PROJECT 3

DEVELOPMENT OF GIS-BASED DECISION-SUPPORT TOOLS AND THE DATABASING OF *PHYTOPHTHORA*-SENSITIVE TAXA.

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OBJECTIVE

To provide a reliable, graphical decision-support system for monitoring and controlling the spread of dieback disease.

The project has three elements:
1. assemble, verify and automate appropriate data sets;
2. interrogate data sets to answer basic management questions;
3. develop a model with predictive capabilities and test validity of predictions.

PROGRESS REPORT

Use of Landsat imagery for mapping combined with GIS to tie together relevant spatial information about *Phytophthora* provides both managers and researchers with a tool that can quickly answer questions that were previously impossible to attempt or extremely time consuming. In the previous report we answered questions such as:

- Which areas are infected?
- What landforms are severely affected by dieback?
- Are there areas of high hazard landform that are not infected?
- Are there any areas which appear to be of low risk?
- Does infection vary with aspect?

Work since March has focussed on the design of a user interface and on the development of the predictive model.

User Interface

The objective here is to provide a tool for people unskilled in the operation of Arc/Info that will make data accessible to managers, so that managers can obtain answers to the above questions for specific areas themselves . The interface developed has been designed by assessing managers needs in several informal fora and by examining approaches taken by other organisations.

The interface provides simple menu-based access to a range of data sets which may then be examined individually or overlayed in any pattern required by the user. Data sets which are currently available include cadastre, roads, contour, elevation, slope, aspect, hydrology, dieback, landform, vegetation, and species distribution based on data accessed from WA Herbarium voucher information. Landsat imagery of the area may also be viewed.

For development purposes, the Herbarium datasets are limited to include only the Proteaceae, Myrtaceae and Cyperaceae. However, it is envisaged that, once dynamic links are established between the Herbarium database and the GIS interface, that information on any plant taxon should be accessible.

The interface also allows the user to define areas on screen and obtain other information such as the distance between two user-defined points, the area of a selected location and so forth. Finally, the user can add legends so that map output of the interrogation session may be obtained if required.

Model

The dieback model relies on GRIDs of aspect, slope, flow direction and flow accumulation. Basic assumptions of the model are that *Phytophthora cinnamomi* will move rapidly downhill with water movement and will grow uphill through the roots of hosts; spread and impact will vary depending upon landform, susceptibility of vegetation, aspect, road networks in an area. Indices of susceptibility modify the rates of spread within different landforms. Indices have been determined by analysis of dieback distribution within different landforms, but these indices can be viewed and modified where the user has additional local knowledge of factors influencing rates of spread.

The model is accessed as a component of the interface described above. The user selects an area of interest, and then the program will run to indicate where new areas of infection are likely to develop. The output of the model shows where dieback was originally, where dieback is predicted to spread to , and the remaining uninfected areas. Once this output is obtained, the user has access to all data sets described above, so that for example roads, cadastre, the distribution of selected species and a legend may be viewed and maps may be produced if required.

FUTURE TASKS

User interface

- The interface must be enhanced by further discussion with field managers and by additional assessment of systems developed by other organisations.

Validation of modelling

Validation of model output has high priority and will be the main focus of activities over the next six months.

- Ground truth model output - baseline dieback data is based on 1992 Landsat imagery, providing the opportunity to compare the actual distribution of dieback in 1994 with the pattern of distribution predicted from modelling.
- Examine historical information obtained from aerial photography to determine if patterns of development
- Information obtained from combine with GIS to improve classification

Data linkages

- Dynamic linking to Herbarium databases will be enabled before the end of this year when the Herbarium's existing RDBMS is upgraded to a SQL-compliant version.
- Explore the potential for linkages with other projects aimed at facilitating the presentation of information to researchers and managers.

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