consistency (are eucalypts identified the same way throughout the database). A spatial database that satisfies these two pre-requisites can be used for modelling. The soil map depicted in Figure 1 could only be created once compatibly scaled mapping was combined with a consistent naming convention and study methodology.

Conclusion

A GIS can be defined to include data input and output functionality, software, and a database which is influenced by the corporate environment within which it operates. Although many reviews of GIS focus on technical functionality, the reality is that in most cases such functionality is meaningless in the absence of a quality dataset. In many circumstances, datasets will be available off the shelf, but to use these effectively, you really need to feel confident with the data's scale and pedigree. In some cases you will need to add your own data, an ideal source for which is air photography in the form of a GIS backdrop. Air photography has its own accuracy related problems, most of which can be overcome.

The highest quality databases are those where mapped components have an accuracy that is appropriate for the use the database is being put to, and the attributes of those components have a consistent nomenclature so that comparisons can be made across the dataset. Such a database can be queried in the most meaningful and flexible ways. Clearly then, it is the database that makes GIS such a beast to tame.

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Priority weed mapping in Melton Shire

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In 1997, Melton Shire Council was successful in receiving grant funding for a GIS Weed Mapping Officer. The primary role of this person was to map the extent of Melton's five priority weeds.

Priority Weeds

- African boxthorn – *Lycium feroissimum*
- Artichoke thistle – *Cynara cardunculus*
- Paterson's curse – *Echium plantagineum*
- Prairie ground cherry – *Physalis viscosa*
- Serrated tussock – *Nassella trichotoma*

A third year of funding has just been received and in addition to priority weed mapping, there will be more complex GIS operations, identifying heavily weed infested riparian zones and mapping Chilean needle grass.

Mapping system

GPS Unit

- (Global Positioning System) determines position of user by co-ordinates e.g. latitude and longitude.

Stylistic 1000 / Pen Computer

- Pen based computer directly linked to the GPS unit.
- 'Weedmap' was the program used for the first two years of mapping.
- New program is 'Field Notes', which is more GIS focused. Each table can have fields the user sets up.

Differential / RDS 3000

- Overcomes selective availability of the satellites from the US Defence Department.
- Corrections are calculated by the JJJ Station at Mt. Dandenong, Victoria and sent to the RDS.
- With a differential, accuracy is increased from 1–3 m. Without a differential, accuracy can be between 10–70 m.

Aims

i. Compare all three years of weed mapping for:

- Weed movement or spatial change across the whole Shire.
- The movement of heavily infested areas or 'Hotspots'.
- New outbreaks of the weeds previously unmapped.

ii. Reasons for spread.

- Birds – common in distributing boxthorn (as seen along fence lines).
- Water – severe gorse and boxthorn weed infestations along creeks.
- Wind – importance of wind breaks to stop seed distribution.
- Non conformance with the EEP (explain later).

Methodology

Can only be attempted when the GPS is fully functional depending on satellite availability.

i. Data collection can be done in two ways:

a. On foot carrying equipment. This was the more common method involving walking around an infestation such as serrated tussock or standing close to a boxthorn.

b. By estimating the extent of an infestation from the car and manually drawing in the area symbol (termed polygon).

ii. Weed infestations are recorded in Fieldnotes as either a symbol point (as for a single boxthorn) or area polygon (as for serrated tussock).

iii. Each time a point or polygon (weed) has been entered, a form is filled out. For example I have a table called 'Weeds' and when I enter data, a pop down form comes up automatically and I have to chose from each category before I enter the next object, e.g.:

- Weed type – select from list
- Intensity – i. 1–10%, ii. 11–50%, iii. 51–100%
- Environs – riparian, open plains, fence line, roadside

iv. This data will then get exported to MAPINFO as a mid / mif. I'll then do a query and separate all the different weed types and create individual maps.

Limitations

Mapping and evaluating a feature such as a weed infestation and its rating is a subjective exercise. Two people have been involved with weed mapping for this project and therefore differences in opinion may have occurred.

Originally, weeds were categorized into eight levels of intensity by the first Mapping Officer. I changed it to three categories: i. 1–10%, ii. 11–50%, iii. 51–100% because I found eight categories too

difficult to classify weeds into, unnecessary and time consuming. Also ones perception of weed cover may differ slightly from day to day.

Roadside mapping was less accurate and data collection on foot was very time consuming

Weeds initiative – Year 3

A third year weed mapping within the Shire of Melton will involve the following activities:

i. Establish a formal reporting / communication system with Conservation Inspection Officer and NRE (Bacchus Marsh Office) for consistency between parties, optimizing weed mapping and the Environmental Enhancement Policy.
ii. Devise the most appropriate symbology for weed representation when displayed on maps.
iii. Accurately map the location of Melton Shire's five priority weeds: African boxthorn (*Lycium ferocissimum*), artichoke thistle (*Cynara cardunculus*), Paterson's curse (*Echium plantagineum*), prairie ground cherry (*Physalis viscosa*) and serrated tussock (*Nassella trichotoma*) with a GPS Mapping System.
iv. Map in detail heavy weed infested properties and ascertain future weed movement to neighbouring properties and watercourses.
v. Create soil, rainfall, vegetation, land use, and contour coverages in the GIS for full spatial analysis of priority weeds over the three years.
vi. Investigate the role of water, birds and machinery in the distribution of weeds.
vii. Present talks to community, Landcare groups and other relevant groups on the state of weeds within the Shire.
viii. Develop an environmental weed mapping and monitoring system as part of a remnant vegetation condition assessment in accordance with Action Plan P22 in the Werribee Catchment Action Program.
ix. Compare all three (97–98, 98–99, 99–00) weed maps for general state of weeds, spatial variation and new outbreaks within the Shire.
x. Identify and prioritize heavily infested weed areas located in the riparian regions of Werribee River, Toolern Creek and Kororoit Creek.
xi. Map the extent of Chilean needle grass within the Shire (additional hours).

Cheap, effective GIS aids catchment planning

Rick Pope and **Jacinta Burns**, Woady Yaloak GIS Advisory Committee, 6 Mansfield Avenue, Mt. Clear, Victoria 3350, Australia.

Farmers throughout the Woady Yaloak Catchment will soon be able to enjoy the benefits of GIS-based farm plans in a new and exciting community-led project being undertaken in partnership with Alcoa, University of Ballarat Centre for Rural and Regional Information, Corangamite Catchment Management Authority, NRE and the Golden Plains Shire.

The new project is an extension of one of the earliest Landcare group-based GIS projects funded under the National Landcare Program. In 1994, the Pittong Hoyles Creek Landcare Group, located in the upper reaches of the Woady Yaloak Catchment, initiated the project with Rick Pope, a student of the Graduate Diploma in Land Rehabilitation Program at the University of Ballarat.

The farm plans developed from this initial project proved to be a valuable resource to the farmers, so the decision to develop a cheap and effective GIS package for the whole catchment was made.

Alice Knight, Chair of the Woady Yaloak Catchment Committee, said the Pittong-Hoyles Creek Project had given them another management tool for their farm at Linton, but also one for their local neighbourhood.

'We found the GIS very useful for planning in terms of prioritizing areas for works on our property and a useful means of identifying potential linkages of works between neighbours to form a truly integrated approach to catchment management in our area. The only drawback was the somewhat expensive software. For this new project to work, we needed a simple cheap package to do the job', she said.

Since completing his Graduate Diploma, Rick Pope has remained in contact with the group and is happy to see the Woady steering committee continuing his work by expanding the GIS model across the whole of the catchment.

The new model is great. It revolves around the development of a CD-ROM that the farmers can either have access to or purchase cheaply, that contains all the relevant information for their farming system and land rehabilitation efforts at a catchment level, but with enough resolution to go to the individual farm level.

'As Alice said, the stumbling block was the cost of the software, but by using free 'public domain' software, with links to higher resolution maps for the whole catchment, we hope to make it cheaper and easier for everyone to use', Rick said.

The Woady Yaloak group, with support from Alcoa and other sponsors, has now produced the CD-ROM with data covering the Woady Yaloak catchment from Ballarat to Cressy that can be viewed on any modern home computer.

'The base layer is a satellite image', Rick said.

'Overlays include soil types, drainage lines and contours, land uses, title boundaries and more. Farmers can select an area, zoom in on it and print it out on their office printer', he said.

The group's Neighbourhood Project Facilitator, Jen Clarke, works with individual farmers to update their informa-

Landholders and DNRE staff working together in familiarisation with the new GIS.