Simple Governance models for Ecosystem Based Fisheries Management

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• EBFM adopted by WA Department of Fisheries
• Qualitative models produced for a range of severe/high risk assets

Governance:
- consultation with external stakeholders
- estuaries & embayments
Why use qualitative modeling?

- Few data required – signs of interactions
- Can investigate direct and indirect interactions
- Predict direction (+, -, 0) of response to disturbance
- Identify data gaps and hypotheses for further investigation

- Provides a means of clarifying system dynamics and processes through stakeholder workshops - Collective understanding of the system
Qualitative modeling

- Community matrix ($A$) displays direct interaction as shown in signed digraph

$$A = \begin{bmatrix} - & - & - \\ + & - & - \\ 0 & + & - \end{bmatrix}$$
Qualitative modeling predictions

Calculation of the predictions matrix (adj. (-A)) allows:
- direct and indirect effects to be taken into account
- predictions (+, - , 0) of response to perturbation/disturbance to be identified using feedback

\[
\begin{bmatrix}
- & - & - \\
+ & - & - \\
0 & + & - \\
\end{bmatrix}
\]
Models constructed during multiple workshops

Workshops Identified:

- Variables of importance in each system (including threats)
- Relationships (links) between variables
- Potential management scenarios – the ‘best’ scenario presented today
Governance and risk

• Asset: Consultation with key stakeholders – **High risk**

‘General fishery consultation model’ objective:

To identify generalized links representing different consultation processes and to assess the impacts on decision-making and system stability.
General fishery consultation model – Current situation

‘Past’ model

- Minister (i.e. decision-making) consults directly with user & lobby groups as well as Department of Fisheries

- Moderately stable (wFn= -0.50)
  wFn: 0 = Unstable, -1 = Perfectly stable

- Positive feedback creates instability:
  User & lobby groups ◘ Decision-making
General fishery consultation model – Future scenario

‘Current’ model (2010 onwards)

• Minimizes the consultative process from the lobby groups directly to decision-making

• Perfectly stable (wFn= -1.00)

• Removed positive feedback and included negative feedback (stabilizing)
Risk to:
• Estuaries & embayments – **High**
  • Peel Harvey estuary – **High**
• Social outcomes, direct stakeholders (community well-being, rec. fishers) – **SEVERE**

‘Governance model’ objectives:

1) To identify key pathways and barriers to effective governance in the Peel Harvey estuary

2) To identify changes that can improve governance and ecosystem management
Peel Harvey Estuary

- Wetlands of International Importance- RAMSAR Convention on Wetlands
- Estuary of high social importance, fastest growing region in Australia

High nutrients & reduced freshwater flushing
Macroalgal growth, mosquitoes, microalgal blooms
Governance in the Peel Harvey Estuary

- Urban footprint/sprawl
- Total resource use
- Agricultural/industrial land use
- Environmental quality
- Population size
- Government (decisions to improve env.)
- Resource development agencies (e.g., development companies)
- Raw development industry (e.g., mining)
Governance model – Current situation
‘Current’ model- low stability (wFn = -0.33)

Overall governance is ineffective

- No management agencies/depts. improve environmental quality, lack of accountability

- Environmental quality predicted to decline or not be impacted by the majority of variables in the system
Governance model – Future scenario

‘Future’ model- Stable \( (wF_n = -0.69) \)

Environmental quality, real estate values and the economic value of the environment were all predicted to respond positively to an increase in decisions by government.

Regardless of the cause, when environmental quality increases so does the economic value of the environment and real estate values.
Conclusions for further investigation

Qualitative models

- provides a visual representation that can be easily understood by stakeholders and politicians etc. with limited data

- allowed identification of conclusions for further investigation

• Collective (whole of government) agreement for environmental decisions is necessary to improve social and economic outcomes via improved environmental quality

Conclusions identified can be used to aid the prioritization of quantitative data collection and funding
Acknowledgements

Neil Loneragan  Norm Hall
Peter Rodgers  Fiona Valesini
Verena Trenkel  Marie-Joelle Rochet
Shire of Murray  City of Mandurah
Peel Harvey Catchment Council
Peel Development Commission
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