Mekong River Commission

Ecological Risk Assessment Course

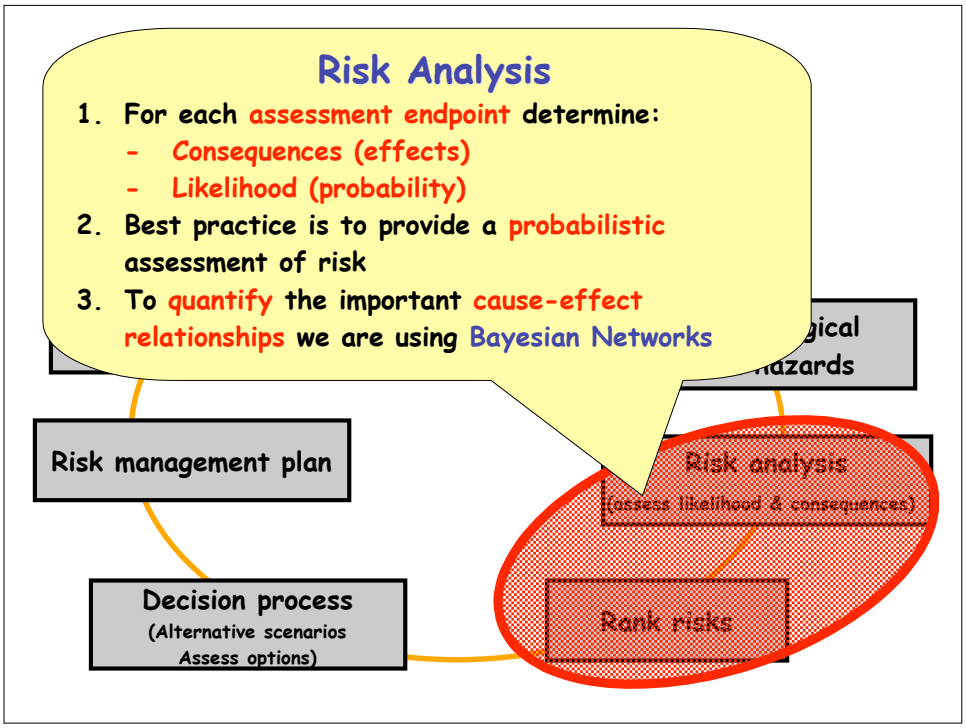
Qualitative Risk Analysis

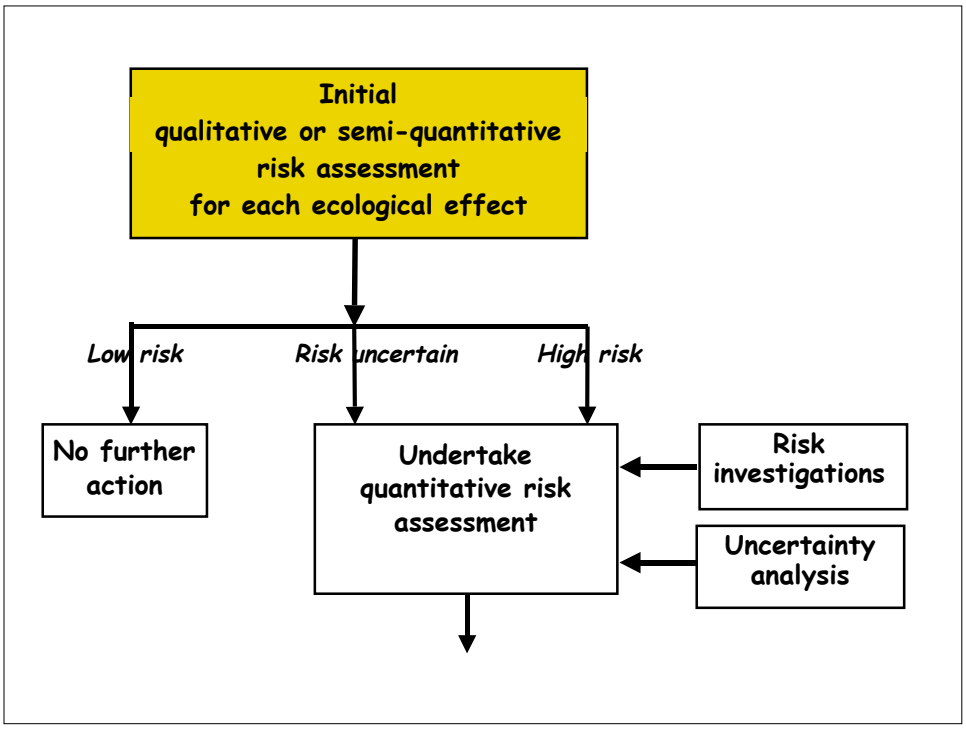
Water Science Pty. Ltd.

Water Studies Centre

To be covered

- Decide on the problem
- Identify ecological issues
- Identify hazards associated with each issue
- Stakeholder workshops
- Preliminary ranking of issues


Risk Analysis
1. For each assessment endpoint determine:
- Consequences (effects)
- Likelihood (probability)
2. Best practice is to provide a probabilistic assessment of risk
3. To quantify the important cause-effect relationships we are using Bayesian Networks
Risk management plan
Risk analysis
(assess likelihood & consequences)
Decision process
(Alternative scenarios
Assess options)
Rank risks


Initial
qualitative or semi-quantitative
risk assessment
for each ecological effect
Low risk
Risk uncertain
High risk
No further action
Undertake quantitative risk assessment
Risk investigations
Uncertainty analysis

Risk analysis

- Need information on:
  - Likelihood of hazards having an effect
  - Consequences (size, magnitude, severity) of effect if it does occur
- Three levels:
  - Tier 1 - qualitative risk analysis
  - Tier 2 - semi-quantitative risk analysis
  - Tier 3 - quantitative risk analysis

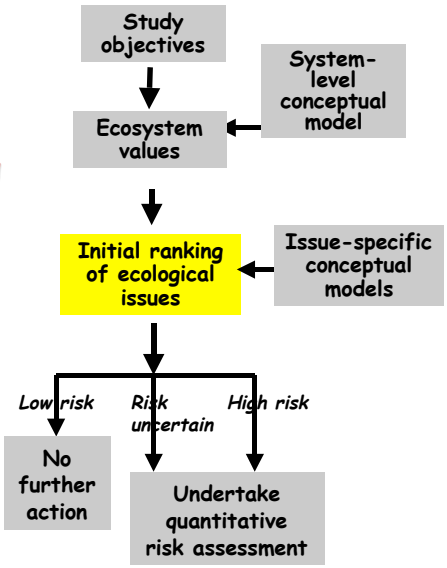
Qualitative risk analysis

- Example - risk matrix (Aust Standards)
- Use words to describe likelihoods and consequences
- These types of analyses suffer from following (non-transparent) problems:
  - Vagueness
  - Subjectivity
  - Bias

Likelihood	Consequences			
	Marginal	Minor	Intermediate	Major
Almost always	Low	Moderate	High	High
Likely	Negligible	Low	High	High
Unlikely	Negligible	Low	Moderate	High
Almost never	Negligible	Negligible	Low	Moderate

Hazard analysis

- What are hazards?
- How best to identify?
  - Structured brainstorming
  - Checklists
- Issue/hazard matrix
- Develop issue-specific conceptual model



How best to undertake these steps?

Option 1: Technical team approach

- Often the approach used
- Should be multi-disciplinary
- Why? to avoid narrow scope

Option 2: Technical team with stakeholder involvement

- Approach now used in most developed countries
- What is involved?
- Stakeholders used to help identify
  - Environmental values
  - Ecological issues
  - Conceptual models
  - Information sources
- Who are the stakeholders? Discuss
- Advantages/disadvantages - discuss

Stakeholder involvement

- Stakeholder involvement is essential
- Stakeholder workshops are common method for eliciting information (but not the only way)
- Purpose of the exercise must be clearly identified before the workshop is run
- Primary aim to inform the ERA process, but also very useful for informing the stakeholders on the range of issues associated with their operations
- Success of these workshops is dependent upon:
  - the knowledge-base of the stakeholders
  - the mix of stakeholders attending
  - the planning of the workshop
  - the way in which the workshop is facilitated

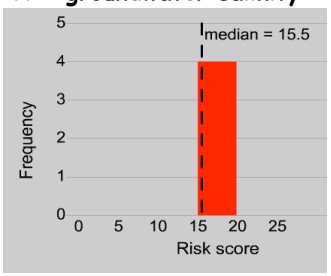
- Important to have good technical/scientific information available, but this should not dominate the workshop – the purpose is to solicit the views of the stakeholders
- Important for the credibility of the process to get ALL the issues on the table
- Stakeholder workshops are most successful if there has been prior interaction between stakeholders (particularly irrigators) and the ERA technical group
- Building of TRUST between the players is extremely important

Issue/hazard matrix

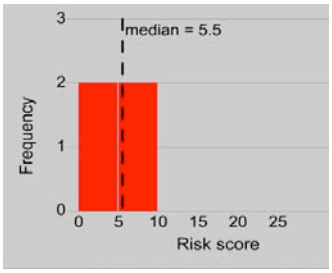
Class exercise

Outcome from subjective risk assessment - WA wetland

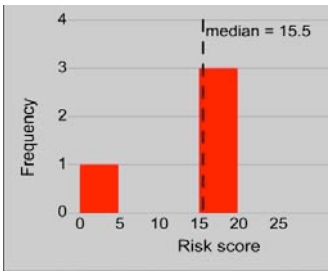
A - groundwater salinity



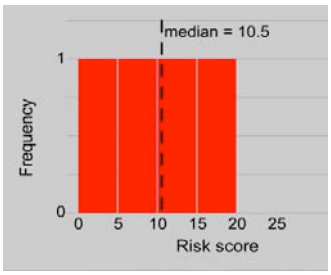
B - sedimentation



C - innundation



D - eutrophication



Initial ranking

- Class exercise

Key messages

- Risk analysis phase provides information on the consequences & likelihood of each issue
- This 'minimalist' approach still very useful (values identified, threat/hazards identified, conceptual models built)
- Need for stakeholder input (workshops etc)
- Qualitative methods (e.g. Risk matrix) can assist
- But issues of bias & subjectivity must be considered

- When risks warrant it - may need to go to a more quantitative analysis