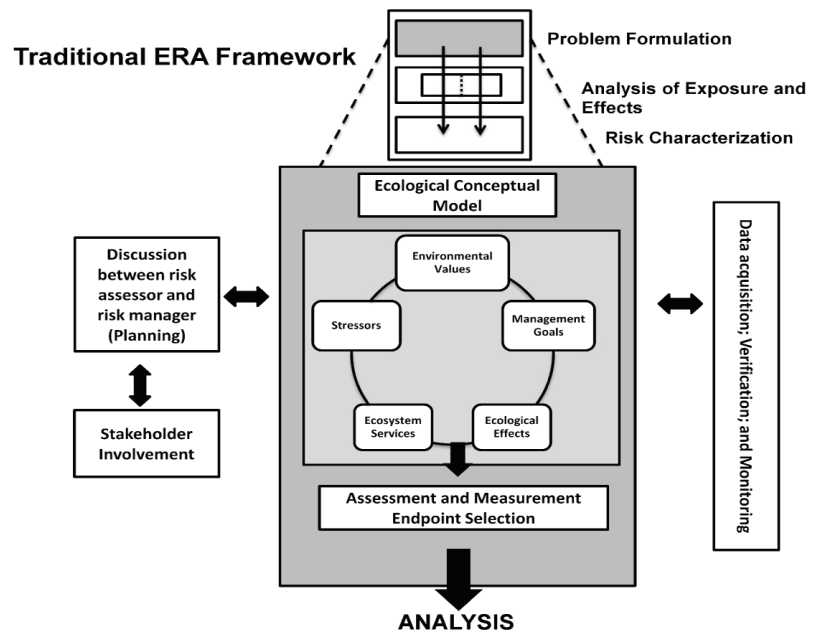


# Ecological risk assessment

CSIRO provides specialist capability for assessing the risk of chemical contaminants and multiple stressors in aquatic systems.

Ecological risk assessment (ERA) is a process that evaluates the likelihood that adverse ecological effects are occurring as a result of exposure to one or more stressors. Either screening level or more complex probabilistic ERAs can be undertaken. ERAs may be effects-driven e.g. an impact on a population or community is detected and the cause of the impact is subsequently investigated, or it may be stressor-driven, where inputs into a system and how stressors interact within the system are used to predict risk and prioritise management actions.

ERA provides environmental managers with an approach for considering available scientific information along with other factors (social, political, economic) in selecting a course of action. Risk assessment differs from hazard and impact assessment in that it provides a direct link between exposure and effects, enabling the comparison and prediction of risk and uncertainty associated with various scenarios.

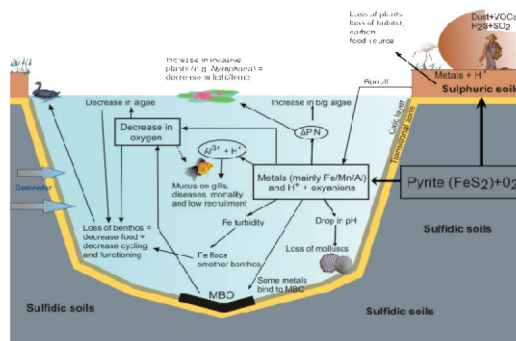
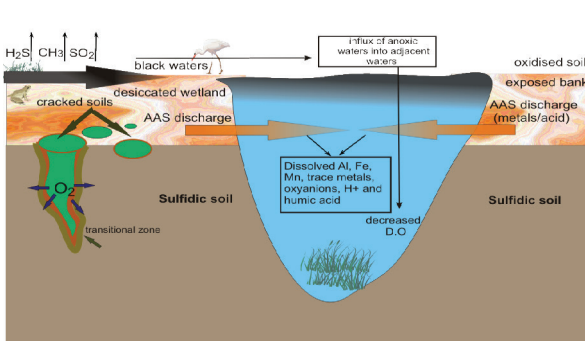


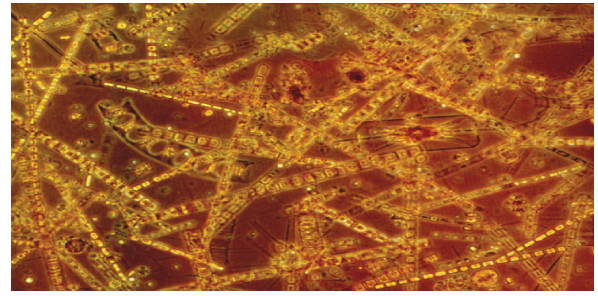
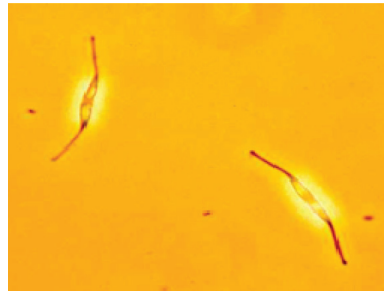
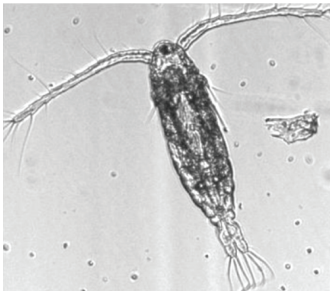
## Problem formulation

The most critical part of risk assessment is the initial problem formulation stage which involves all stakeholders establishing the goals of the ERA. Information on stressor sources and characteristics, exposure pathways, habitats, receptors, effects, environmental values, assessment endpoints, background monitoring data and data gaps is gathered and a conceptual model of cause-effect pathways is constructed.

## Exposure assessment

CSIRO has state-of-the-art analytical facilities to measure the concentrations and chemical forms (speciation) of contaminants in water, sediments and biota. We specialise in the determination of trace levels of contaminants and have pioneered the development of chemical methods to assess their bioavailability e.g. Chelex-labile metals. Our labs are NATA accredited and certified quarantine approved premises.





## Effects assessment

CSIRO has developed and applied a wide range of biomarkers and toxicity tests to assess the effects of contaminants in marine, estuarine and fresh waters and sediments. Further details of tests available for effects assessment are provided in the companion brochures on *Direct toxicity assessment* and *Whole-sediment ecotoxicology*.

## Risk characterisation

Measured or predicted concentrations of stressors are compared to concentrations known to have no effect using either deterministic approaches (Hazard Quotients) or probabilistic methods. This enables estimation of risk (likelihood and consequence) and associated uncertainty for communication to stakeholders.

## Examples of risk assessments by CSIRO Centre for Environmental Contaminants Research (CECR)

CSIRO scientists have undertaken a range of environmental risk assessments for industry and state government agencies including:

- water quality screening risk assessment of acid sulphate soil impacts in the Lower Murray River system, South Australia
- screening risk assessment of contaminants in Port Curtis, Gladstone, Queensland
- risk assessment of impacts downstream of mines in Australia and the Asia-Pacific region
- tropical risk assessment of metals in SE Asia
- development of frameworks for risk assessment of multiple stressors in the context of climate change.



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### AT CSIRO WE SHAPE THE FUTURE

We do this by using science and technology to solve real issues. Our research makes a difference to industry, people and the planet.

### FOR FURTHER INFORMATION

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