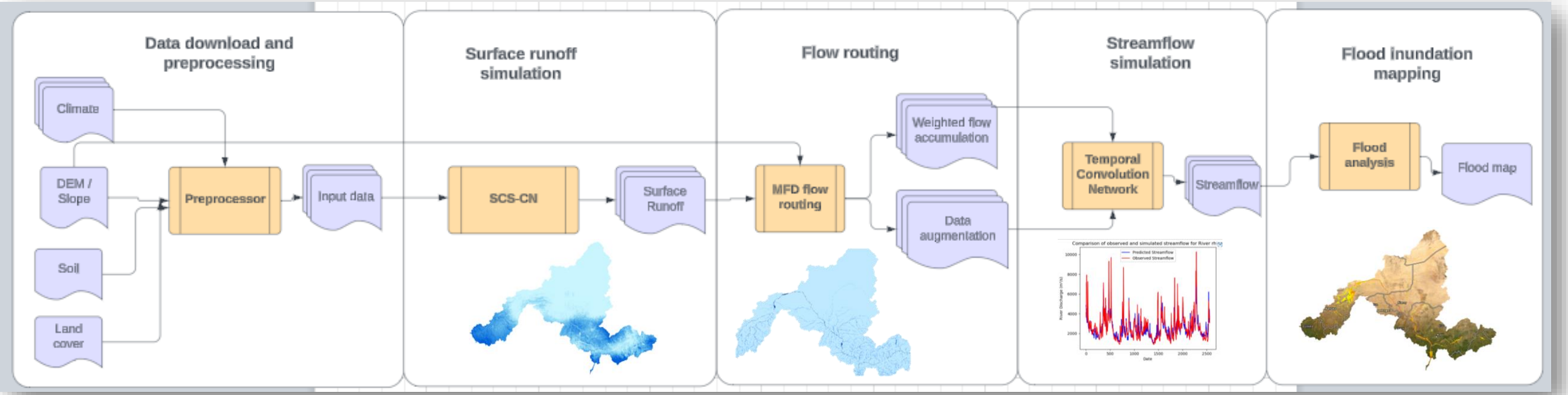
1. Assessing effectiveness of NBS in reducing climate risks (flood & heat)
2. Identifying winners and losers of NBS interventions

Natural science perspective focusing on ex-ante assessment

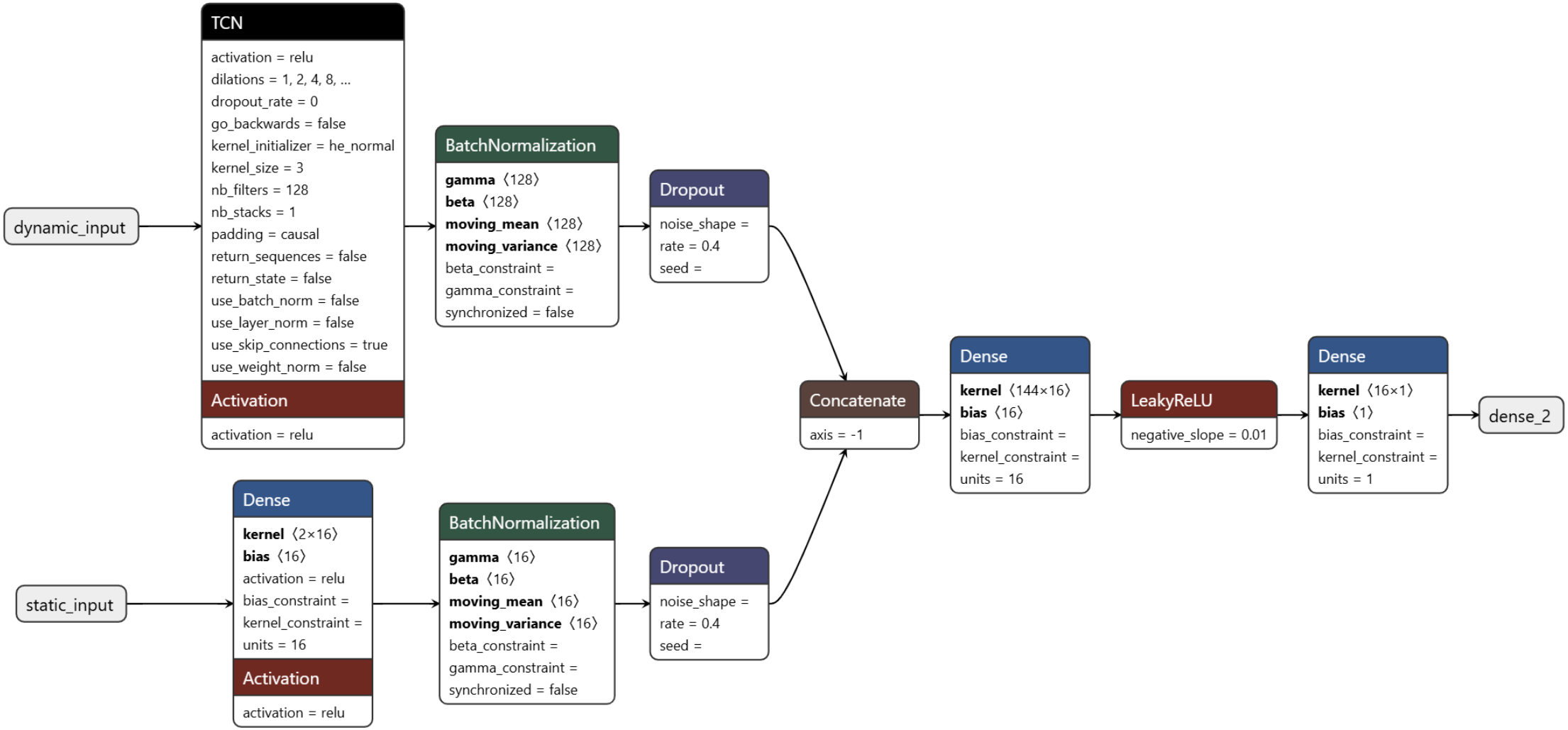
Social science perspective focusing on ex-poste assessment

1. Assessing effectiveness of NBS to reduce climate risks

Assessing NBS effectiveness against flooding

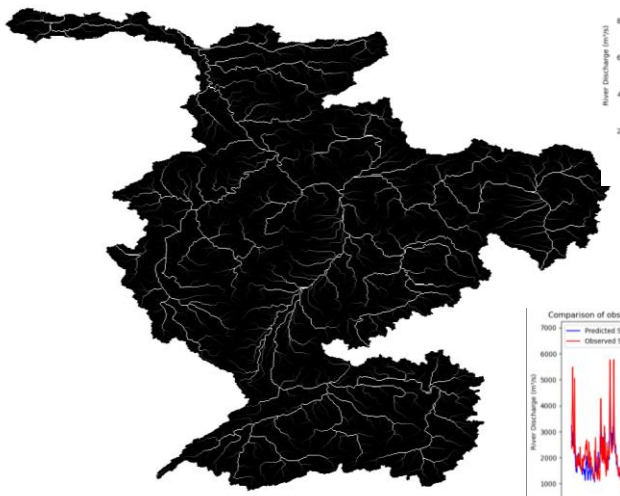


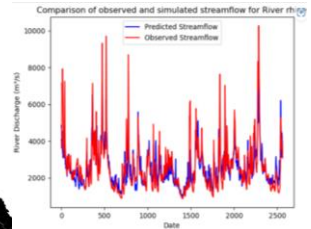
The neural network architecture

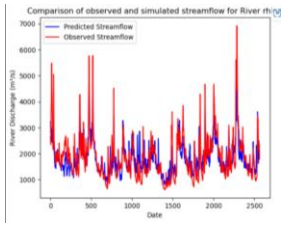


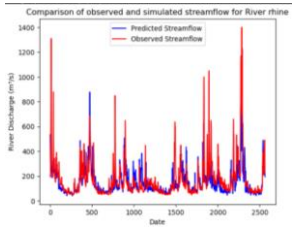
Building trust in the model

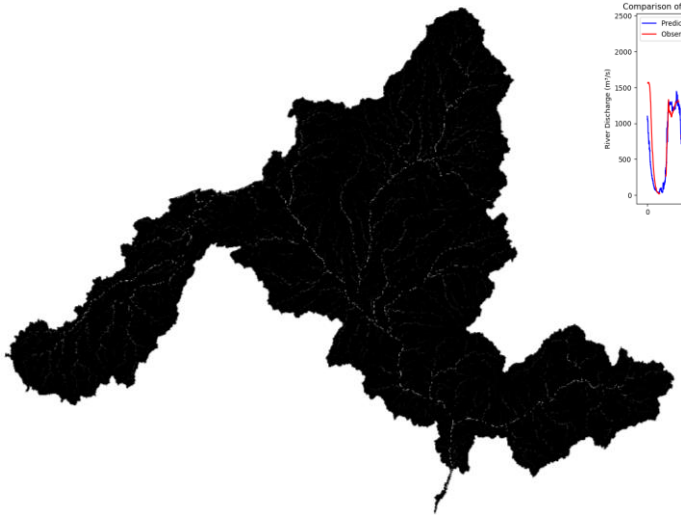
Rhine basin

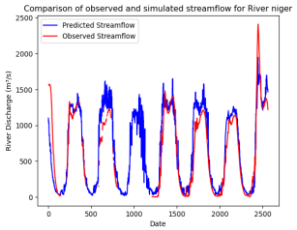


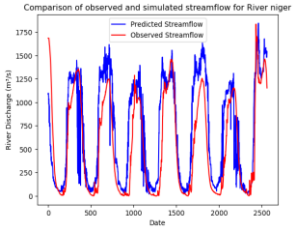


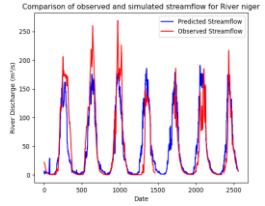








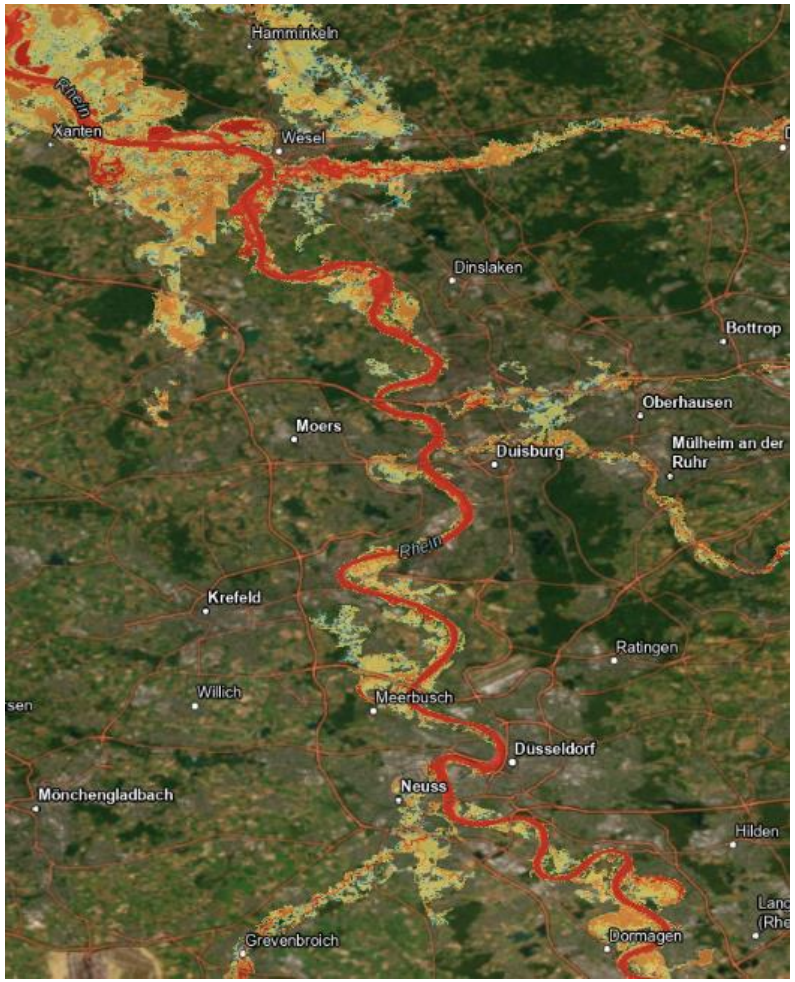




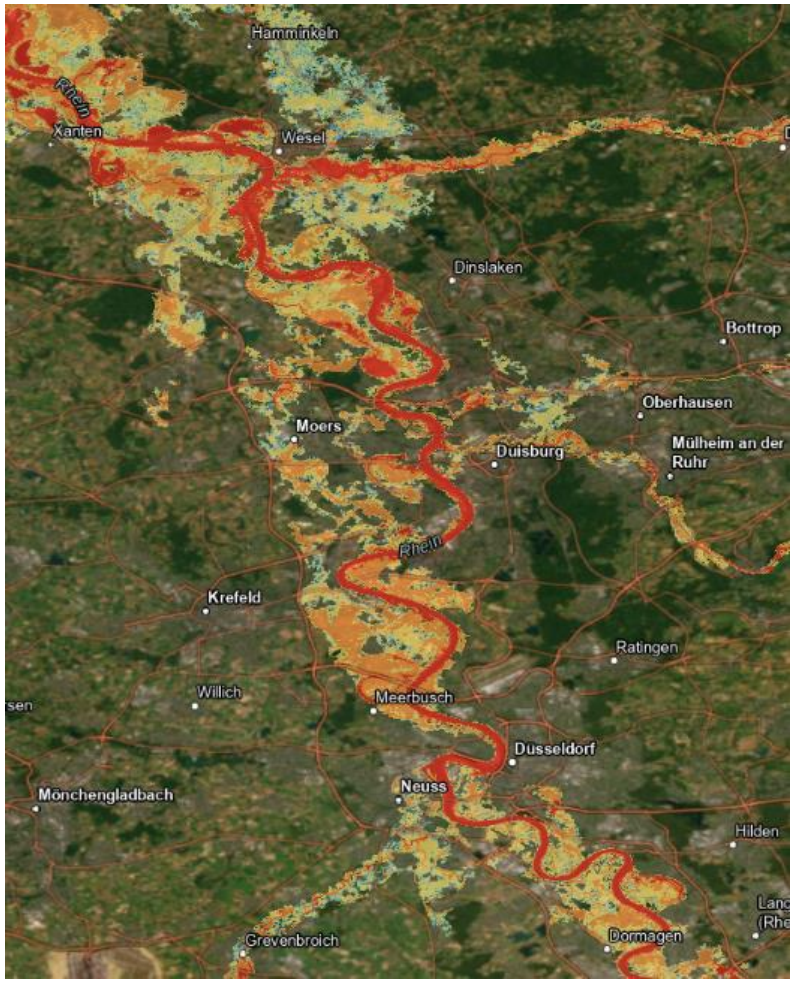
Niger river basin

Benefits of forest protection

With current forest cover



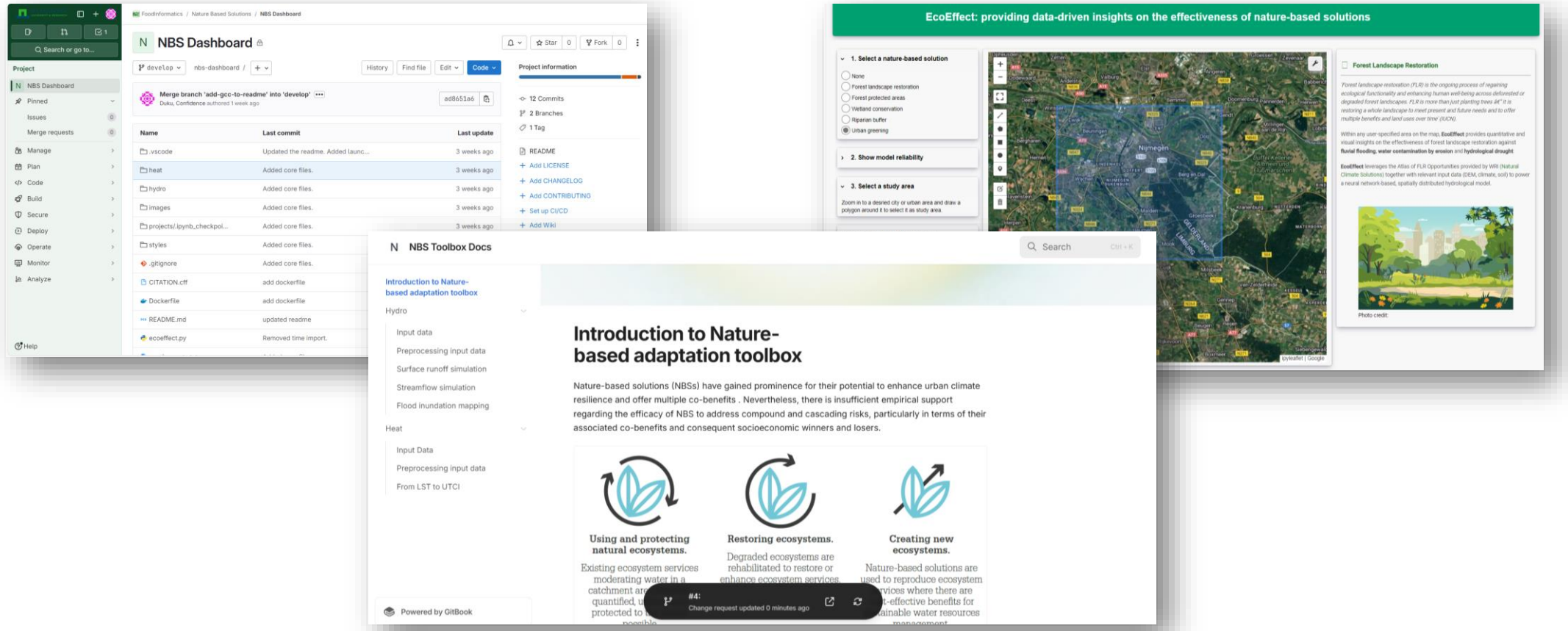
Without forest cover



Tailoring toolbox to different users

GitLab Repo for the specialists

Web-based UI for non-specialists

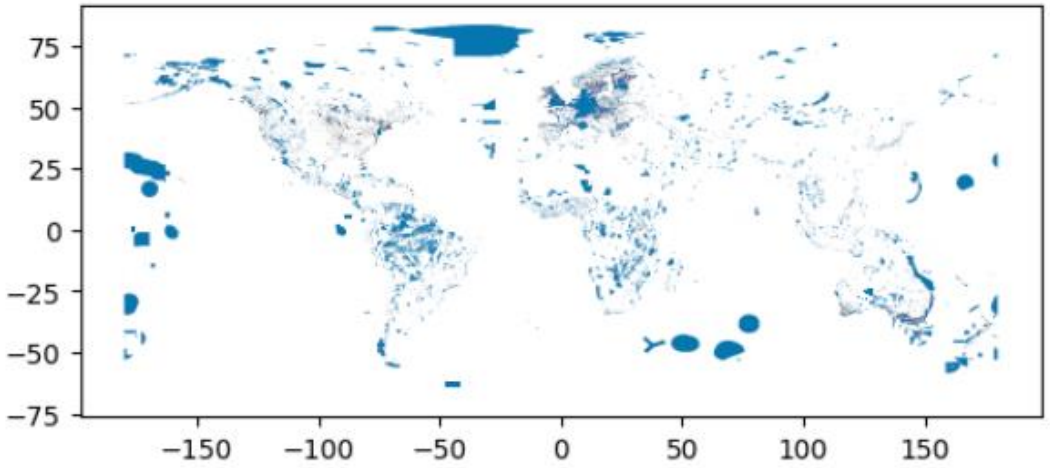


GitBook online documentation

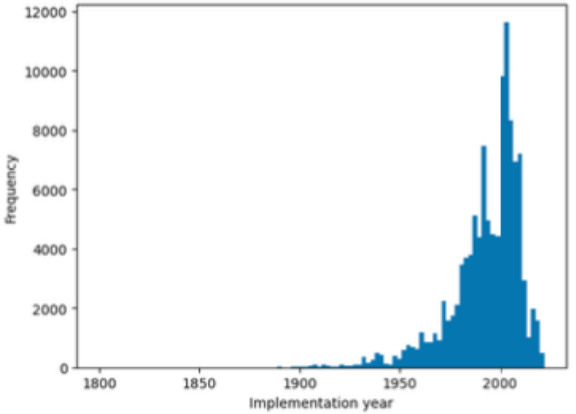
2. Identifying winners and losers of NBS

Identifying winners and losers of NBS

- Use of difference-in-difference methodology
- Focused on health and economic activity outcomes
- Used protected areas (national parks) as proxies of NBS



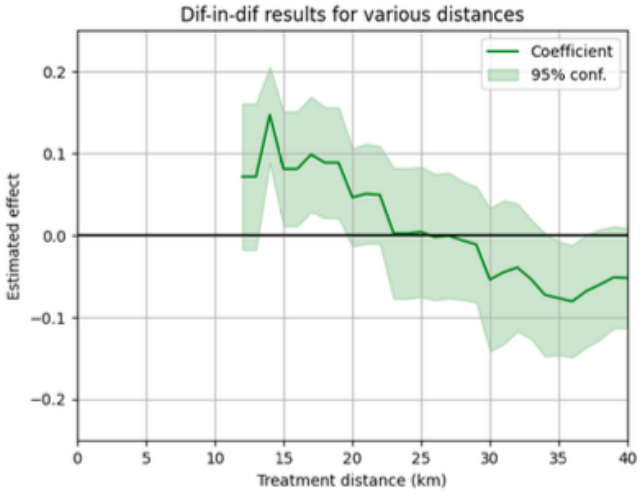
125,764 protected areas in the world

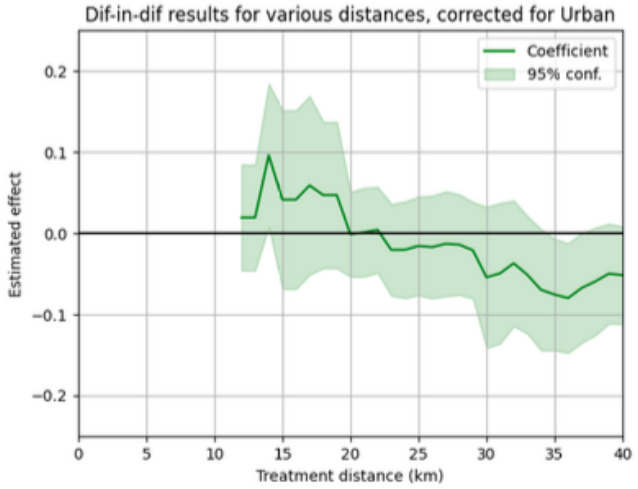


PA implementation in 2000's

Identifying winners and losers of NBS

Health Outcome

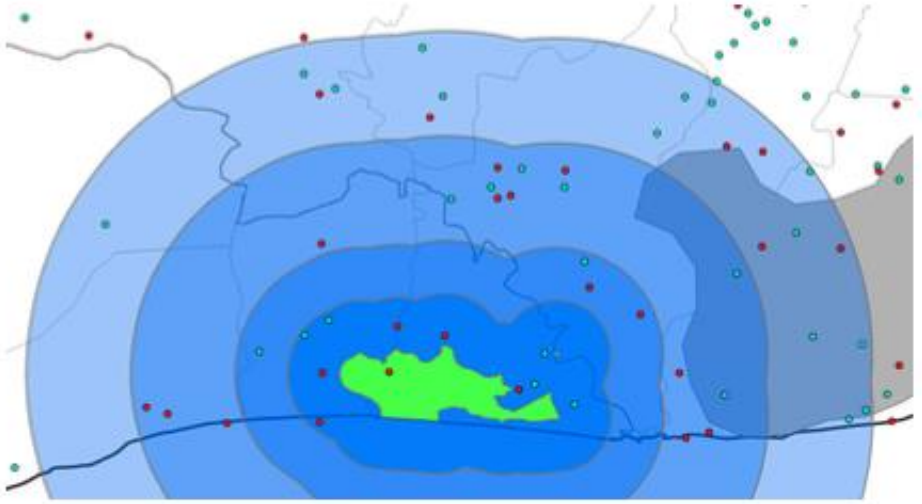




DHS interview clusters come with a randomness of 5km. These maps show all geolocated clusters near the two green PAs.

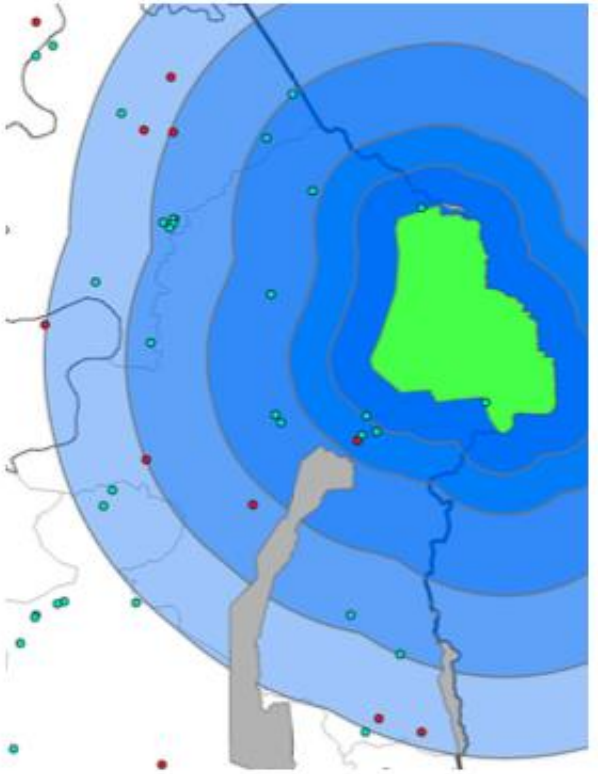
Red clusters = DHS survey before or during PA designation year
Green = DHS survey after designation year

Buffers are made for 5, 10, 20, 30, (40) km respectively.



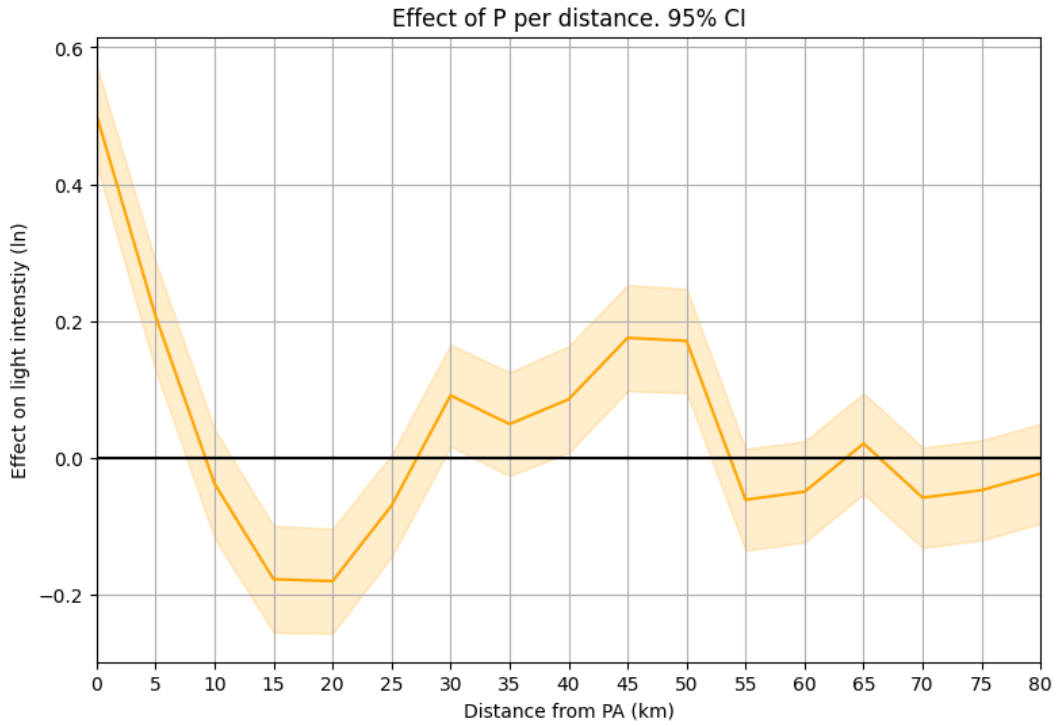
Songor Lagoon

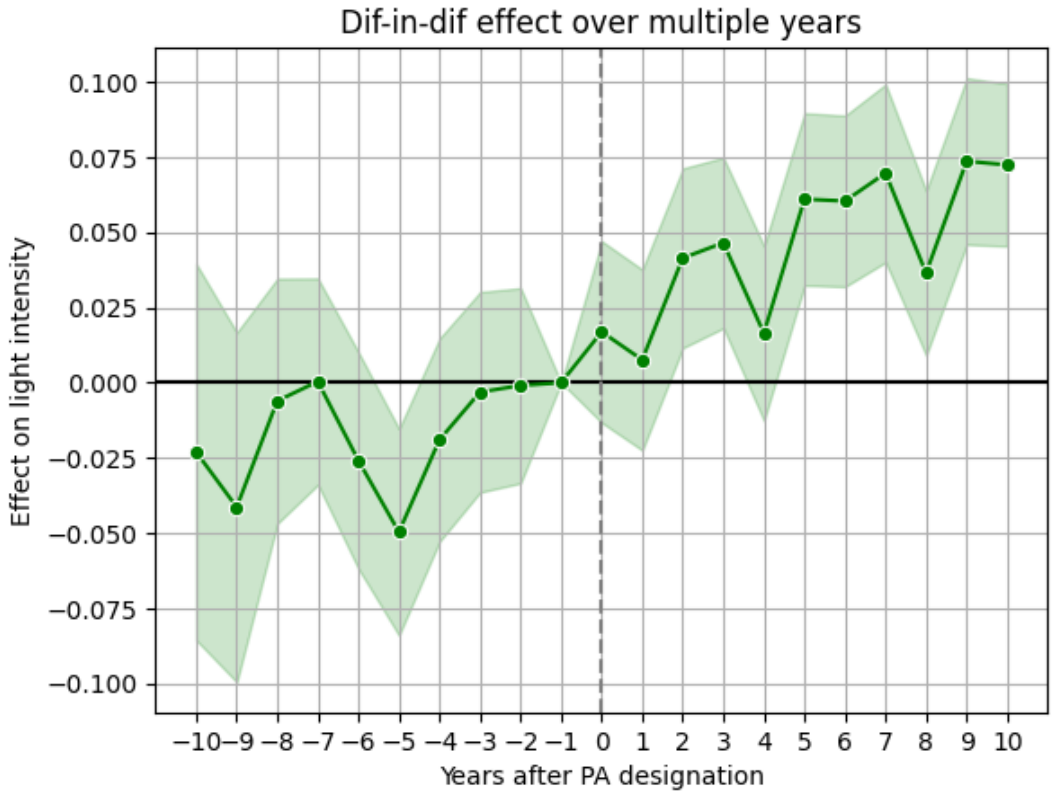
Kyabobo National Park



Identifying winners and losers of NBS

Economic activity (night-time light)





Conclusions and reflections

General

- AI allows for rapid and scalable assessment of NBS effectiveness either ex-ante or ex-poste
- AI allows for harnessing ever-increasing remote sensing data for nature-based adaptation assessments

Limitations of hydro / flood modelling

- Applicability is limited to effect of NBS on surface hydrology
- Detailed definition of NBS interventions in terms of input variables can be challenging

Limitations of Difference-in-difference approach

- The method shows promise in its **wide applicability and use of remote sensing data**. However, for enhanced reliability **localized calibration** is required
- Temporal datasets on outcomes over a period of time is also required.

Next Steps

- Linking toolbox to participatory modelling tools available in house (Global-Detector, QuickScan)
- Repurposing hydrological and heat model for impact-based forecasting in an upcoming project