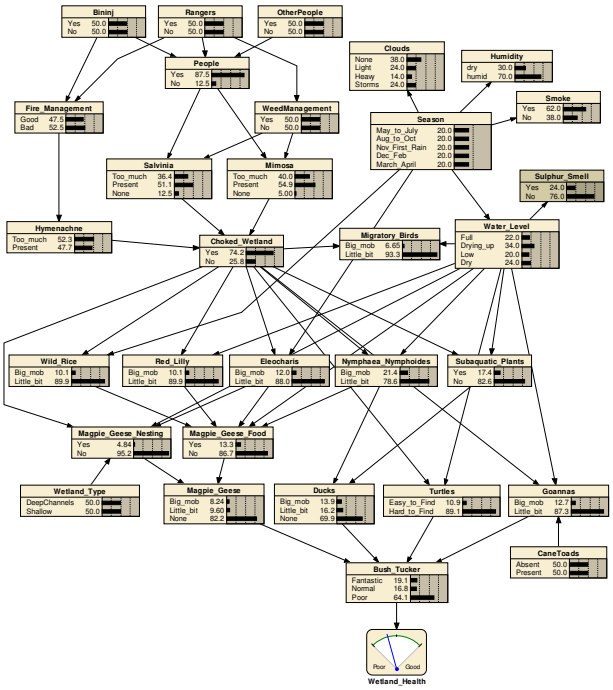
Representing Indigenous wetland ecological knowledge in a Bayesian Belief Network

Liedloff, A.C. [1], **P. Christophersen** [1,2], **S. McGregor** [1,2] **and B. McKaige** [1].

[1] *CSIRO Sustainable Ecosystems, Northern Territory, Australia*
[2] *Bushfire Cooperative Research Centre*

It is widely appreciated that Indigenous Australians hold a wealth of ecological knowledge that could be beneficially applied to contemporary land management. However, this has rarely happened, and unfortunately a large amount of Indigenous knowledge is being lost as elders pass away. The Bayesian Belief Network (BBN) approach is ideal for recording traditional ecological knowledge and applying it to land management, as it can integrate qualitative information in the form of expert opinion with the quantitative data of conventional process-based models. Once a model is developed, the Bayesian network approach also provides an intuitive means of exploring system dynamics, therefore offering an effective educational tool for Indigenous and non-Indigenous people alike. The collaborative process of model development also fosters new relationships and a better understanding of the ecosystem by all parties. This project was designed to examine the cultural benefits of Indigenous fire management as it is re-applied to wetlands associated with the South Alligator River, Northern Territory, Australia, by working with a family of Aboriginal land managers, a number of whom are traditional owners in Kakadu National Park. A BBN was developed to formalise the integration of western and indigenous knowledge systems, and to develop a visually appealing, interactive, educational experience for a diverse audience, from Aboriginal land managers to tourists and park management. A web-based, graphical presentation and associated management software was developed to clearly present BBNs and display additional underlying knowledge to a diverse audience. This paper presents the process and unique challenges in developing the BBN with Indigenous Australians who have not been previously exposed to western modelling approaches.



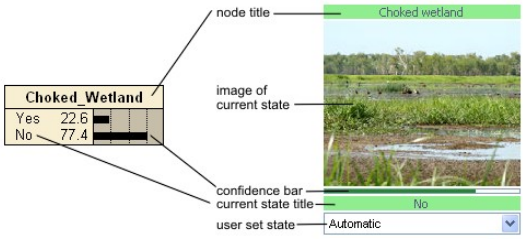


Figure 2. A Netica BBN node (left) and the visualisation of the same node for display on the web page (right) with common attributes shown.

Figure 1. The Bayesian Belief Network representing Indigenous ecological knowledge about wetland health in Yellow Water, Kakadu National Park, Northern Territory, Australia.

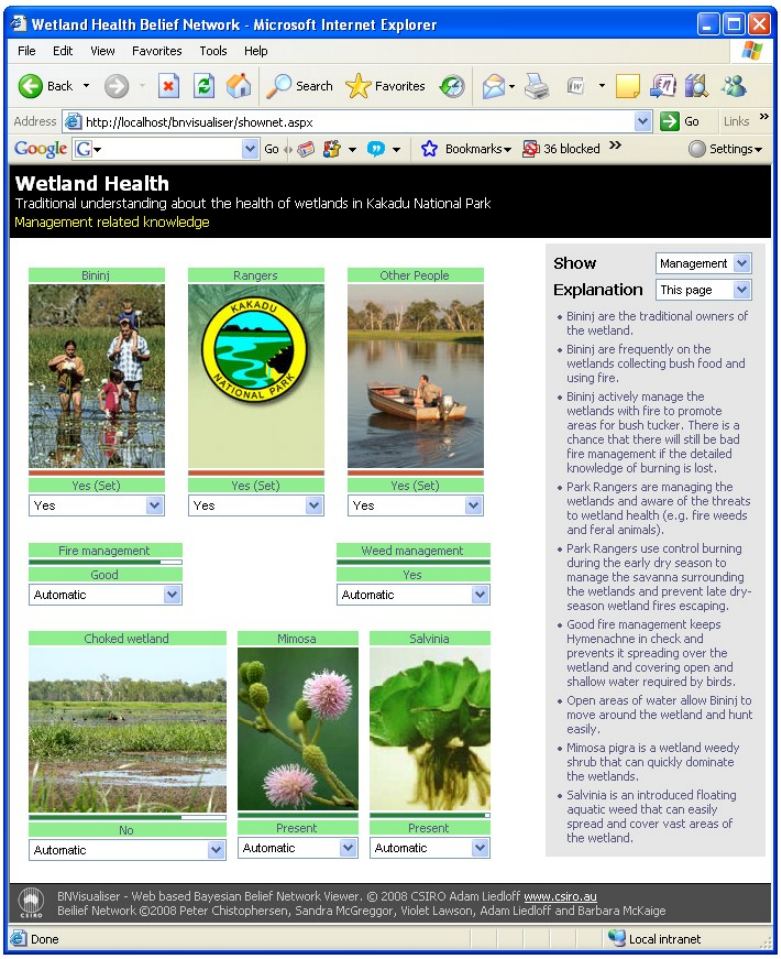


Figure 3. An example of the web-based visualisation showing the Aboriginal land management understanding of the Bayesian Belief Network developed for this project.