Using machine learning for SEEA EEA

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Contents

- What is machine learning?
- Examples
  - Carbon mapping
  - Hydrology mapping
  - Mapping precipitation patterns
  - Cultural services
  - Deforestation mapping

What is machine learning?

- Machine learning is a type of artificial intelligence, whereby algorithms are developed using sets of training data without specifying the types of relation / equations that can be expected. Different types of algorithm structures can be used, such as Random Forest, or Convolutional Neural Networks.

2015: AlphaGo versus Lee Sedol (33), world champion Go (4-1)

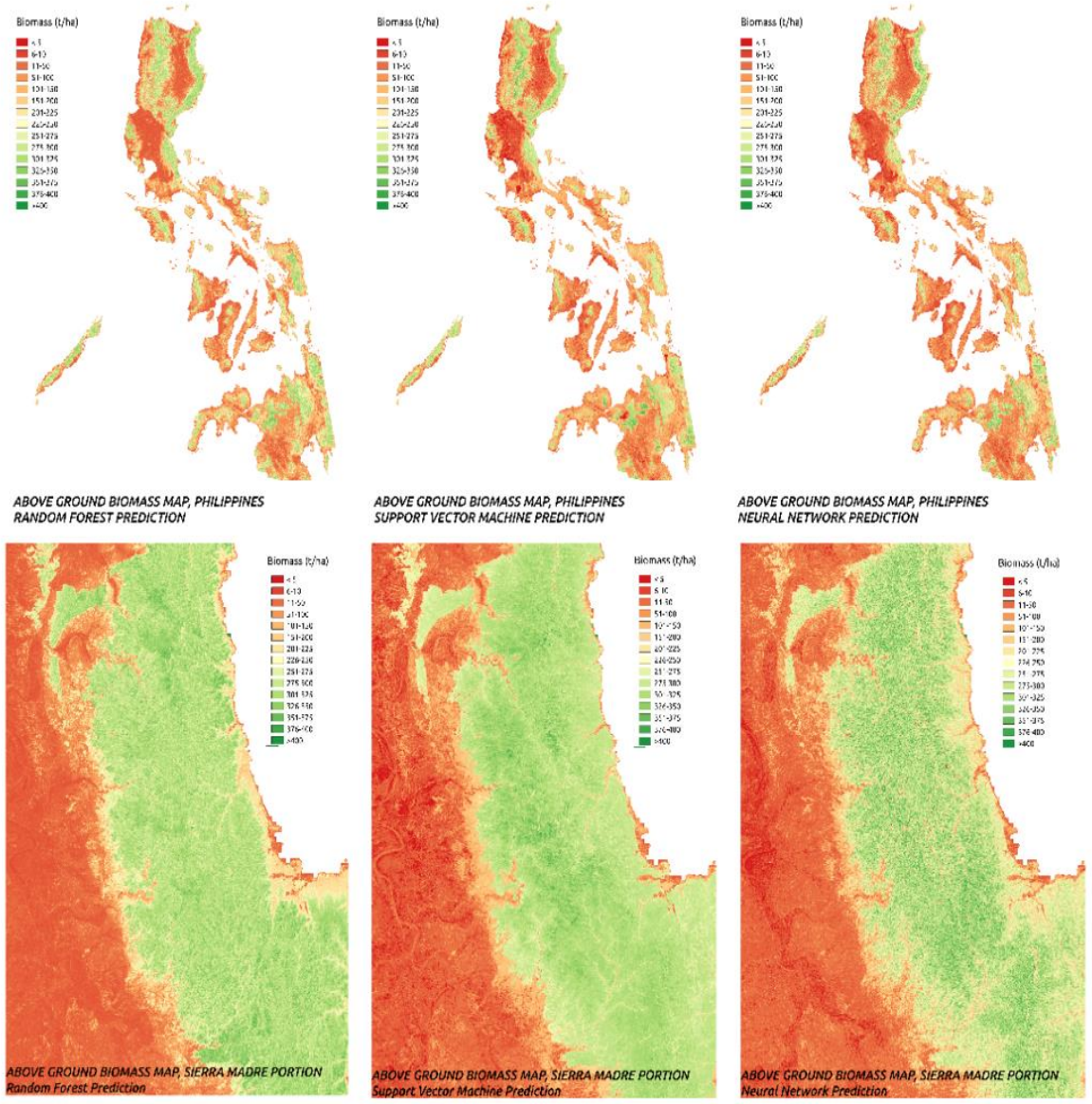
Uses ML to identify optimal responses based on data from a very large number of actual moves plaid in Go.

Machine learning continued

2018: AlphaGo versus AlphaZero

- ApphaZero was trained with self-play
- After one week of training defeated AlphaGo 100-0.

Using machine learning for mapping carbon



Biomass maps predicted by random forest, support vector machine, and neural networks

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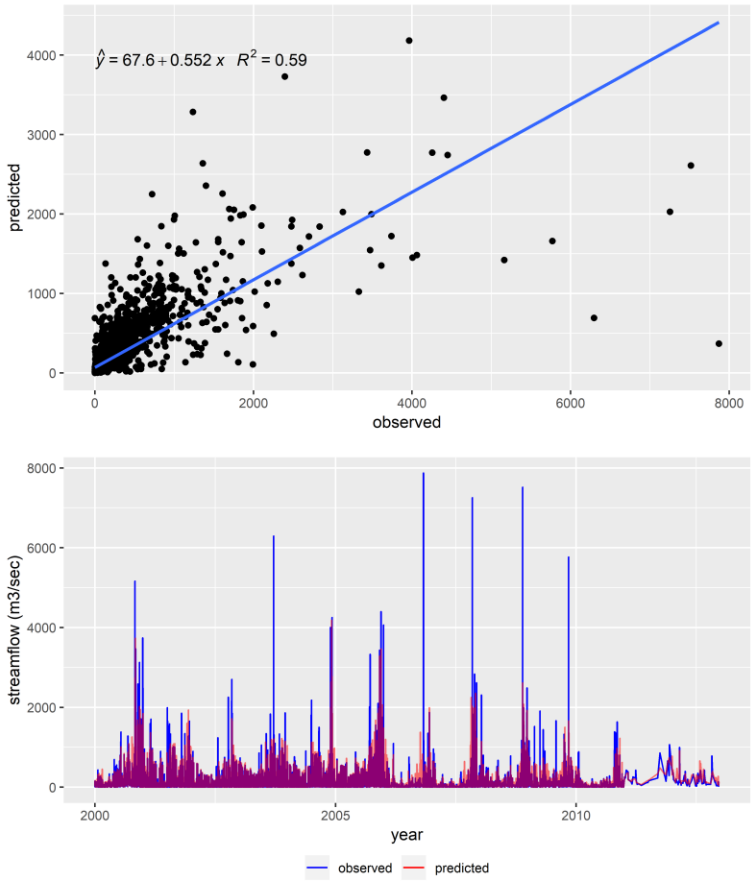
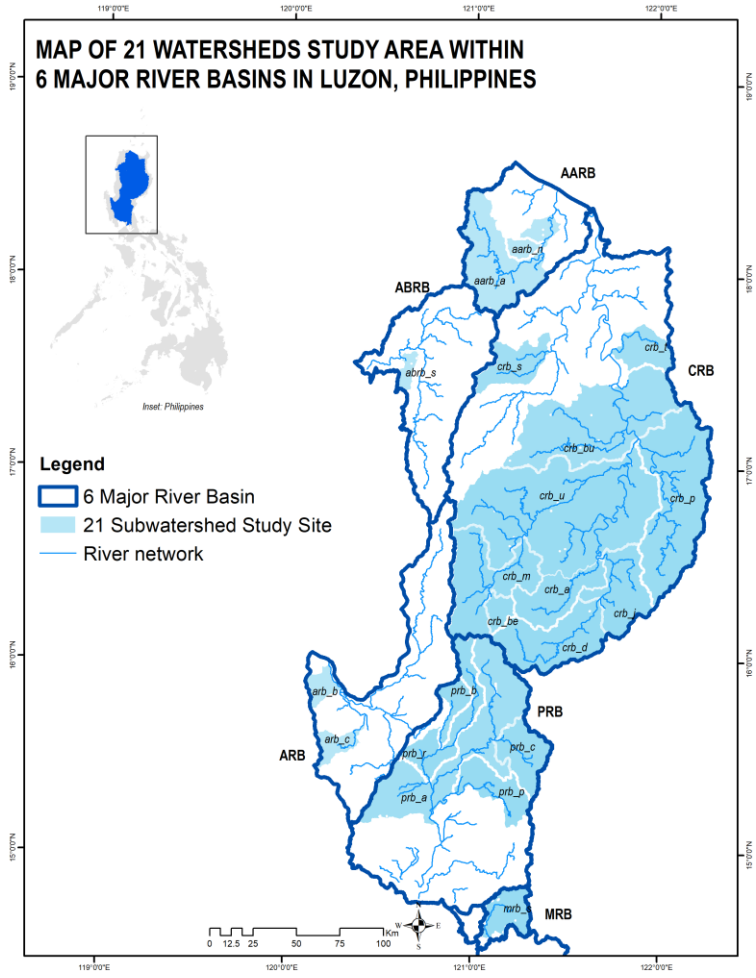
Mapping hydrology in the Philippines



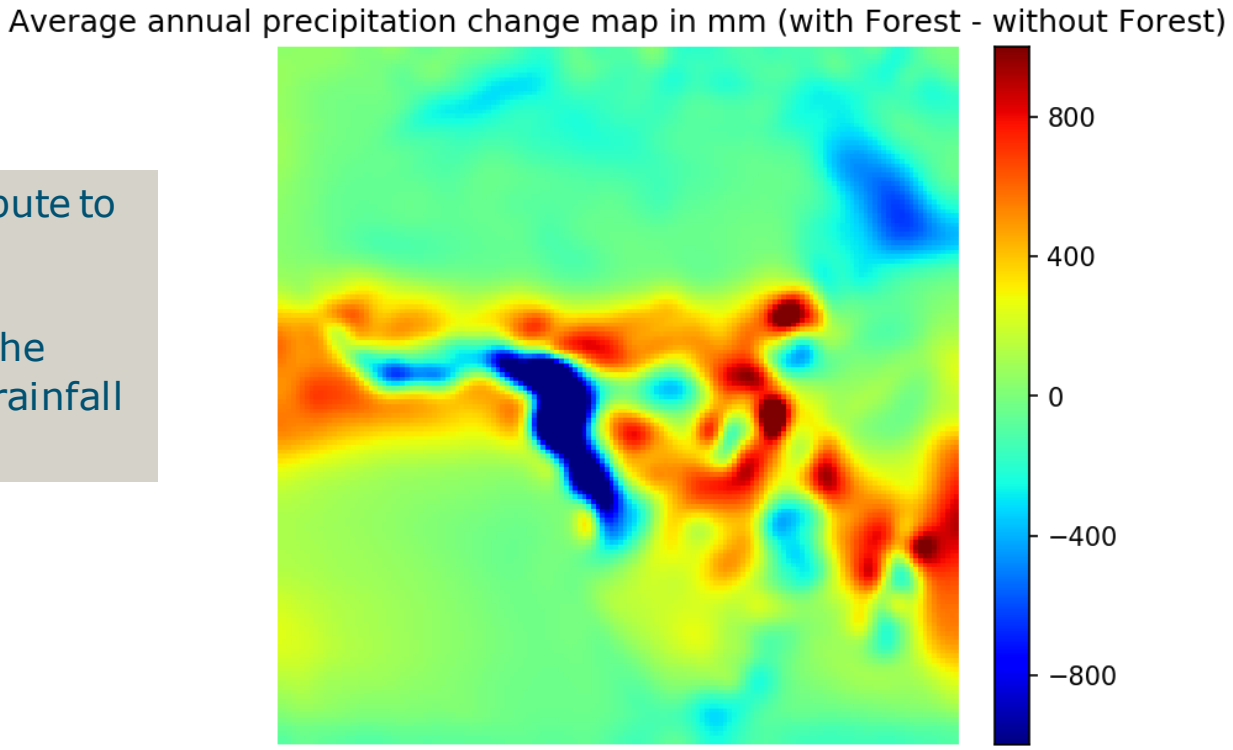
Regression of all test data



Mapping impacts of forests on precipitation

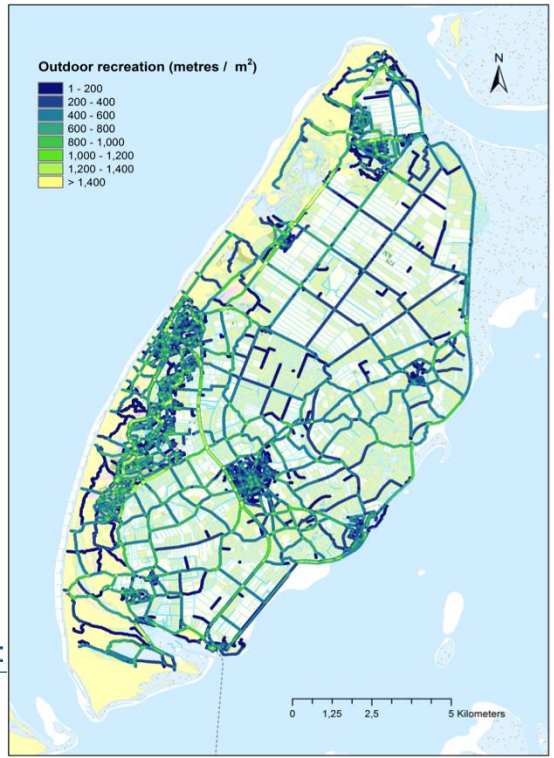
Question: how do forests contribute to maintaining rainfall patterns?

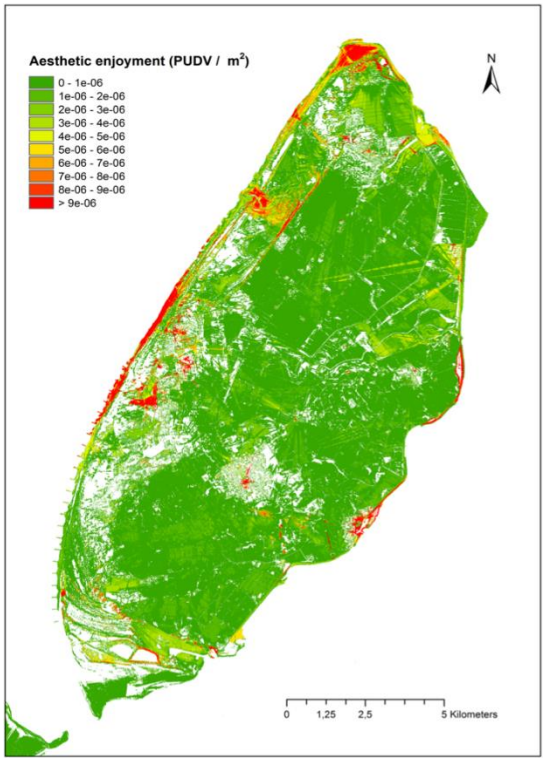
Can we use ML to inform us on the ecosystem service 'maintaining rainfall patterns' ?



Big data and machine learning for mapping cultural services

- PhD Ilan Havinga, with Patrick Bogaart (CBS)
- Modeling cultural services
- Looking at big data (Flickr, Strava)





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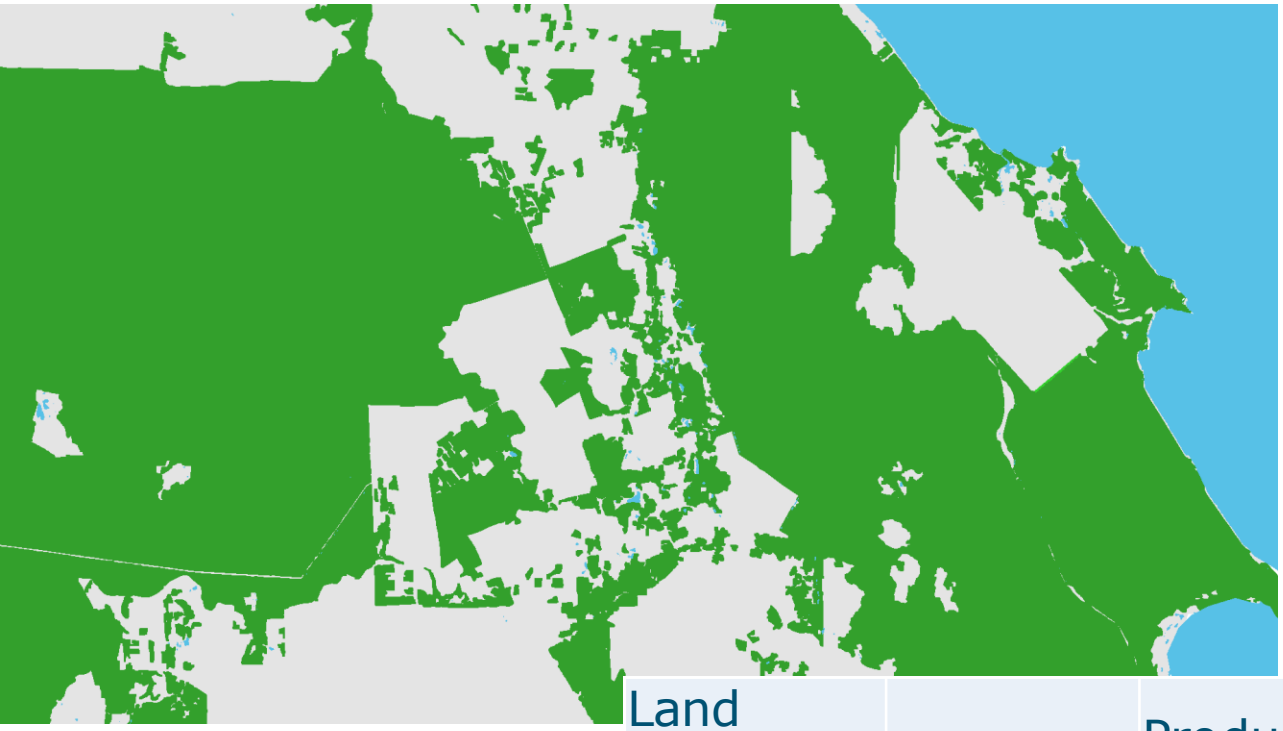
Compiling extent accounts with satellite data



Detail of map

Plantation

Forest

Case study showing expansion of oil palm plantations in Johor, Malaysia 2016-2018

Land cover (ha)		Production	(ton)
Forest	109,000	Timber	981,000
		Carbon sequestration	654,000
Plantation	91,000	Oilpalm fruit	1,820,000
Annual crops	85,000	Paddy rice	1,020,000
Urban	25,000	-	
Total	310,000		

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Applications in remote sensing

Conclusions and look into the future

- Technology for using models, earth observation and open data for informing natural resource management and compiling accounts are developing rapidly
- Machine learning will increasingly dominate earth system modelling approaches.
- Level of detail, in time and in space, and high accuracy already present multiple policy use options
- Dependent upon 'big' data
- Need for further development:
    - Developing new models and approaches, testing in new areas, scaling up, connecting to users