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

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WISE-UP to Climate project

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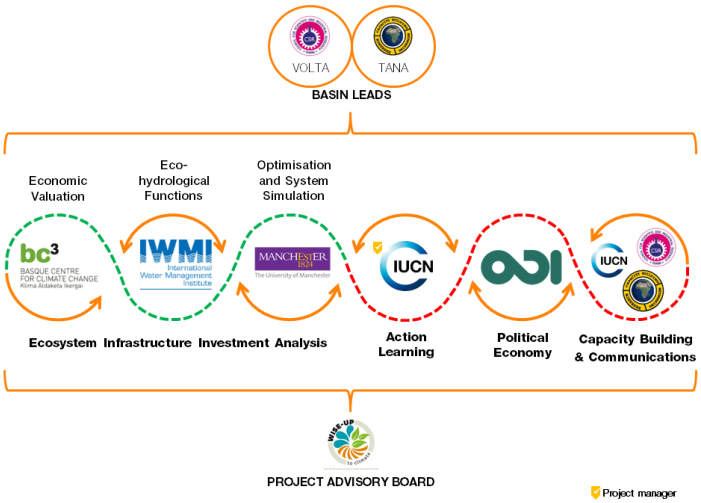
Multi-disciplinary partnership



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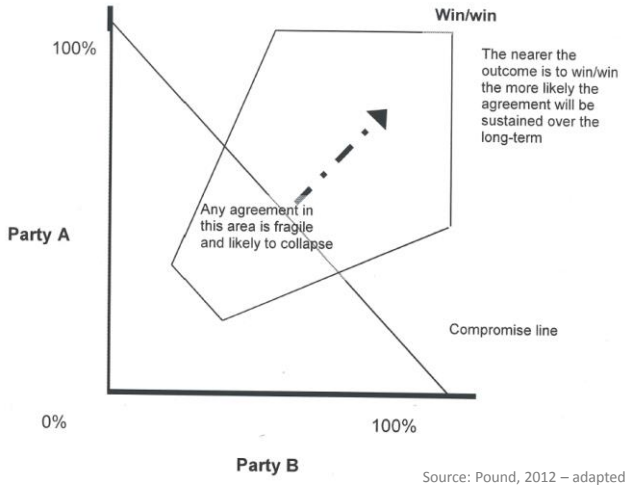
Some water management challenges

- 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

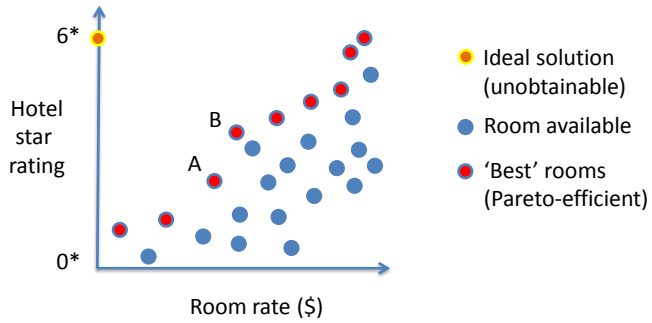
From compromise to win-win



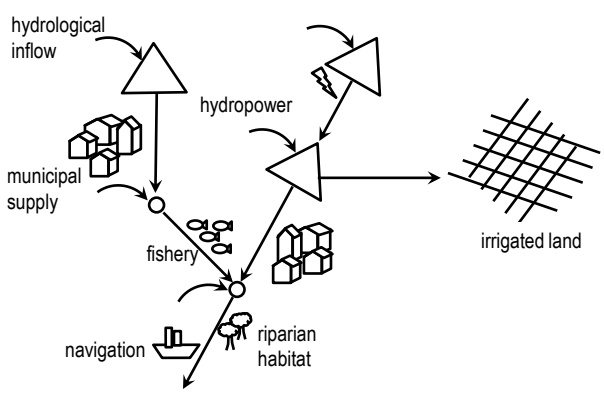
Source: Pound, 2012 – adapted from Harris, 2001

The premise of our approach

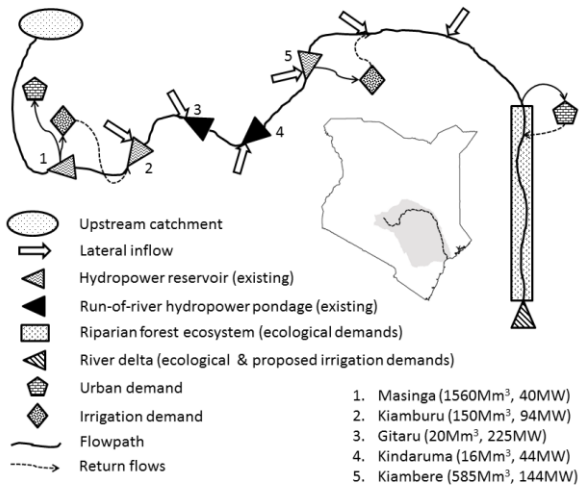
- Win-Win most likely at limits of efficient use
  - "Pareto-optimal"/ "Pareto efficient" trade-offs
- Trade-offs are compromises, common in life



Modelling with stakeholders



Initial model schematic



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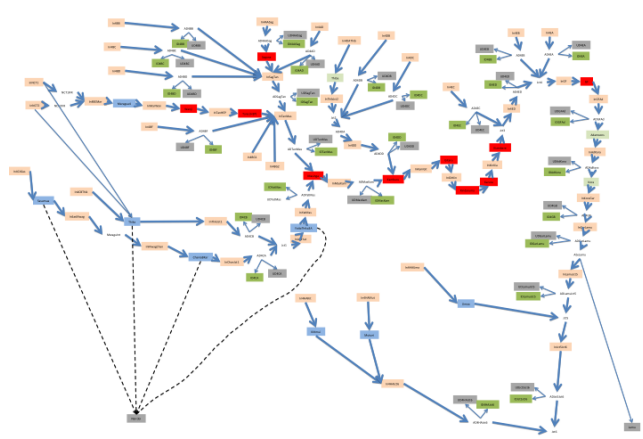
Stakeholder informed model schematic

- Inflow (subcatchment)
- Water supply
- Hydropower
- Irrigation
- Urban demand
- River
- Abstraction/diversion
- Inter-basin transfer



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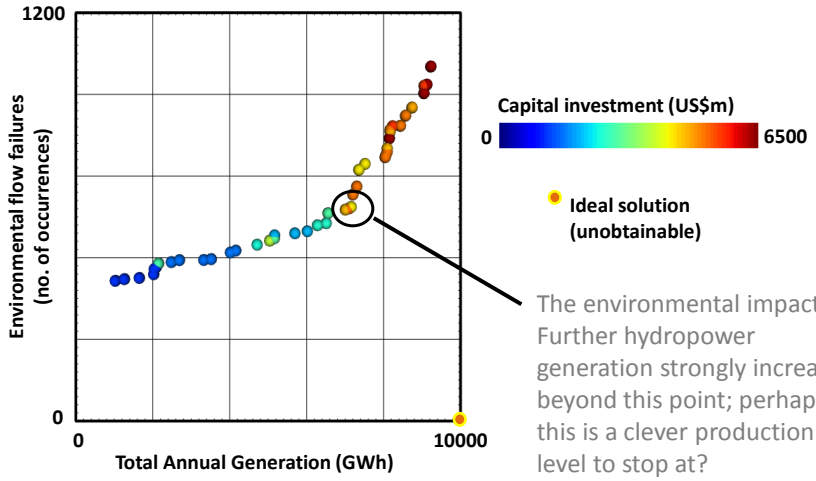
Example trade-off



The environmental impact of Further hydropower generation strongly increases beyond this point; perhaps this is a clever production level to stop at?

Climate change robust investments

Infrastructure portfolio

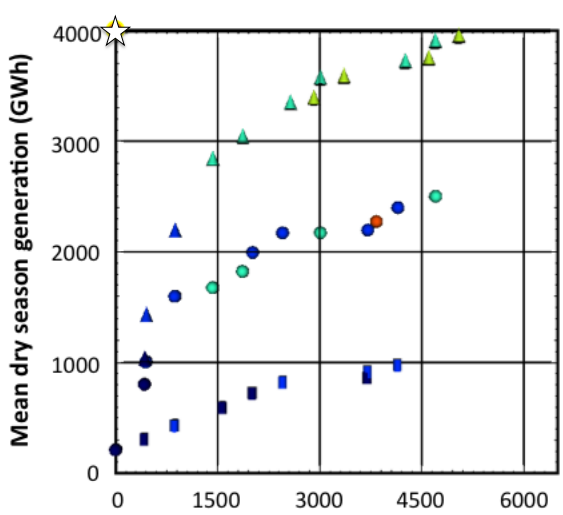
- A
- B
- C
- D
- E
- F

△ Best case

○ Average

▯ Worst case

☆ Ideal solution (unobtainable)



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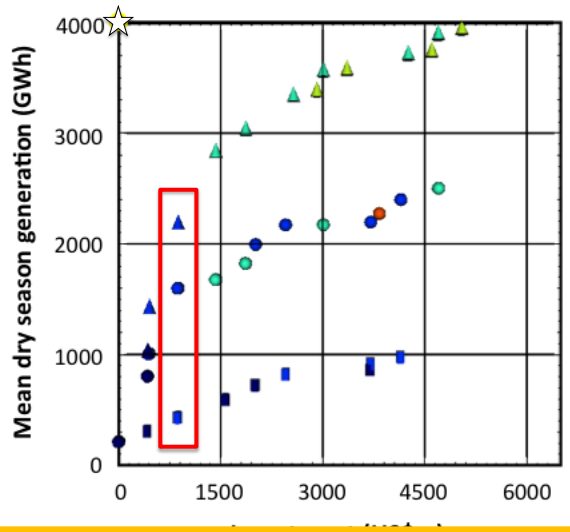

Challenges

- Internal vs external stakeholder perspectives
- Balancing current priority development needs with future adaptation
- Data availability and quality
- Institutional silos
- Political decision making – 'Flagship' projects

Conclusions

- Trade-off analysis is a new and pragmatic approach for evaluating trade-offs between ecology, 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 but there are significant challenges

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Further info, Google Search:

"Hurford Harou Kenya"

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