

# Trading-off ecosystem services with engineered and economic benefits to inform investment decisions

Anthony Hurford

[anthony.hurford@manchester.ac.uk](mailto:anthony.hurford@manchester.ac.uk)

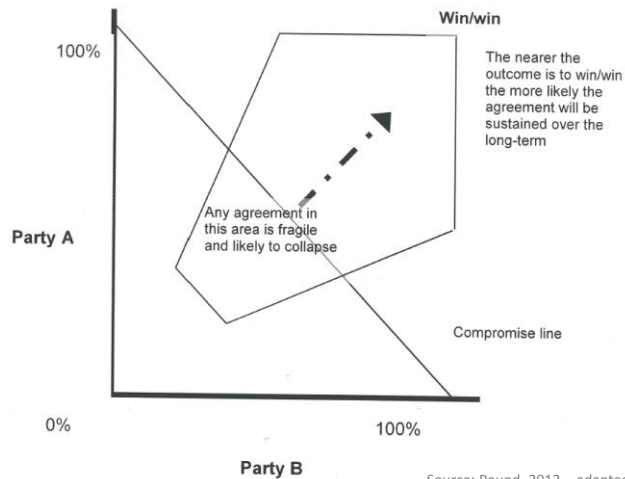
## Some water management challenges

- Water-Energy-Food security – depends on water resources



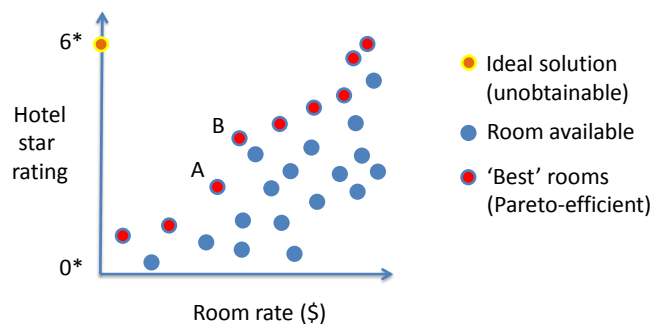
- Top-down planning is no longer acceptable
  - Negative impacts, e.g. environmental degradation and increased vulnerability of the poorest people through ignoring complex reality
- Compromises necessary, win-win opportunities ideal
  - Multiple conflicting stakeholders & objectives

## From compromise to win-win

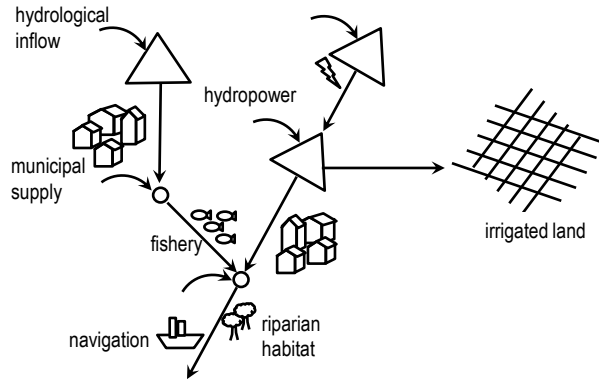


## The premise of our approach

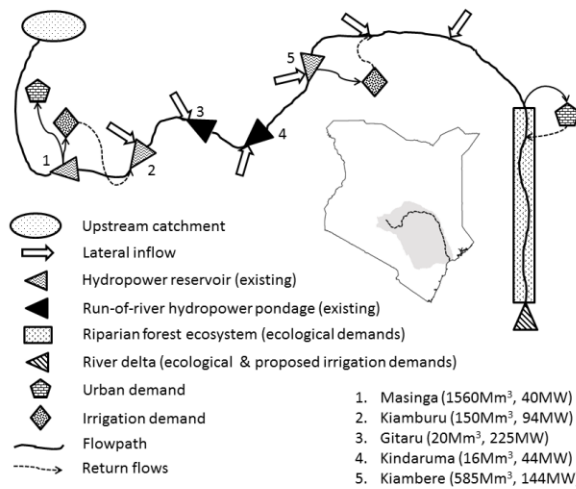
- Win-Win most likely at limits of efficient use
  - “Pareto-optimal”/ “Pareto efficient” trade-offs
- Trade-offs are compromises, common in life



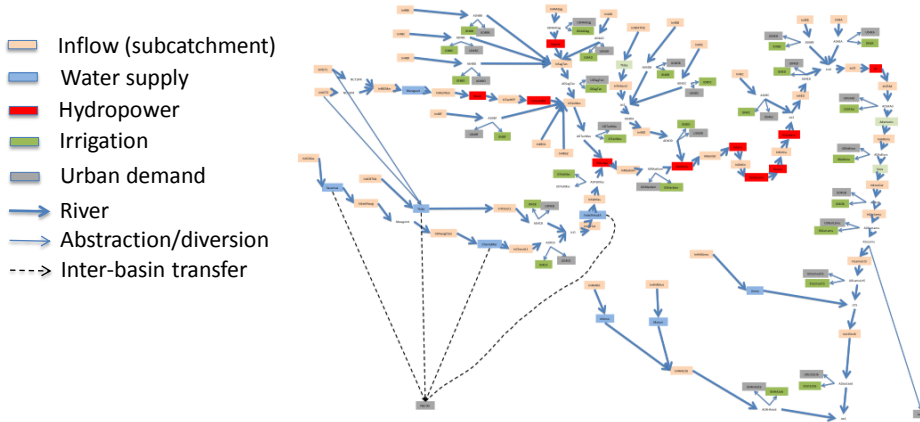
# Modelling with stakeholders



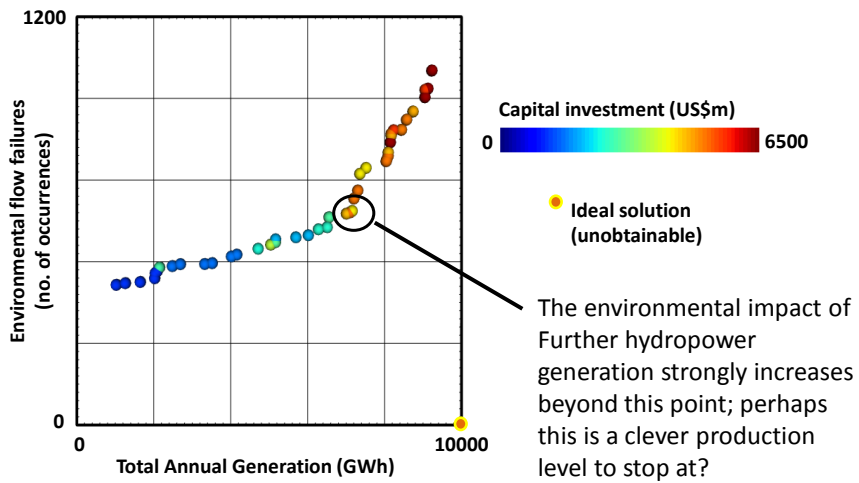
# Initial model schematic



# Stakeholder informed model schematic



Each point represents the performance of a set of proposed dams and their associated operating rules



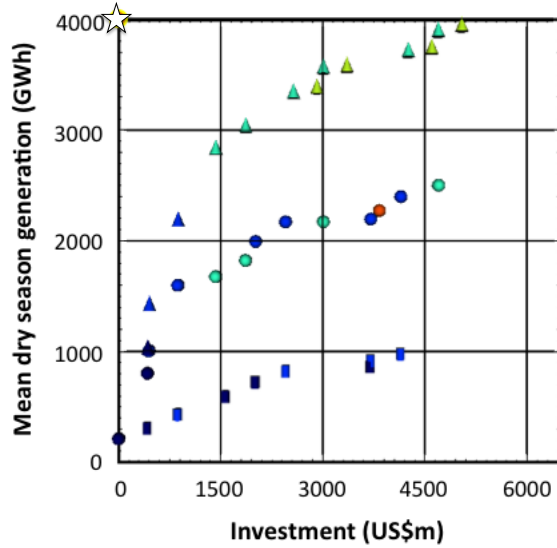
## Climate change robust investments

### Infrastructure portfolio

- A
- B
- C
- D
- E
- F

- △ Best case
- Average
- Worst case

☆ Ideal solution (unobtainable)



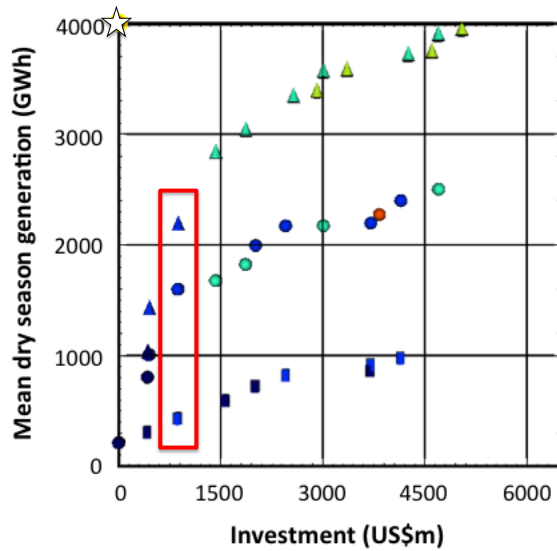
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# Conclusions

- Trade-off analysis is a new and pragmatic approach for evaluating trade-offs between ecology and other economic and engineering benefits
- It shows particular promise for understanding the implications of new investments in complex hydro-ecological-economic systems under climate change
- Aids negotiation, decision-making

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For more detail, Google Search:

“Hurford Harou Kenya”

“Hurford Harou Brazil”

“Myanmar system-scale hydropower”

## Contacts

Julien Harou - [julien.harou@manchester.ac.uk](mailto:julien.harou@manchester.ac.uk)

Anthony Hurford – [anthony.hurford@manchester.ac.uk](mailto:anthony.hurford@manchester.ac.uk)

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