5 Discussion

In the early development phase of the LUIM, emphasis was placed on defining the underpinning risk assessment framework. This focus on the conceptual framework and associated terminology was necessary to make the LUIM robust, simple but adaptable. The latest version of the LUIM, based on an agreed, consistently applied, risk assessment framework, has now been successfully used in three different projects. Through collaboration with Drs David Pullar and Carl Smith of the University of Queensland, the initial conceptual and software development of the LUIM has been completed.

5.1 LUIM consortium

In 2002 discussions with other agencies resulted in formation of a LUIM consortium with Landcare Research (New Zealand) and the New South Wales Department of Land and Water Conservation. The consortium was set up in order to provide a mechanism for:

- Coordinating R&D activities between departments and research institutes.
- Maximising potential development and benefits.
- Increasing access to the technology.
- Increasing communication and collaboration.
- Potential development for new markets.

Members of the consortium pay an annual service fee and in turn receive the LUIM code which they are free to modify and augment. These modifications can then be shared with other members of the consortium.

5.2 The future for LUIM

The development process for the LUIM has highlighted many possibilities for applications and improvements to methods so far.

Engage with next users

We need to increase engagement with next users and encourage adoption of the LUIM within and outside DPI. This is particularly relevant to CMAs who could use the LUIM as a reporting tool for their regional strategies. By simply updating the land use practice inputs over time the LUIM can be used to indicate changing levels of threat or risk in a region. A common problem with maps is that they are taken as factual rather than as modelled outputs. A critical level of engagement is needed to ensure a common understanding of the limitations of the results and how the outputs should be used. We also need a better appreciation of what is required by CMAs or SoE reporting in terms of product and presentation of results.

There is a need for provision of training and support to next users in the use of the LUIM.

Validate LUIM outputs

Outputs of LUIM are modelled and predicated on a number of assumptions or 'expert' knowledge. While the relationships defined by experts have some validity, the degree to which these relationships express themselves in the real world is often unknown, unless there are good empirical data to back the assumptions. There is a general need therefore to validate likelihood outputs of the LUIM by assessment of asset condition on the ground. Such validation would then be fed back into the model to adjust ratings in the likelihood and consequence matrices, with appropriate weightings if required. Recently, soil erosion was mapped for the Corangamite region. The actual occurrence of erosion conformed well to the susceptibility ratings of the regional experts, but did not correlate well with the likelihood outputs from the LUIM. This indicates that the importance given to management practices with respect to increasing erosion on susceptible land was over-estimated. In the WGCMA soil erosion management plan project we applied lessons from Corangamite and adjusted the likelihood matrix ratings to give less weight to management and more to susceptibility. In a current project assessing wind erosion in the Mallee, the occurrence of erosion and factors leading up to the erosion are being analysed using remote sensed imagery and ground truth. In the Mallee project there will therefore be some validation or control over the LUIM model.

Refine methods

The LUIM risk framework has served different projects well and should not need to be altered. Improvements could be made in the rules and classifications that are used to populate the nodes in the

framework. In particular, robust ways to assign values to assets are needed. Sensitivity (or resilience) is an important consideration for the sustained use of natural resources but firm rules and criteria for measuring this do not exist. The ecological assessments using the LUIM have been challenged due to lack of quantitative data on the dynamics of native ecosystems, in particular in an agricultural context and this is an important area for fundamental research.

Develop LUIM in a more accessible software environment

The LUIM runs as an extension in ESRI's ArcGIS 9.1. This restricts the development of projects in the LUIM to users who are licensed to use this software. The functionality required by the LUIM does not necessarily require a high powered GIS such as this. Future work to build the LUIM in a more affordable and available platform should be supported. Ideally, this should include the capability to run scenarios in the LUIM through the worldwide web.

Create a LUIM knowledge base

A primary value of the LUIM is the focus it has provided for integration of knowledge and data from a range of sources. The LUIM process has forced engagement across disciplines in order to develop rules to relate land use practices to degradation processes, and to develop criteria for measuring susceptibility, sensitivity, and value. The knowledge and rules documented through the LUIM projects can be changed, updated, and augmented. A LUIM knowledge database is needed to manage this. A database for the LUIM rules could store information for many more land uses and practices (present or future) and be a resource for future modelling.