

# Mekong River Commission

## Ecological Risk Assessment Training Program

### ERA Overview



## References

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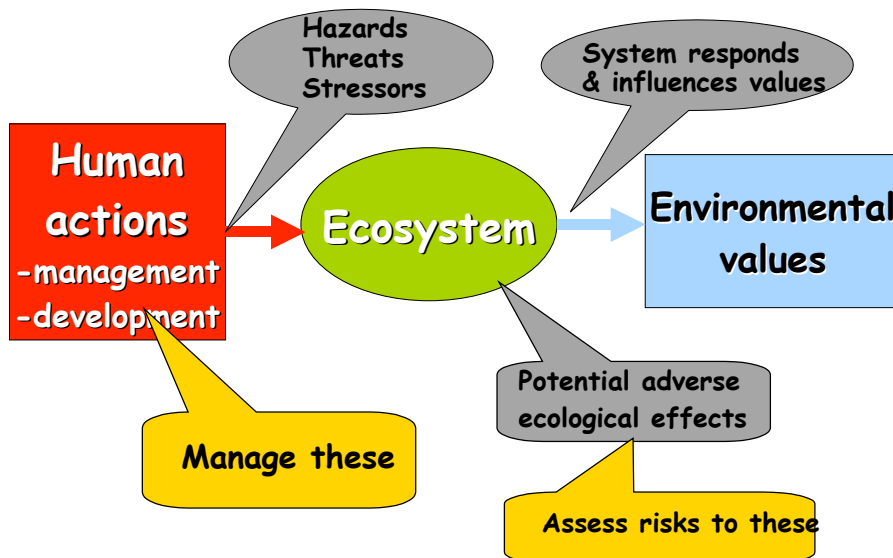
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*Guidelines for Ecological Risk Assessment*. U.S. Environmental Protection Agency, Federal Register 63(93): 26846-26924, Washington 1998 [www.epa.gov/ORD/WebPubs/ecorisk]

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## Why the need for risk assessment?



## Assessing risk to natural resources

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- Need to manage aquatic systems (and catchments) that are characterised by:
  - *Variability*
  - *Complexity*
  - *Uncertainty*
- We have some (general) knowledge about ecological effects of contaminants such as copper & nutrients
- But we lack well-accepted quantitative (and predictive) *cause-effect models*

## Definitions

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### Risk

*probability that an adverse effect will occur in a person/group/ecosystem (target) that is exposed to a particular dose or concentration of hazardous materials (toxicant)*

### Ecological risk assessment

*process for determining level of risk posed by stressors (contaminants) to the survival & health of an ecosystem*

## Use of ERA

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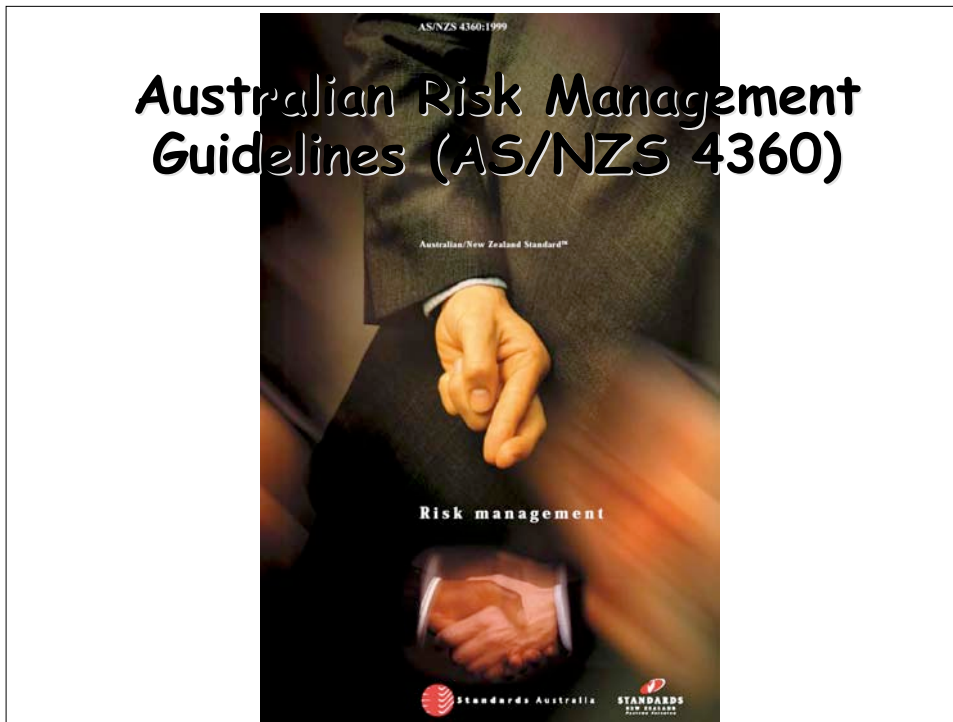
- To link management actions with possible consequences when judged against environmental values (cause-effect relationships)
- Used to assess ecological/environmental risks from:
  - Toxicants, contaminants
  - New developments in catchment (e.g. urban subdivision, irrigation scheme)
  - Managing biological resources (e.g. forests, fisheries)
  - Channel deepening in Port Phillip Bay
  - Impacts of mine wastes on Ok Tedi and Fly river (PNG)

## Ecological Risk Assessment

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- Method for assessing level of risk to ecosystem health posed by multiple stressors & then deciding what to do about the priority risks
- Two main components of risk
  - The **consequences (or hazard)** if an adverse event occurs
  - Probability or **likelihood** of such an adverse effect occurring
- Also need to consider **scale**
  - Spatial, temporal
- Risk = **consequences x likelihood**

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## Risk Ranking Matrix

Likelihood	Consequence Severity				
	Low	Minor	Moderate	Major	Critical
Almost Certain	High	High	Extreme	Extreme	Extreme
Likely	Moderate	High	High	Extreme	Extreme
Possible	Low	Moderate	High	Extreme	Extreme
Unlikely	Low	Low	Moderate	High	Extreme
Rare	Low	Low	Moderate	High	High

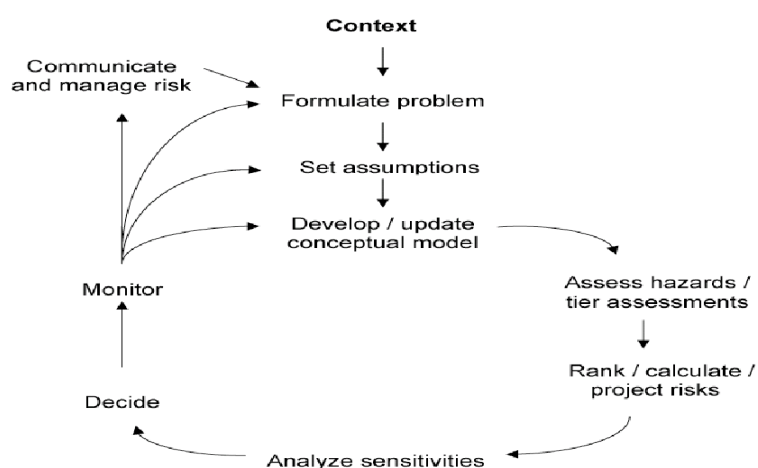
## Ecological risk assessment vs human health risk assessment

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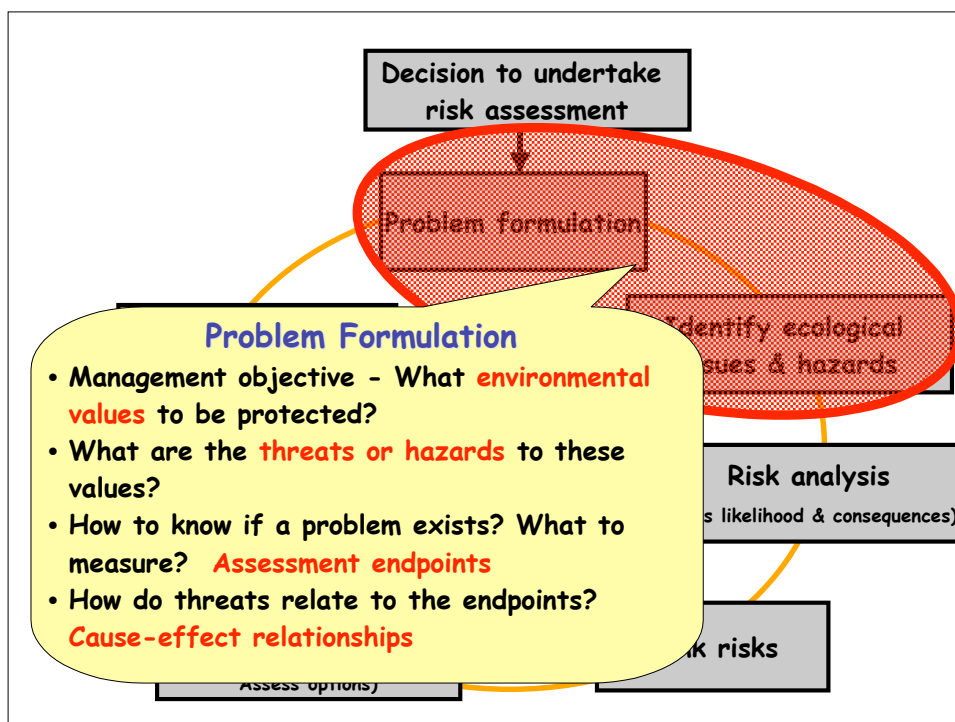
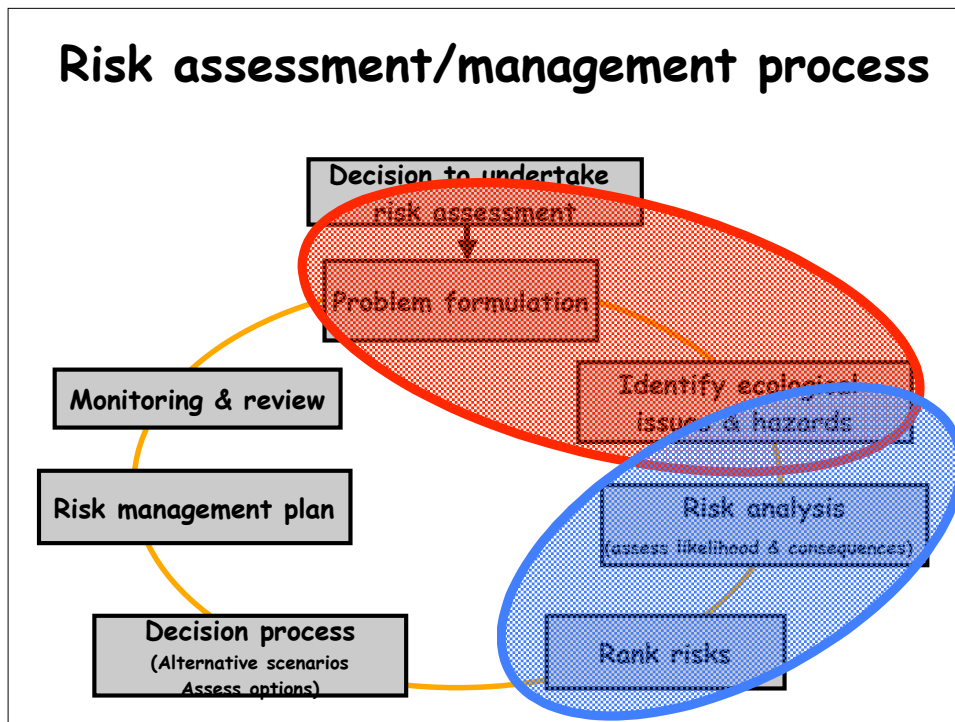
- Large number of target species
- What "end points" to use? how to judge adverse effects or consequences?
- What is "acceptable" risk?
- How to sort out perceived vs actual risk?
- Often subjective judgements need to be made
- How to make these "more reliable"?

## Risk management cycle

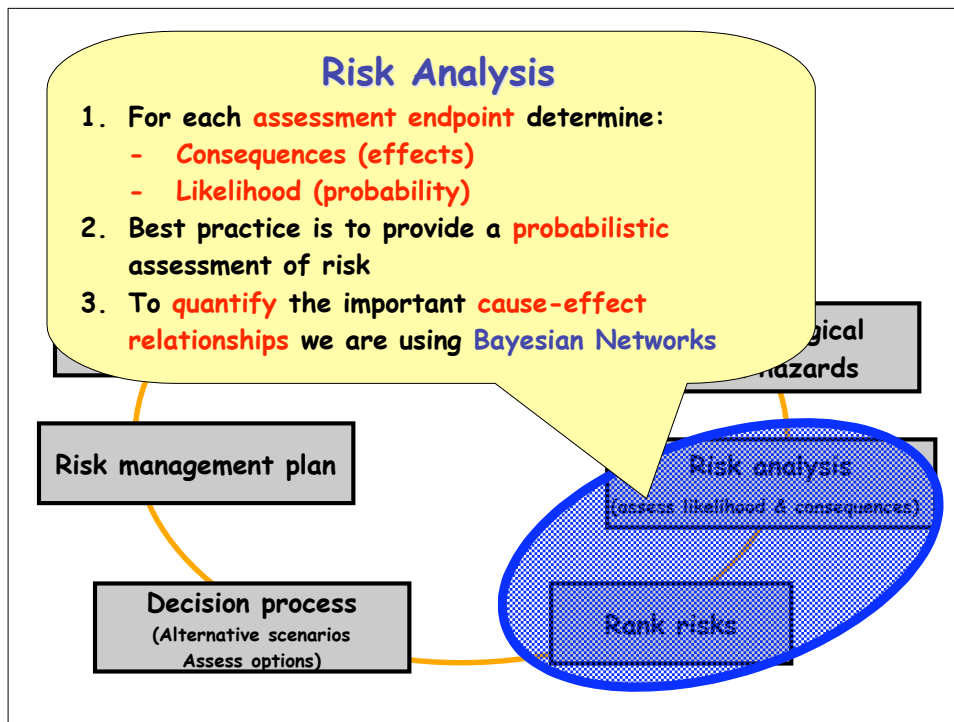
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## ERA Steps

- **Problem formulation**
- **Risk analysis**
  - Hazard assessment
  - Likelihood assessment
- **Risk ranking**
- **Test scenarios**
- **Develop risk management plan**
- **Monitoring & review**



## What does ERA offer?

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- **Robust process**
  - Rigorous & logical process (steps now well documented)
  - Scientifically credible
  - Internally consistent
  - Transparent
  - Assumptions & uncertainties clearly identified
  - Aim to quantify the linkages between threats/stressors and effects
- **Outputs**
  - Risk predictions (with probabilities)
  - Priorities for action