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Cumulative Impact Assessment

Setting the Scene with Lessons from Regional Natural Resource Management


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Workshop

- Background on Social and Economic Impact Assessment for Regional NRM
- Definition and Principles of Cumulative Impact Assessment (CIA)
 - Group Discussion on CIA Principles
- Method of Cumulative Impact Assessment
 - Group Discussion on Best Practice Methodology and Techniques
- Barriers to CIA
 - Group Discussion: Addressing the Barriers
- Case Study: Bayesian Networks for CIA


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What is Social and Economic Impact Assessment?

- The systematic analysis in **advance** of the likely impacts and effects an action will have on the day-to-day life of persons and communities.
 - To understand and anticipate the possible social, economic and cultural consequences on populations and communities
 - A part of the planning process:
 - To maximise information and evidence available
 - To determine possible alternatives, mitigation or enhancement measures

"Turning Insight into Foresight" – Rabel J. Burdge, 2006


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Regional Body Requirements for SEIA

Consideration of social and economic impacts is an expectation under the legislation, including transparency and documentation:


- Use accepted methodologies, document the methods, justify the selected methods
- Fully consult and engage the range of stakeholders affected, document the participative process and justify stakeholder involvement
- Clearly and fully document the range of identified impacts
- Provide a clear rationale for why a management action was chosen and how the impacts will be mitigated

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Barriers to SEIA for Regional NRM

- No accepted methodology, and current SEIA methods more geared towards large infrastructure development / decommission
- Larger onus on regional bodies than on government for SEIA in the design and delivery of natural resource management actions
- Outside of the state-wide investment program for social and economic integration, no resources or expertise are available to regional bodies to assist with SEIA
- Variation across regions limit the applicability of a single approach
- Commission of SEIA by experts cannot be undertaken without sufficient understanding of the what, why and how for SEIA


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Building Upon Existing SEIA Methods

- Identify people who will be affected by decisions?
- Predict the likely outcomes of actions on the community?
- Develop and assess alternative ways of achieving outcomes?
- Consider social and economic criteria?
- Consciously manage side-effect impacts as part of projects?

- Systematic analysis and consistent application
- Documenting learning
- Accountability and transparency
- Developing improved project management skills

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Cumulative Impact Assessment

- Landscape-scale change originates not only from single projects and management actions, but also from complex and dynamic interactions of multiple past, present and future management actions.
- Biophysical, social and economic change accumulates through additive or interactive (or synergistic) processes. The aggregate impact of multiple actions on the environment can be complex and may result in impacts that are more significant because of interactive processes.
- Any given action does not operate in isolation. The most significant changes are often not the result of the direct effects of an individual action, but from the combination of multiple minor effects over the accumulation of time.

General Principles for Cumulative Impact Assessment

- Cumulative impacts are caused by the aggregate of past, present, and reasonably foreseeable future actions.
- Cumulative impacts are the total effect, including both direct and indirect impacts, on a given landscape of all actions taken, no matter who has taken the action.
- It is not practical to analyse the cumulative impacts of an action on the universe, hence the list of impacts must focus on those that are truly meaningful.
- Cumulative impacts need to be assessed in terms of the specific landscape (including resources, ecosystems, communities) being affected.

- Cumulative impacts on a given landscape are rarely aligned with political or administrative boundaries.
- Cumulative impacts may result from the accumulation of similar impacts or the synergistic interaction of different impacts.
- Cumulative impacts may last for years beyond the life of the action that caused the impacts.
- Each affected landscape must be analysed in terms of its capacity to accommodate additional impacts, based on its own time and space parameters.

Discussion:

- What are your experiences with the assessment of cumulative impacts?
- What degree of consideration of cumulative effects is reasonable in an environmental assessment?
- How useful are these principles in guiding the conduct of cumulative impact assessment?
- Is there a need for an agreed and consistent definition of cumulative impacts?
- On the basis of these initial principles, what are some of the issues you can already identify in relation to cumulative impact assessment?

Steps in Impact Assessment

1. Scoping
 - Identification of objectives, issues, variables
2. Profiling
 - Overview and analysis of current context and historical trends
3. Formulation & Consideration of Alternatives
 - Comparison of available options
4. Projection and Estimation of Effects
 - Detailed examination of potential impacts of the options
5. Monitoring, Mitigation and Management
 - Collection of information about the actual effects and application of this information
6. Evaluation
 - Systematic, retrospective review of options and effects against objectives

Steps in Cumulative Impact Assessment

1. Scoping
 - Identify the significant cumulative effects issues associated with the proposal
 - Establish the geographic scope for the analysis
 - Establish the temporal scope for the analysis
 - Identify other actions (and agencies) affecting the landscape of concern
2. Profiling
 - Overview and analysis of current context and historical trends identified in areas of concern in terms of their vulnerability and adaptive capacity
 - Characterise the pressures affecting the areas of concern
 - Define a baseline condition
3. Formulation & Consideration of Alternatives
 - Identify the cause and effect relationships between the proposed actions and the identified areas of concern
4. Projection and Estimation of Effects
5. Monitoring, Mitigation and Management
6. Evaluation

Scoping for CIA: Temporal and Spatial Boundaries

- How do we avoid assessing everything?
- How do we identify what is important to assess?
- How large an area around the action under review do we have to assess?
- What other actions should we consider?
- Over what duration of time must effects be assessed?
- How do we determine significance of these cumulative effects?
- What do we need to do about these cumulative effects?

Bounding the Analysis

- Screening
 - When is a cumulative impact assessment required?
 - What constitutes a *significant* cumulative impact?
- Geographic Scales
 - How do you define the project impact zone?
 - What about external activities with an indirect effect on the project?
- Temporal Boundaries
 - How far back / how far forward in time does the analysis need to assess?
 - On what basis do you include or exclude *reasonably foreseeable future actions*?

Methods of Cumulative Impact Assessment

- **Tends to use the existing methods of impact assessment, but adapted to incorporate unique requirements of CIA**
 - Expanded spatial and temporal boundaries, need for multiple agency co-operation, recognition of dynamic interactions, complex conceptual modeling
- **Best practice would imply a suite of methods:**
 - Participatory techniques
 - Checklists, matrices, decision-trees
 - Network or systems analysis
 - Modeling and scenarios
 - Extrapolation and trend analysis
 - GIS overlay mapping
- **Methodological issues inherent in these approaches persist and tend to be compounded by the increased complexity and scope**
- **Most of these techniques struggle with quantification of cumulative effects**

Adaptive Management Approach to Impact Assessment

- **Application of the Precautionary Principle to CIA:**
 - Begins with the recognition of a high degree of assumption and uncertainty
 - The absence of perfect predictive capacity should not be used as a basis to forego cumulative assessment with available data and analysis techniques
- Adaptive management techniques, flexible implementation and research and monitoring programs can be incorporated into the program to improve future methods and analysis.
- Appropriate recording of all assumptions, data gaps, and confidence in data quality and analysis to justify conclusions provide the basis of continual improvement in methodology.

Discussion

- What techniques have you used to consider cumulative impacts?
- Are there additional techniques from social or environmental impact assessment which may be adapted for assessing cumulative impacts?
- What constitutes current best-practice in the field of cumulative impact assessment?
- What standards are reasonable for the evaluation of assessments and assessment methodologies?

Discussion Points:

- What challenges do you face in undertaking cumulative impact assessment?
- What challenges do we face collectively as CIA practitioners?
- What actions can we undertake, as a community of practice, to address these challenges?

Case Study: Causal Network Analysis

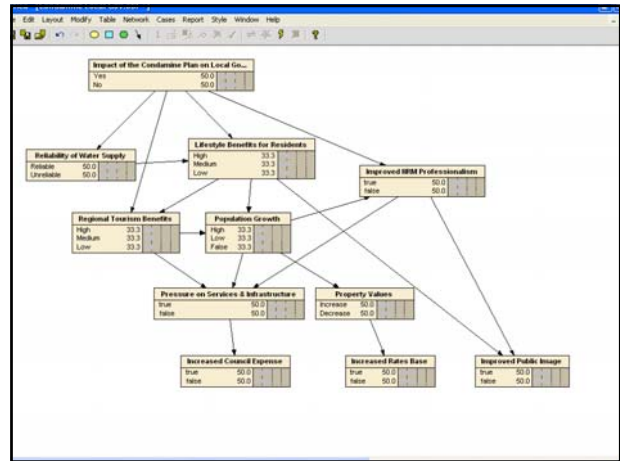
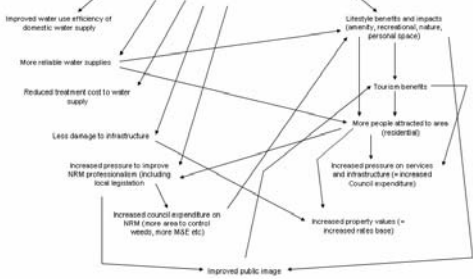
- Development of Bayesian nets based on conditional probabilities
- Visioning of potential impacts and variables of an action in a web of cause-effect relationships
- Develops into a working document for staff and stakeholders to assess, evaluate and contribute to as a means to structure dialogue and organise the analysis
- May contribute to the development of a quantitative model

Examples of Social and Economic Impacts

- Population size, density and characteristics
- Voluntary associations
- Employment and income characteristics
- Economic resilience
- Distribution of power and authority in the community
- Conflicts over land uses between community members
- Levels of co-operation between groups
- Community knowledge, understanding and commitment
- Trust in political and social institutions
- Perceptions of risk, health, and social well-being

Appendix 1

Potential outcome impacts of the Condamine Alliance's NRM vision on LOCAL GOVERNMENT



Conditional Probabilities

- A table underlying each variable in the network that expresses the probability that the 'child' variable will be in a specific state given the 'state' of its parent 'variables'
- Information gathered from the collection of data against indicators used to determine probabilities
- Data can be generated by:
 - Direct measurement (population stats)
 - Stakeholder elicitation (landholder perceptions)
 - Simulation models based on measurements
 - Academic or 'expert' opinion

Regional Tourism	
true	50.0
false	50.0

Population Growth	
High	33.3
Low	33.3
Negative	33.3

Property Values	
Increase	50.0
Decrease	50.0

