An interdisciplinary study of the peatland fish and fishing in Borneo: Ecology, values, and implications for future conservation

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Introduction

• My PhD focuses on:
  • interdisciplinary approaches to conservation, the ecosystem service approach and its critiques (recall Caroline’s presentation),
  • along with the use of a framework based on Assemblage Theory to support interdisciplinary approaches and analysis.
  • The challenging of various dichotomies (e.g. between various forms of knowledge such as ‘scientific’ and ‘local’ knowledge’, between disciplines of ‘natural’ and ‘social’ science and hierarchies between human and nonhuman)
  • The Sabangau was my case study to explore these aspects!
  • Not enough time to go through all of this…

• Will try to give you a sense of the type of data that I collected for my PhD, and if you want more info lets talk after!
Introduction to the PhD

40% Indonesia’s population: **forest-dependant livelihoods**

6.4 million people: **fishing & fish farming** in Indonesia¹ (2012)

54% of animal protein comes from **fish and seafood**¹

**What we know:** Kalimantan has a higher fish consumption than any other part of Indonesia²

**What we don’t know:** very much about the fish in peat-swamp forests in Kalimantan and more in-depth information about the importance of fish and fishing to local communities, their values, and their perspectives of environmental change and challenges in these peat-swamp ecosystems
This project

- Interdisciplinary PhD
  - **Social element:** Relationships between people and their environment, evaluating broader values related to fish and fishing for local communities
  - **Ecological element:**
    - sampling fish → our understanding of TPSF fish ecology and biodiversity
    - Approaches for fish population sampling for future monitoring and sampling strategies
    - Also collected data pre- and post- 2015 fires

Some of the first in-depth assessments of local fish biodiversity of tropical peat-swamp forest (TPSF) habitat in the Sabangau catchment in Central Kalimantan, Borneo.
Methods

- Interviews (40), focus groups (4) and questionnaires (206) in Kereng Bangkirai and Taruna Jaya
  - Perceptions of environmental changes through time and the future of fish and fishing
  - Importance of fishing for lives and income, how participants learnt to fish
  - Impact of dams, fish ponds, fire, oil palm etc., that might affect fish and fishing in area
  - Perception of fish population and diversity changes in recent years
  - The relative economic importance of fish and fishing
Methods (continued)

- Fish surveys: Monthly surveys of Sabangau River and Forest (over 15 months)
  - Fish identified, Standard Length (SL)
  - Mortality noted
  - Environmental measurements:
    - pH, water temperature, dissolved oxygen (% and mg/L), Secchi depth (as a proxy for turbidity).
    - Samples of surface water analysed for NO$_2$ and NO$_3$.
  - Fish catch per unit effort (CPUE) calculated
Results

- River: **55,147** fish trapped
  - 1,300 trap nights (Av. CPUE = 42.22)
  - 22,917 fish measured
  - **38 different species**

- Forest: **3,938** fish trapped
  - 600 trap nights (Av. CPUE = 6.1)
  - 3,905 fish measured
  - **27 different species**

54 different species from 16 different families
(For. spec.: 8, Riv. spec.: 25, Both: 17)
Results (continued)

An almost **five-fold increase** in acidity of the Sabangau River post-fire:

- This corresponded with a significant decline in fish catches
Results (continued)

• Average fish consumption per person = 49kg/year
  • 2.6 times the global average per person (19kg/year)!

• Information on livelihood strategies, e.g. having a wide variety of income sources through the year

• Perceived a decrease in number and size of fish, catching fish had become more difficult

• Ecosystem damage by fires, canals, logging, dams, increase in number of people fishing, use of harmful fishing methods (electricity & poison) and ‘outsiders’ coming to fish

• Consideration of socio-cultural values essential for more complete understanding of importance of fish, fishing and wetland environments to local communities
Discussion

• With the use of a wider range of sampling methods this species list could be added to in the future.

• Continued monitoring highly recommended to collect longer-term data on fish catches, population trends and water quality → to facilitate on-going evaluation of river health

• We need interdisciplinary approaches in conservation
  • Why people make decisions…economics not the only aspect!
  • How to design conservation strategies that are locally relevant → more likely to succeed
Key points

1. Locally-used traps and tools can be used for long-term fish population monitoring

We need more (long-term) fish and water surveys for:

2. Greater understanding of peat-swamp forest ecology

3. To allow for long-term monitoring of these habitats to understand the impacts of climate change and human disturbances

   On both fish and human communities!
Key points (continued)

5. Locally supported and appropriate conservation measures needed to conserve Sabangau river and fish along with peatland restoration and fire prevention projects

6. Fish: high relevance to local communities. Peatland conservation initiatives that integrate the ecological and social values associated with fish and fishing into their project planning are likely to result in improved outcomes for both peat forests and people.
Future projects:

- Livelihoods, peatlands, peatland restoration; relationship between food security, TPSF conservation, resilience and wellbeing of communities

- Applying for postdocs that are focusing on smallholder oil palm plantations: “Exploring the Experiences and Challenges of Smallholder Oil Palm Plantations on Peatlands to Elucidate Opportunities for Biodiversity Conservation alongside Community Development”

- Will be applying for the SESYNC postdoctoral position: using synthesis methods to address problems arising from, or associated with the relationship between humans and the environment.
  - Focus on already existing data
  - Will propose a project that focuses on the smallholder oil palm plantations…also dependent on the potential sources of data out there!
  - Let me know if you have ideas of data sets that could be useful!
Terima kasih!

Dudin, Iwan, Kris yoyo, Karno, Erna, Ahmad all staff and volunteers at OuTrop (BNF)
References
