Towards a systematic framework for analysis of cross-disciplinary tools and approaches in biodiversity conservation

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Towards a systematic framework

• **Context:** Australia’s humid tropical forests.
  • cross-disciplinary research – purpose to achieve a significant transformation of knowledge through the integration of ideas or tools typically used by different disciplines or knowledge-generation systems
  • Key challenge in integration – identifying and justifying most suitable tools and approaches for analysis/design

• Three key issues in developing a systematic framework for analysis and design.

• Towards a systematic framework for analysis and design:
  • Two-step process

• Concluding remarks – future directions
Australia’s humid tropical forests

• Living record of the ecological and evolutionary processes that shaped Australian flora & fauna

• Listed as a World Heritage site for its natural values, adjacent Great Barrier Reef WH site

• Multiple and contested values: Indigenous, agriculture, tourism, lifestyle

• Ongoing loss of forest cover outside the protected area estate

• Two severe tropical cyclones in the last five years

• Need for better engagement of people in protecting biodiversity
Cross-disciplinary science challenge: provide underpinning knowledge and tools for biodiversity conservation in this context of competing values, visions, knowledge, use
Participatory scenario generation

- Participatory scenario generation:
  - Intense science/community interaction over 2 year period
  - Key drivers of change, projected trends out to 2025, biophysical, social, institutional data
  - Part of an action co-research approach for a lowland Habitat Network Action Plan
Indigenous cultural indicators of the wet tropics

- Cooperative research for Indigenous cultural indicators:
  - Indigenous Ecological Knowledge (IEK):
  - Key principles of Indigenous governance, cooperative problem-framing, human relationship management, and scale-sensitivity
  - IEK-driven categories of indicators, science-based measurements

<table>
<thead>
<tr>
<th>Categories</th>
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<tbody>
<tr>
<td>1 Recognition of rights and interests</td>
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<td>2 Participation in management</td>
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<td>3 Socioeconomic benefits</td>
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<td>4 Heritage and spiritual values</td>
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<td>5 Understanding history</td>
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<td>6 Climate change</td>
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Status and trends of wet tropics environments

• Status and trends of wet tropics biodiversity, landscape and soils:
  • Prototype integrated indicator framework: radar plot, score-card, multiple data sources including remote sensed data, expert opinion, modelling of weed and pest distributions.
  • Pressure-state-response, ecosystem services.
Why biodiversity declines and protected areas increase:

- Why biodiversity declines while protected areas increase:
  - System model of links between governance systems, public discourse about biodiversity risks/benefits, extinction debt, and increased public access to biodiversity in protected areas
  - STELLA dynamic systems model
Systemization issue 1:

Different types of engagement between disciplines and other knowledge generation systems

Systemization issue 2: differences in philosophy, theory, research strategy (methodology), method

Systemization issue 3: nesting of philosophy/theory/strategy can lead to significant perceptual gaps.
Status and trend in the wet tropics: prototype indicator framework
Perceptual gap

Status and trends of wet tropics environment

Indigenous cultural indicators of wet tropics environment
<table>
<thead>
<tr>
<th>Nested hierarchy</th>
<th>Relevant integrative tool</th>
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<tbody>
<tr>
<td>Philosophy</td>
<td>Deep dialogic tools: Place-based learning communities; principles of Indigenous governance, cooperative frameworks</td>
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<tr>
<td>Theory</td>
<td>Topic-focused dialogic tools: Scenario-generation, dynamic systems conceptual models, common vision tools (e.g. collaborative planning for habitat)</td>
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<td>Research strategy (methodology)</td>
<td>Common platform tools: Simulation and integrative models that can combine multiple data sources, radar plots, Bayesian Belief Networks, Mind-mapping software applications</td>
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<td>Methods</td>
<td>Common data collection tools: Field based protocols and tools, citizen-based data collection, adaptive management experiments</td>
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<tr>
<td>Type (Issue 1)</td>
<td>Highest level (Issue 2)</td>
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<tr>
<td>Trans-disciplinary</td>
<td>Philosophy</td>
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<tr>
<td>Theory</td>
<td>High:</td>
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<tr>
<td>Inter-disciplinary</td>
<td>Theory</td>
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<tr>
<td>Research strategy</td>
<td>Low</td>
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Conclusion

• Key challenge in cross-disciplinary research is about linking the significant transformation of knowledge through integration across different disciplines and potentially knowledge-generation systems.

• Identified three key issues in systemization of approaches:
  1. Type of engagement between disciplines and other systems
  2. Differences in philosophy, theory, methodology and methods
  3. Perceptual gap that arises from these differences

• Initial framework for systemization of two steps:
  1. Matching tools to the research practice hierarchy: deep dialogic, topic-focused dialogic, common platform and common data-collection tools
  2. Consideration of the three issues above to identify the highest priority tools

• Climate adaptation and biodiversity conservation in the wet tropics highlight the need for transdisciplinary research that integrates knowledge between science and society. Key area for future interrogation:
  • Emerging new epistemology? : sustainability science
  • Mediating dialogic relations: power, values
  • Trust, respect, reciprocity
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Thank you