



# MODELLING OF RIVER HEALTH USING BAYESIAN NETWORKS

PhD Project



## WHAT

This project aims to develop a decision support tool that can predict the ecological health of river systems, with the focus being on native fish communities. Bayesian network models will be used to achieve this.

The outcome will be a decision support tool that:

- enhances our understanding of the variables that influence fish communities;
- investigates the linkages between the physical, chemical and biological components of a river system and natural resource management actions;
- identifies key risks to ecological health, assisting resource managers in effectively prioritising management actions and investments; and
- predicts the outcome of system changes due to changes in management strategies, modifications to flow regime and climate change, on fish communities.



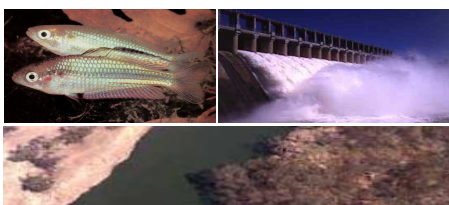
## HOW

- Using fish communities as an indicator of ecosystem health, a model will be constructed to examine natural and human-induced factors that influence communities in selected sub-catchments of the Murray Darling Basin (MDB).
- The study involves the following activities:
  - A **conceptual framework** will be constructed to link system drivers (including management activities and climate) with physical, chemical and biological factors, with the focus being on fish communities in the MDB. This will be reviewed by a group of fishery experts and natural resource managers.
  - Using this framework along with **data and knowledge**, a Bayesian network will be constructed.
  - The model will be **evaluated** by comparing fish community predictions against fisheries monitoring data (obtained from the MDBC Sustainable Rivers Audit) and by expert review.
  - Model weaknesses will be identified, and the model **revised** using an adaptive and iterative approach.
  - The **final model** and documentation will be presented in a user-friendly format.
  - The **decision-support tool** will be presented at a workshop involving resource managers, fishery experts, and other potential users.



## WHO

- **PhD student: Serena Chen (ANU)**
- Supervisory panel: Carmel Pollino (ANU), Tony Jakeman (ANU), Keith Walker (Murray Darling Basin Commission), Martin Lambert (University of Adelaide)



## BRINGING IT ALL TOGETHER

This student project fits within the Knowledge Integration (Project 6) activities of the Landscape Logic project. It addresses the water quality and quantity theme for freshwater systems. The decision support tool will be applied to Victorian catchments, and be adaptable to systems throughout the MDB.