GEOGRAPHICAL INFORMATION
SYSTEMS (GIS)
AND
THE DEPARTMENT OF CONSERVATION

by

Mary McEwen

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ABSTRACT

Two reports on the subject of Geographic Information Systems (GIS) are included. The first was prepared for the Coastal Resource Inventory (CRI) workshop held in Porirua (Wellington) in June 1989. It examines some of the potential uses of GIS in DOC and gives the reasons why many past attempts to create and maintain inventories of information about places with high value have failed.

The second paper is a proposal for a plan of action which should be undertaken by the Department to ensure that any future introduction of GIS technology is made in the most cost-efficient manner to the department as a whole.

Geographic Information Systems hold a lot of promise for the future handling of much of DOC's geographic information. This technology is however, both complex and expensive. It is essential that the department plans properly before embarking on the purchase of hardware and software and that there is a thorough understanding that the system will only ever be as good as the information it contains.

A properly developed strategic information plan should help to identify where there is greatest need for a geographic information plan in the department.

THOUGHTS ON THE POTENTIAL USES OF A GEOGRAPHIC INFORMATION SYSTEM (GIS) IN THE DEPARTMENT OF CONSERVATION

by

Mary McEwen

Paper prepared for the Coastal Resources Inventory (CRI) Workshop,
28-29 June 1989

1. INTRODUCTION

From October 1983 until April 1987 I worked in the New Zealand Biological Resources Centre (BRC), and I have been aware of the technology of GIS since about late 1985 when the Centre decided to have the boundaries of the New Zealand ecological regions and districts digitised instead of being drawn by traditional cartographic methods. DSIR's Science Mapping Unit were just beginning to use an Intergraph GIS, system, probably one of the first ones available in the country apart from the tailor-made system which MWD then used to manage the New Zealand Land Resource Inventory.

Geoff Park, then BRC manager, and I were excited by the incredible potential opened up by GIS technology, as the BRC had been working on the development of national geographically based biological resource information system, BRIS for short. Admittedly the proposed BRIS was very much terrestrially oriented, but the concept which drove it was similar to that which is now driving the CRI. The idea was that if you could readily identify places with important nature conservation values, then those places would be less likely to become the focus of major conservation battles as, hopefully, developers would attempt to avoid such places wherever possible, thereby avoiding conflict.

2. US NATURAL HERITAGE PROGRAMME

The BRC ideas were inspired largely by the work of the North American Natural Heritage Inventory Programme of the US Nature Conservancy. These natural heritage programmes set about developing a Heritage Register in each state of the US, identifying natural areas that have high conservation value.

3. REASONS WHY PAST INVENTORIES HAVE FAILED

Two important papers about the natural heritage programme point out very clearly the reasons so many inventories fail in what they set out to achieve (Burley 1983; Jenkins 1982). I think it is important to spell out these reasons here, before we all get so excited by the glamour of the new technology that we fall into the same trap, as many past inventories have done.

Building a successful database is akin to building a piece of machinery. All parts must work together smoothly or the whole thing will fail. While I don't want to dampen people's enthusiasm for the CRI project and the development of other databases in my current experience managing the computerised Wetlands of Ecological and Representative Importance inventory (WERI) and the national set of non-computerised information in the Sites of Special Wildlife Interest inventory (SSWI) has shown me something of the difficulty and expense of setting up and maintaining even simple databases. For this reason, I think it is worth spelling out some of the potential pitfalls ahead.

3.1 Reasons why many former overseas attempts at constructing conservation databases failed include:

a) **Imprecise Goals:** Many early ecological information efforts had goals which were too broad or were not clearly stated. Frequently problems arose when goals were not confined to biological conservation objectives but attempted to include scenery, renewable and non-renewable resources, human history, archaeology, developmentally sensitive or "hazard land", ecosystem processes and so on.

   There seems to be some parallel here with what people are planning for the CRI.

   According to the US Nature Conservancy, with decades of experience, "by attempting everything, nothing gets done well". DOC should learn from the experiences of the past.

b) **Impermanence**: Short-term projects were designed to be completed quickly and then set aside. Often these were not finished, and when staff were disbanded, they took a lot of knowledge with them, and it was difficult for newcomers to the database to work out where it was up to and how to complete it and update it.

c) **Wide geographic scope:** Trying to cover too wide a geographic area led to problems of classification, data source organisation, logistics etc. In the case of New Zealand however, the country is a reasonable size, and it should be possible to overcome these problems with careful planning and co-ordination of the project, especially if the goals of the database system are precise and limited in scope.

d) **Site orientation:** This problem is strictly related to database designed to assist in nature conservation. It is the particular attributes of a site which are important in terms of nature conservation, rather than the site itself. Past inventories have consumed their limited resources very inefficiently by attempting to amass indeterminate amounts of information about particular sites, which were themselves chosen arbitrarily, without establishing a way of comparing sites with one another. **In other words, it is important to have a method of evaluating sites in terms of their nature conservation values**.

e) **Ad Hoc methods**: Many earlier inventories have been undertaken as isolated projects without proper documentation of the procedures followed and the lessons learnt in the development stages of the methodology. This has meant that each new inventory was "re-inventing the wheel". The lesson here is to try and learn from the experience of other inventories, e.g. the PNA Programme, and to make careful documentation of all procedures and methods followed so future workers don't have to start from scratch.

4. THE PROTECTED NATURAL AREAS PROGRAMME

The planning for the proposed New Zealand Biological Resources Information System was closely linked with the development of the PNA Programme. Geoff Park was asked by the National Parks and Reserves Authority to convene a technical advisory group, which developed the survey methodology for the PNA Programme. This Programme has two main interrelated goals: (1) the identification of representative natural areas to be added to New Zealand's system of protected natural areas; and (2) information for the planned BRIS. The Programme was designed especially to yield most of the elements which were to be the contents of the BRIS (Park, 1984).

5. ECOLOGICAL REGIONS AND DISTRICTS

Both the PNA Programme and the BRIS were based on the newly developed framework of ecological regions and districts, which, in turn, had been designed as a basis for assessing ecosystem representativeness.

What was being planned by the BRC, was a system which would, theoretically, work wonderfully on a GIS. Using a suitably scaled base map of New Zealand, with sufficient digitised topographic information to allow users to locate and orient themselves, ecological district boundaries would be digitised to form the framework for the rest of the information system. For each ecological district the associated database would include several sets of information. These are shown in Table 1.

To introduce this idea which originated with the former Biological Resources Advisory Committee, we had a mock-up example prepared in 1986. (See Appendix 1.) Note, however, that this is not all accurate information, i.e. some of it we made up for the purpose of the exercise. Also note that there is really not enough topographic information on the base map to allow easy location. We learnt by this exercise that it would be preferable to include more of the important topographic features on the base map.

6. HERITAGE REGISTER

This concept is similar to the idea of a heritage register, an idea which has been around in the department since the early drafts of an information strategy. A heritage register aims to show what elements of the natural and cultural heritage still exist and which ones are protected. It would be a valuable planning tool for the department as well as providing information for conservation advocacy, both for statutory planning and also for general education.

7. MANAGEMENT USES

DOC has many other management problems which could be assisted by a GIS. For example:

- Fire control - Where are the water supplies located? Where are the heli-pads?
- Search and rescue as well as general maintenance - Where are the tracks, routes, huts, bivouacs, bridges?
- Recreation and tourism - Where are the picnic sites? Which camp-grounds get the most use?
- Environmental impact assessment - How will the local environment be modified by a proposed tourist development or mining activity?

These are a few examples of the way a GIS could be used in the department, but it must be asked whether we can manage nearly as well with cheaper, more basic systems.

8. CONCLUSION

GIS technology is tremendously exciting and challenging, and I have no doubt that our department needs a GIS. It is also, however, a very expensive technology, and one which requires at least some staff with special training. For that reason I advise the department to move into the GIS area with caution and, in particular, with careful and thorough planning. As one who is responsible for the management of the WERI inventory and also the computerised national set of Sites of Special Wildlife Interest information, I am acutely conscious of the cost and effort involved with the setting up and maintenance of even simple single purpose databases. Without continued maintenance and updating, much of the information in an inventory becomes historical and therefore not as useful for daily management needs.

A GIS is probably ultimately the kind of information system the department should have, but we must keep our feet on the ground and not attempt to set up a system from the beginning, which aims to be all things to all people. The number one reason why many inventories fail, according to the US Nature Conservancy, is because the programme objectives are not clear to begin with.

We already have an ecological description of each district, published in the books which accompany the third edition ecological regions and districts maps 9McEwen 1987), and improved descriptions are included in PNA Programme reports. PNA Programme surveys are providing information for number x on the list, i.e. the high priority or "critical" areas for nature conservation, now called recommended areas for protection. PNAP survey reports also list the "biological resources" or ecological units within each district (numbers (vii) and (viii)). The existing Protected Natural Areas Register describes the protected natural areas of each ecological district. As well as this, the WERI inventory describes wetlands of ecological and representative importance and is also arranged on an ecological district basis.

TABLE 1: The Intended Contents of a National Geographically Based Biological Resources Information System

For each ecological district:

---

a) An ecological description of each district.

b) A directory of <u>people</u> with knowledge about the biology of the district.

c) A biogeographic assessment of the opportunities to protect the pattern of the flora and fauna.

d) A bibliography of published information.

e) A checklist of each district's biological resources (vegetation types, habitats, etc.).

f) A checklist of the protected natural areas in each district.

g) A checklist of the biological resources that are protected in each district.

h) A checklist of the biological resources that are not protected in each district.

i) A checklist of the biological resources about which there is a stated concern.

j) A listing of specific sites considered to contain the most significant biological resources for nature conservation (i.e. critical areas).

k) A reference system of biological information sources for each ecological district.

9.0 GIS APPLICATION

A GIS for DOC could have layers showing, for example, the ecological region and district boundaries, DOC conservancy boundaries, local government boundaries, existing protected natural area boundaries, recommended areas for protection from the PNA Programme, wetlands from WERI, sites of special wildlife interest from the Wildlife Service inventory of that name, important geological and soil sites from the Geopreservation Inventory (a copy of which is managed by Information Services Unit of S & R) and so on.

10. REFERENCES

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APPENDIX 1. **Example of the Capabilities of the Intergraph Interactive Graphics System to Produce Graphic and Textual Information the Biological Resources of an Ecological District.**

Preface

Attached are examples of the type of output that can be produced by the Intergraph system to fulfil requests for information[1]. BRC will be able to prepare packages of biological information to assist in town and country planning. These will be available to local body planners in advance of district scheme reviews. Similarly, material of use in national conservation planning exercises can be supplied to National Parks and Reserves Boards.

The example chosen, North Taranaki Ecological District, illustrates a district in which BRC has had regional input into the data gathering exercise (PNA survey). Mines Division of the Department of Energy provided money for a contract to allow this survey to take place.

The information presented here could be displayed in a variety of different ways the Intergraph system is extremely flexible. The examples have been compiled from a number of data sets based on different mapping projections. It should be noted that we have chosen only a selection from a much larger amount of biological information to illustrate the capabilities of the system.

The geographic precision of point and areal information in these examples is approximate only although the Intergraph system is capable of very high precision. For this reason these maps must not be treated as a real data set. In the interests of clarity the bulk of the information available to BRC on the North Taranaki District has not been shown on these maps.

[1] Note that the vegetation map was originally produced in full colour.

NORTH TARANAKI
ECOLOGICAL DISTRICT

SHOWING A SELECTION ONLY OF BIOLOGICAL
RESOURCE INFORMATION TO DEMONSTRATE
THE INTERGRAPH SYSTEM

LEGEND

1   The Mokau Coalfield

2   The Tainui Scenic Reserve: an example of
     a) a protected natural area
     b) a special insect locality (the only place where the bupestrid
        beetle Neocuria eremita is abundant)
     c) a special plant locality (one of only 2 colonies of the
        rare plant Pomaderris apetala, tainui, in this district. This
        species is restricted to the area from Kawhia to Mokau

3   Mohakatino Swamp:
     a significant Wetland: kahikatea, pukatea swamp,
     one of the last remnants of its type;
     a significant Wildlife Habitat for spotless crake

4-7 Significant Wetlands (marked with an *)

4   Waitaanga Silver Beech Swamp:
     silver beech, kamahi swamp and kahikatea swamp
     Proposed scientific reserve

5   Hutiwai Swamp:
     the major kahikatea swamp remnant in North Taranaki

6   Mimi River Estuary:
     estuarine swamp and mudflat; Maori history value,
     including food gathering

7   Mimi River:
     this part of the river contains a threatened fish species

8-10 Significant Wildlife Habitats (shown cross-hatched)

8   Waitaanga State Forest:
     North Island kokako locality; short-tailed bat locality
     (on Waitaanga Plateau)

9   Mangakara Stream:
     blue duck locality

10   Ohura:
     skink (Leiolopisma striatum) locality

11   Mokau River: a nationally
     important river
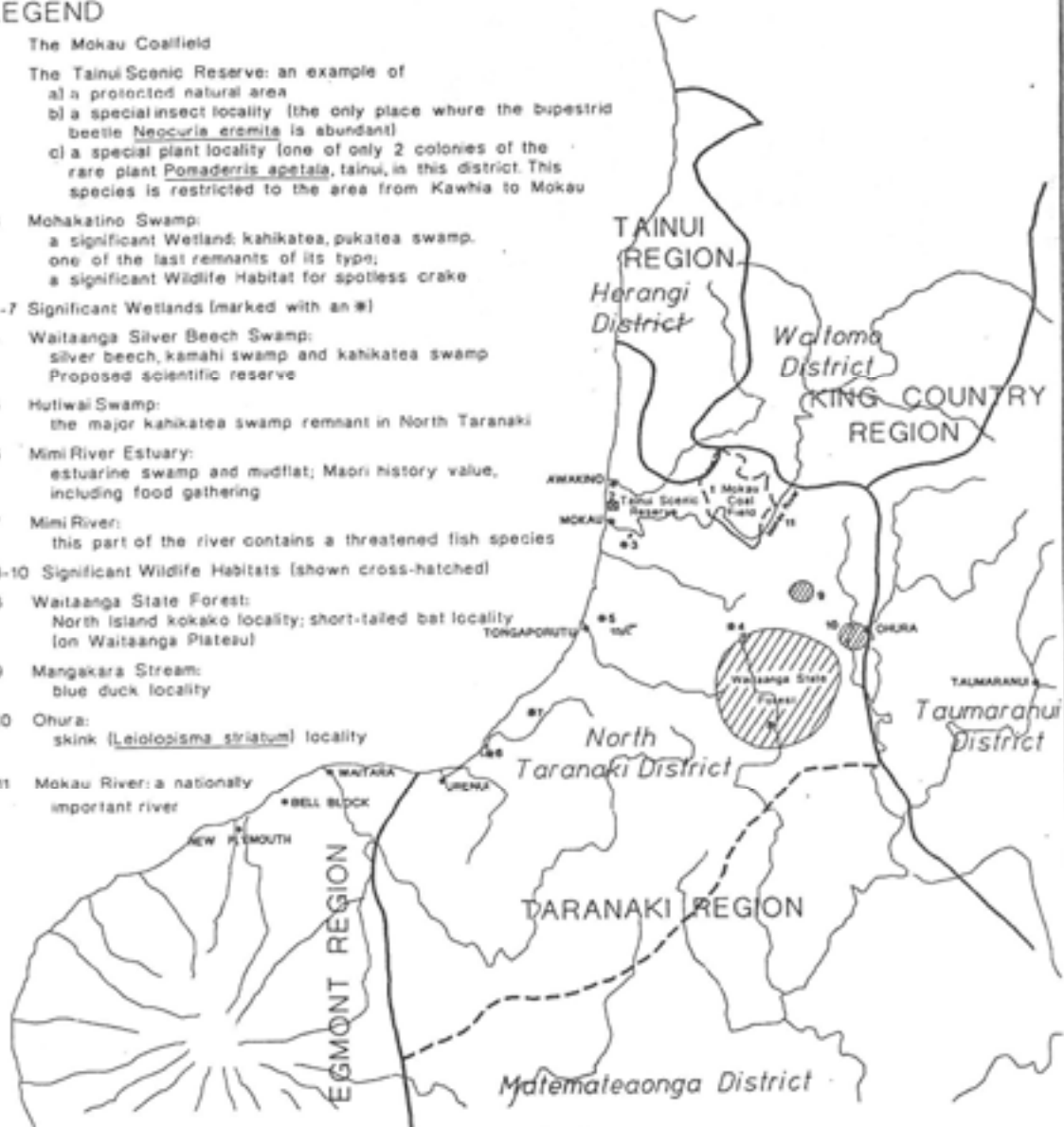
Scale: 1:500,000 (approx)

9

VEGETATION MAP OF PROPOSED
MOKAU COAL MINING AREA

Taken from NZMS 1 N91

■ Kamahi - tawa forest

▨ Hard beech forest

Rimu/kamahi forest

Tawa forest

■ Tawa - pukatea forest

■ Kahikatea forest

■ Secondary kamahi forest

■ Manuka scrub

■ Wetland shrubland

■ Kamahi - swamp maire forest

✳ Kohekohe

--- Boundary of proposed
    Coal Mining Area
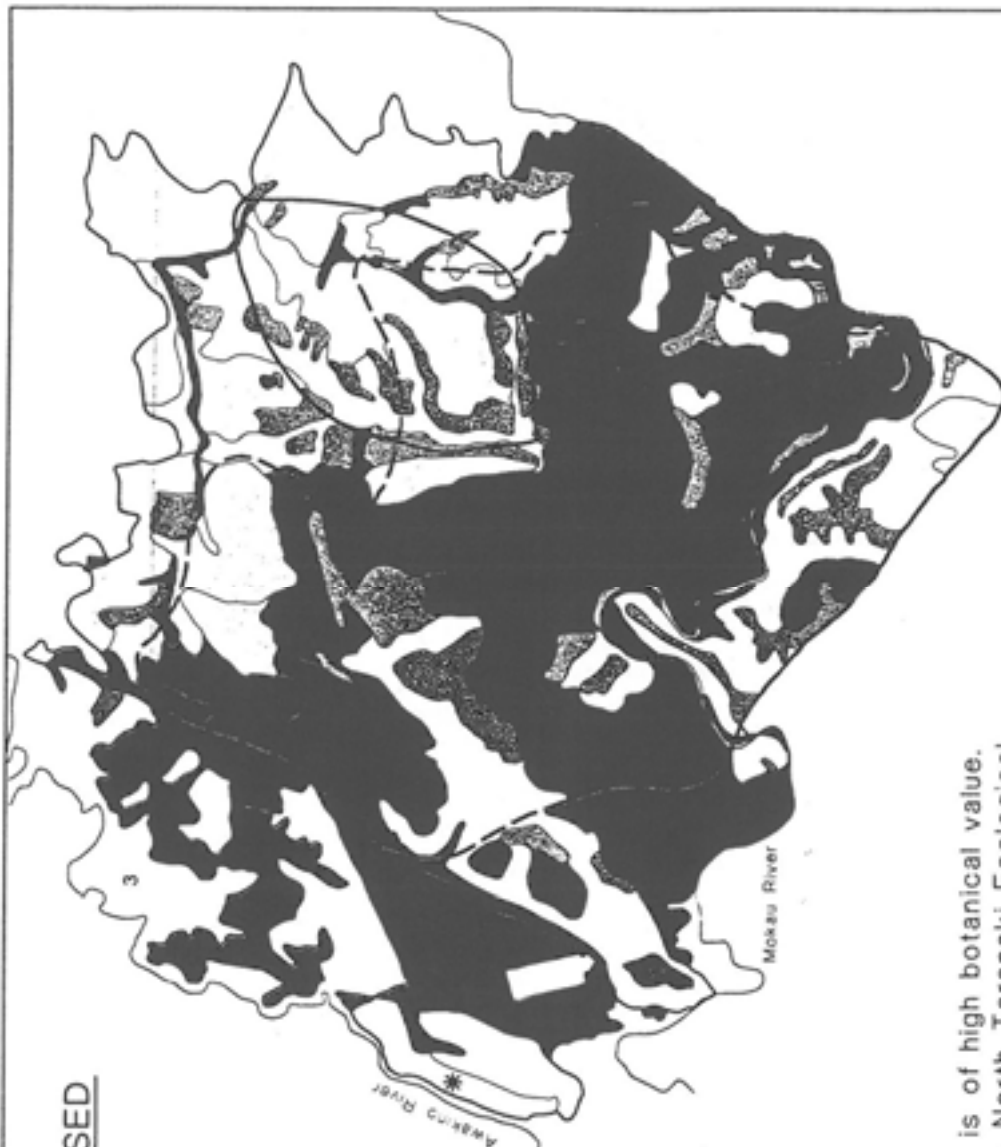
The rimu/kamahi forest on dip slopes is of high botanical value.
It is not represented elsewhere in the North Taranaki Ecological
District and therefore has a priority for protection. ——
A probable priority natural area proposal is delineated. ---

Final proposals and recommendations will be made at the end of the survey (June, 1986).

Scale: 1:100,000 (approx)

GEOGRAPHIC INFORMATION SYSTEMS (GIS) AND THE DEPARTMENT OF CONSERVATION

A PROPOSED PLAN OF ACTION

by

W. Mary McEwen

(Convenor, Information Consultative Group)

NOVEMBER 1989

1. INTRODUCTION

As heralded in an article in *Computerworld New Zealand (14* August 1989) reporting an interview with Deputy Director-General, Alan Edmonds, the Department of Conservation is re-evaluating its data processing and networking needs and is studying the possibilities of introducing a computer-based GIS.

If it is decided the department needs a GIS, it will inevitably mean a very large financial investment, both in terms of dollars and in time and expertise. What is now needed is a very clear plan of action to take us from the position we are now in (vague ideas) to the stage when we are ready to make decisions about purchasing a GIS system. This should include a thorough cost-benefit analysis to ensure that this expensive technology is really going to improve the efficiency of the department's outputs.

Luckily many other organisations have been through this planning process already and companies have prepared very useful guidelines to assist potential clients in their project planning. This paper is based on one entitled "GIS - Strategic Planning for Project Success" by Edward J. Mance of GeoVision.

2. PLANNING FOR PROJECT SUCCESS

2.1 Defining the Scope

A GIS project must be set up within the Corporate Plan. The project will be divided into a number of clearly defined stages.

Certain decisions, however, must be made <u>before</u> the project is launched.

Will the project be restricted to a single departmental function (e.g. CRI or mapping/draughting requirements)?

or

Will the project serve the GIS requirements of the whole department?

If it is decided that the initial project be limited to the immediate requirements of, say, mapping/draughting and the CRI Task Force, then it is important that the potential future needs of other parts of the department should be considered in this initial project plan so that a system which is capable of expanding to accommodate these is chosen.

2.2 Project Launch

The project should be launched with a "kick-off" meeting, which should involve all prospective users of the GIS. This should involve senior managers, it could be part of a meeting. This meeting should explain the concepts of and participants should be pre-circulated with a technology so that they all understand the terms being used and can develop an idea of the impact that GIS will have on the way information can be input, stored, managed and analysed.

2.3 In-house Expertise

It is important to have a group of specialists within the department who understand:

    a) the technical aspects of GIS, and
    b) the management issues vital to the success of any GIS project.

This group should include people who understand, on the one hand, departmental operations and required information flows, and, on the other hand, computer technology, systems interfaces, database architecture, data structures, cartography, photogrammetry, surveying and other disciplines.

If necessary, some of this expertise should be purchased from outside the department; for example from DSIR's Division of Land and Soil Sciences, Soil Conservation Centre, at Aokautere, who

    a) we already under contract to provide land resource information, and
    b) have considerable GIS expertise.

3. SURVEY OF EXISTING OPERATIONS - INCLUDING COST-BENEFIT ANALYSIS

A study should then be made of the information requirements of each part of the department. This study has in part begun with the development of the Information Overview Model (Malcolm Harrison, in preparation) as well as the draft discussion paper on the Role of Information Systems in the 1989/90 Regional Business plans of the Department of Conservation (Mary April, 1989; Appendix I).

The survey should answer the following questions:

- What types of geographic information do DOC managers use at present?
- Where do they obtain it from now?
- How long does it currently take to obtain it?
- How much does this cost in terms of salary time and operating?
- What databases of geographic information currently exist (e.g. Archaeological Sites, WERI, SSWI, Ecological District descriptions, PNA Register, Recommended Areas for Protection in PNA Programme reports, Blue Duck Distribution etc. etc.)?
- Would these databases be managed more efficiently in future on GIS and would departmental outputs be improved as a result?
- What state are these databases in currently? (Well-maintained databases, especially those that are already on computer, will be easiest to convert to a GIS.)

Work is needed to add to the information in several of our national databases: e.g. SSWI and WERI, where many of the records are over five years old.

The survey of existing operations should give a picture of what geographic information transfer costs at present, any costs required to bring existing systems into a more useful condition, and which key outputs could be made more cost-efficient by the use of a GIS.

The survey will also help to determine the functional requirements the department has for a GIS, including the type of analytical capabilities required of the software, the type of hardware required (processing power, memory, display criteria etc.).

4. LOOKING AHEAD

Planning for GIS must take the long view and see beyond the automation of existing manual mapping production. GIS systems are capable of automating complex and time-consuming analytical tasks. For example, the GIS could manage "layers" of information about sites with various "conservation values", e.g. geopreservation sites, wildlife habitat sites, rare plant sites, sites with high landscape value and sites which are representative natural areas in the ecological district. A particular site, for example, the location of an application for a mining licence, could be evaluated by studying the various "conservation values" it contained.

Data required for the largest number of departmental functions will normally receive highest priority for handling by computer-based GIS. For this reason, the first DOC functions to receive technological enhancement are likely to be mapping and recording basic geographic data. Second priority should probably go to those systems which give rapid access to other sources of information (e.g. geographically based bibliographic systems) and to existing computerised geographic databases (e.g. WERI).

5. CHOOSING WHICH SYSTEM

Once the department's needs for GIS have been determined precisely, we should employ unbiased expertise, say, from DSIR (Land Resources) to assess which of the available systems is best suited to DOC's requirements, both immediately and in the longer term.

One of our staff with a thorough understanding of the department's functions would work with the consultant.

6. BEGIN WITH A PILOT

Whatever decisions are made regarding the end-users of a GIS I believe we should start by piloting some of our most urgent requirements. While it is tempting to purchase a PC-based system on which to run a pilot, this should only be done with full understanding of the limitations of a PC-based system.

A lot of expertise is involved in setting up and using a GIS and we will probably need to employ new staff with some of these skills. We should also, however, train one or more of the current staff, because DOC's GIS team will need to have a very thorough understanding of the functions of the Department.

Any pilot system would best be developed with full consultation between the end-user of the pilot system and the proposed GIS technical team. The user would acquire a custom built system, but the building blocks would be a shared departmental resource. For example, the basic land and water boundaries would be fundamental to a range of other inventories and databases, which would potentially become additional "layers" in the GIS.

A key to success of future developments is the ability to transport between systems and avoid duplication or translation problems. Graeme Croker (Assistant Surveyor-General) in a recent paper to the Anzgraph 89 Conference in Wellington (21-23 November 1989) emphasised the huge cost of data entry into GIS systems and therefore the importance of data sharing.

7. SUMMARY

The steps to be taken are:

a) Decide whether the Department needs a computer-based GIS.
b) If so, decide either whether it will potentially serve all the department's geographic information handling needs or be limited to only some of them. If the former, more thorough planning is necessary. If the latter, options for future expansion should not be overlooked.
c) Establish a GIS Project in the Corporate Plan and, more specifically, in the appropriate Business Plan(s).
d) Launch the project at a CMT meeting.
e) Develop an appropriate project team.
f) Survey existing operations.

g) Plan ahead.
h) Choose a system, using unbiased expertise, say, from DSIR.
i) Begin with a pilot, using high-priority information, e.g. general mapping requirements and CRI.

8. READING LIST AND OTHER INFORMATION SOURCES

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ARC News. Environmental Systems Research Institute. Winter 1989, Spring 1989.

APPENDIX I: **The Role of Information and Information Systems in the 1989/90 Regional Business Plans of the Department of Conservation.**

Draft discussion paper by Mary McEwen, Science and Research Division, April 1989.

Introduction

The eight regional Business Plans for the financial year 1988189 were examined and specific outputs involving information gathering are recorded. These include outputs where the stated result is an inventory or database (e.g. Coastal Resource Inventory), as well as outputs describing survey and monitoring activities which will result in the collection of information. Also included are outputs involving the administration of licences, leases, applications and other statutory requirements. Computerised tracking systems can be designed to assist in administration of these areas.

Databases

Many of the databases required by regions are site related. A standard database structure has been designed by Information Systems Development (ISD) and Conservation Sciences Information Group (CSIG) which can be adapted to suit various functions.

It is recommended that regions should use this Sites Database for all information related to geographic locations.

Copies of the Sites Database System (written in dBase III+) can be obtained from Geoff Patterson, (ISD), Head Office. It may be necessary to adapt the basic database structure to suit some specific purposes. Assistance can be obtained either from ISD or from Sciences Information Group, Science and Research.

The Sites Database will be used for the computerisation of the Sites of Special Wildlife Interest Inventory. It is also suitable for information gathered about a particular site, by surveys of various kinds.

Number

The numbering used in this report follows that used in the 1989/90 Corporate Plan: Mark V (21 December 1988). Corporate Objective is abbreviated to CO Key Outputs. New Key Output numbers are shown in brackets.

Recommendations

Recommendations are interspersed throughout the text, which comprises a summary of the information-related specific outputs of the 8 regional Business Plans. The main recommendations are summarised below:

a) That the standard sites database structure, designed by be used for recording all information related to geographic locations (e.g. SSWI data, survey and monitoring data of various types, Coastal Resources Inventory data). The database is designed to suit a variety of requirements.

b) That standard tracking systems for administration of various leases, licences, planning applications etc, be developed by ISD for use throughout the Department.

CO 1.1   To identify terrestrial, marine and freshwater natural resources of special significance and to implement appropriate protective measures.

1.1.2(2)   <u>Processing, negotiating and implementing results of PNAP surveys conducted to date:</u>

Recommendation: That copies of all field data from PNAP surveys should be lodged in Science Information Group, HO.

<u>Waikato</u>   SO1 Completion of Coromandel PNAP survey information analysis and report.

<u>Canterbury</u>   (KO3) - PNAP survey reports - Ditto question above.

<u>Southern</u>   PNAP survey reports.
If additional funds: SSW reports publication.

1.1.3(3)   <u>Marine Protected Area surveys to identify areas meriting protection.</u>

Recommendation: That marine protected area survey data be entered on the Sites Database.

<u>Northern</u>   Marine PA surveys will yield data/information.

<u>Waikato</u>   SO5 Survey and monitoring programmes - will yield data/information.

Eastern   SO1 Surveys of Mayor Island, Whale Island, Lottin Point Area - will yield data/information

<u>Wanganui</u>   SO6 Complete data collection for proposed protected area.

<u>West Coast</u>   C/M Inventory of all natural and cultural features of West Coast and all foreshore structures.

1.1.4(4)   <u>PNAP surveys to identify terrestrial areas meriting protection.</u>

Recommendation: PNAP survey data could be entered on Sites Database. See also Recommendation under 1.1.2(2)

<u>Northern</u>   Information (up to date) on natural flora, fauna and landform features Waitakere ED.

| Eastern | SO1 Survey of Waipua ED -will yield data/information. |

| Wanganui | SO7 PNAP survey reports - will yield data/information. |

| Nels/Marlb. | If additional funds: write up biological survey of reserves for Nelson Land District - a database (in form of written reports). |

| Southern | PNAP surveys Publication of reports of Manorburn and Nokomai EDs - will yield data/information. |

| 1.1.5(5) | Investigations of additions to National Parks and other protected areas. |

Recommendation: Survey data could be entered on Sites Database.

Canterbury (listed as 1.1.4) Surveys will yield data (Arthur's Pass and Mt Cook NP).

| 1.1.6(6) | Public information and education. |

General information requirements for this key output. Nothing specific noted for most regions.

| Eastern | Educational, media and public information material. |

| 1.1.7(7) | Monitoring the ecological quality of the protected estate. |

Recommendation: Monitoring information could be entered on Sites Database on PCs. A Database format specifically for the Protected Natural Areas Register has been developed on the VS system by Information Systems Development.

| Northern | e.g. Kaimaumau block monitoring after fire -need for baseline information and periodic monitoring. (listed as 1.1.5) Inventory work for update of inventory (no field survey). |

| Waikato | Assessment of changes in ecology of Whangamarino wetland caused by causeway. |

| Eastern | Update of PNA Register database for region. Revise, correct, update and extend WERI for region. Update SSWI data for region. |

| Wanganui | "We are not sure what additional databases are proposed." |

| Nels/Marlb. | Continue to monitor animal numbers and vegetation condition. Update WERI -devise system of recording ecological changes to wetlands. Wading bird counts on Farewell Spit and Nelson Estuary with OSNZ monitoring seasonal and yearly fluctuations. If additional funds: compilation, computer input, mapping of WS fauna survey data from Marlboorugh (SSWI). Update PNA Register. |

Canterbury   (listed as 1.1.5) Wetland survey related to updating WERI.

Southern   Mavora Park monitoring
               Monitoring recommended areas for protection where grazing continues.

CO 1.2   To maintain, enhance or restore the natural character and qualities of the
               conservation estate.

1.2.A1(D)   <u>Coastal resource inventories</u>

Recommendation: Coastal survey data could be entered on the Sites Databases.

Northern   CMID - note problem of incompatibility with other DOCnet databases (i.e.
               Sites, Land Register).

Eastern   Develop coastal resource strategy.
               Survey remainder of coastline to give first order inventory.
               Documentation of all CRI and survey data.

Nels/Marlb   Need a comprehensive inventory of the Maori resources of Marlborough
               Sounds. Foreshore structure/harbour works Register -a database.
               Appraisal and collation of exiting data sources, (especially Marlborough
               Sounds) - leading to base maps plus database.

Canterbury   Concern that CMID is not compatible with Sites Database (cf. Northern).
               Expand the Coastal and Marine Inventory to incorporate, identify and
               map all coastal structures.

Southern   Regional report on inventory and coastal district classification and survey
               plan. Potential for marine farming siting.
               Field surveys. Lakeshore-structures inventory.

1.2.A2(10)   <u>Marine environment protection</u>
               (No information-related key outputs listed for most regions.)

Northern   Scientific monitoring -Leigh Marine Reserve.

1.2.A3(11)   <u>Licensing and other statutory functions</u>.

Recommendation: A standard licence tracking system could be developed for use by all
regions.

Waikato   Efficient handling of applications under Harbours Act.
               Licensing and administration of foreshore occupations etc.

Eastern   Process Harbours Act and marine farming applications.
               Quantify sustained volumes of sand.
               Monitor all licenced activities.

Wanganui	Licensing applications etc.

Nels/Marlb   Efficient processing for all applications for statutory consents etc.

West Coast   Registration of whitebait stands; marine dumping; illegal coastal baches etc.

Canterbury   Licensing applications etc.

Southern   Processing applications for statutory approvals etc.
Sand and gravel monitoring.
Licensing of illegal structures, Lake Manapouri.

1.2B1(14)   <u>Suppression of fires which threaten the conservation estate</u>.

Comment: Presume all regions require information on water supplies, fire fighting equipment etc, as well as location of valuable habitat, historic resources etc.

1.2.B2(15)   <u>Containment of animal pest populations and prevention of their further dispersal</u>

Recommendation: Vegetation and animal assessment information is available in the National Indigenous Vegetation Survey database managed by Larry Burrows at the Forestry Research Centre, FRI, Christchurch, Phone (03) 517099. A standard tracking system for permits and licences could be developed for use by all regions.

Northern   A variety of survey and monitoring.
Issuing licences and permits.

Waikato   Apparently little information or database work planned.

Eastern   Complete and write up information from vegetation and animal assessment survey, especially in Urewera.
Licensing of fitch farming in region.

Nels/Marlb.   Wild animals control plans and strategy.
Hunting permits.

1.2.B4   <u>Maintenance of conservation values of pastoral leases and licences</u>.

Recommendation: The Sites database could be used to record survey data.

West Coast   Carry out biological survey of the 2 pastoral leases in South Westland.

1.2.C1(18?)   Action initiated by Department to protect (fresh) water values.

Recommendation: A standard tracking system for water right applications could be developed for use by all regions.

Northern   (listed B1.2.5) Monitor water right applications.

Waikato   No mention of WERI in spite of the fact Science Information Group has sent a copy of Waikato WERI on disk to Lis Humphreys.

Eastern   Scrutiny of all water right applications advertised in region (approx 800 per annum)

Southern   Recommend update of WERI - (Science Information Group has sent a copy to District WERI on disk – Bill Jarvie).

1.2.C2(18?)   Departmental responses to proposed or actual alteration in water values.

Recommendation: A standard tracking system could be developed for use by all regions.

Waikato   Review and examine all applications for abstraction, use and discharge of natural waters.

West Coast   Maintain regional register of water rights.
               Monitor water quality at selected sites.

CO 1.3   To ensure the survival of endangered, vulnerable, and rare and protected indigenous plants and animals and their habitats.

1.3.1(23)   Protection of species

Recommendation: The Sites database could be used for monitoring and inventory information.

Northern   Kiwi monitoring in 2 locations. Determining abundance, distribution etc. of various species of threatened fauna and flora.

Eastern   Undertake regional inventory of native fish species distribution and abundance by using existing data sources and by field sampling.

Wanganui   Compilation of regional rare and endangered plants inventory.

Nels/Marlb.   Surveys to establish conservation status of species.

1.3.2(24)   Protection of habitat

Recommendation: Updating of WERI could be done in conjunction.

Waikato   Wetland management and restoration programmes.

West Coast   Protection of wetlands - WERI should be useful here for comparative wetland values.

1.3.3(25)   Information gathering (research and survey)

Recommendation: Survey data could be entered in Sites Database.

Northern   Resurvey of SSWI - Franklin, Hobson, Hokianga and Rodney Counties.

Waikato   Blue duck surveys
NZ dotterel nesting surveys
Fish habitat surveys
Monitor changes in Whangamarino following fire.
Survey to assess long-and short-tailed bat distribution and abundance.
Monitor etc. rare, threatened and endangered plants.
Identify areas suitable for pingao management.
Collate rare species records for inclusion in region's inventory database.

Eastern   Collection of additional information on protected reptiles and invertebrate fauna.
Completion, printing and distribution of 2 reports outlining SSWI for region.
Up-date threatened species distributional and status report for blue duck, kokako, Hochstetter's frog, NI brown kiwi and other species at risk.

Wanagnui   Blue duck research, Manganui-o-te-ao etc.
Kokako survey, Taranaki Ecological Region.
Kiwi survey.
Tongariro District Upper Wanganui and Whakapapa blue duck census.

Nels/Marlb   Fauna/flora surveys of specific habitats databases reports.
Marlborough Sounds Maritime Park bird survey.
Kaikoura seal population monitoring and census.

West Coast   Monitor yellowheads
Survey brown kiwis
Status of blue duck
Fiordland crested penguin monitoring

Canterbury   Information on key threatened plants - survey of Ashburton Lakes, Waimakariri Lakes, Lake Ellesmere and Islands.
On going species and habitat monitoring.
Blue duck and crested grebe monitoring.
Assessment of long-tailed bat population.

Southern   Monitoring and research on SI kaka, yellowhead, red-and yellow-crowned parakeets.
                Giant skink distribution survey.
                Subantarctic Islands database.
                Freshwater habitat survey and dune entomological survey, Stewart Island.

1.3.4(26)   Law enforcement and administration

Recommendation: Standard databases and a licence tracking system could be developed for use by all regions.

Nels/Marlb.   Law Enforcement.

Canterbury   Licensing of species in captivity.

CO 1.4   To identify and conserve historic resources and to provide where culturally and environmentally appropriate for their appreciation and enjoyment by the public.

1.4.3(30?)   Historic resource conservation

Waikato   Completion of overview document which will provide a database for evolving...management...strategies.

West Coast   Management and upgrading of historic archives.

1.4.4(31)   Resource Inventory (especially Maori).

Northern   Archaeological sites database.

Eastern   Ditto - identify gaps in database.

Nels/Marlb.   Ditto

West Coast   Ditto

Canterbury   Ditto

CO 2.1   To foster public recreation and to manage commercial recreation and tourism in areas administered by the Department.

2.1.1(35)   Recreational opportunity surveys

Recommendation: There is potential for a standard date storage system to be developed. The sites database is suitable.

Northern   Recreational opportunity surveys study proposal.
                Monitoring use of recreational facilities, Great Barrier.
                Bay of Islands user survey.

Waikato	Completion of Recreational opportunity surveys.
Eastern	Completion of Recreational opportunity surveys.
Wanganui	Recreational opportunity surveys.
Nels/Marlb	Recreational user monitoring - (visitor monitoring databases).
Canterbury	Recreation inventory
Southern	Review of recreational user monitoring systems and data; development of integrated regional system.

2.1.4(38)   Concessions

Recommendation: A standard system for monitoring concessions could be developed for use by all regions.

Northern	Monitoring concessions
Waikato	Managing concessions
Eastern	Managing concessions
Wanganui	Managing concessions

2.1.5(39)   Information on recreational opportunities

Waikato	Volcanic hazard monitoring etc.
Eastern	Potential for outdoor recreation guide.
West Coast	Databases?
Southern	(SO3?) Inventory opportunities for less popular recreational activities.
CO 2.2	To manage and sustain, where possible, the sensitive use of natural resources including minerals, plants and animals and those traditionally used by Maori.

2.2.1(42)   Processing of application for consent to mining privileges over the conservation estate and the monitoring of issued licences.

Recommendation: A standard system for tracking mining applications has been developed and is installed on the West Coast. This system should be installed in other regions where mining applications occur.

Northern	Mining tracking systems required?

Waikato	Ditto

Eastern	Ditto

Wanganui	Ditto - Register of licences required.

Nels/Marlb.	Ditto (they note that entering mining data would be 4 months' work).

West Coast	The standard system for tracking mining applications is installed on West Coast.

2.2.2(43)   <u>Issue of concessions. leases and licences for use on or of areas of the conservation estate and the monitoring of those grants.</u>

Recommendation: A standard system for this could be developed for use throughout the department.

2.2.3(44)   <u>Provision of cultural materials and from the conservation estate.</u>

Northern	Inventory of sources of pingao and native timbers (kauri and totara) to establish suitable sources and sustainable yields.

Waikato	Compilation of inventory of totara resource.

2.2.4(45 & 46) <u>Administration of sports fish and game in acclimatisation society managed districts, the management of those resources elsewhere, and the management of indigenous freshwater fisheries throughout New Zealand.</u>

Recommendation: A standard tracking system for administration of licences etc could be developed. Inventory data could be entered on the Sites Database.

Northern	Vetting of applications. Banding programme, paradise shelduck. Licensing whitebait stands

Waikato	Maintain inventories for exploited game birds and monitor annual harvest.

Eastern	Monitor whitebait harvest. Survey eels, koura, smelt utilisation. Black swan, Canada geese, paradise shelduck trend counts. Monitor resources. Hunting diaries. Banding. Collation and analysis of waterfowl count and hunting diary data. Monitor catch of non-Crown fish. Administration of fishing licences and revenue.

Nels/Marlb.   Inventory surveys of freshwater areas, e.g. Mangarakau wetlands.

West Coast   Management of indigenous freshwater fish.

2.2.5(47)   Issue of licences for the taking of other commodities from the conservation estate and the monitoring of these grants and commodities.

Recommendation: A standard tracking system could be developed.

Northern   Inventory of resource information for all existing extraction sites. Monitoring operations.

Eastern   Inventory of bee-hive sites.

West Coast   A tracking system would be of benefit.

Southern   Ditto.

CO 3.1   To raise public awareness of New Zealand's heritage through education and information and to advocate its protection.

3.1.1(48)   Education of people and organisations about New Zealand's natural and historic heritage and its interpretation.

Waikato   Various information requirements.

Eastern   Information on outdoor education camps etc.

West Coast   Media updates on etc.

Canterbury   Information provision.

3.1.5(50?)   Co-ordination of policy formulation, management planning and developing of advocacy strategies for natural resource conservation.

Recommendation: A standard system for monitoring notified planning applications could be designed for use throughout the department.

Northern   Implementation of an efficient monitoring system to monitor planning applications.

Waikato   Information requirements for advocacy planning and management planning.

Nels/Marlb.   Monitoring T & C Planning applications.

West Coast   Finish existing and initiate new management plans.

Southern   Involvement in review of district schemes. Monitoring notified planning applications.

3.1.8(56)   <u>Development and marketing of and services which promote conservation and generate revenue.</u>

Recommendation: A database on DOCnet could be set up to show stock holdings of saleable products throughout the department. This idea was suggested by Eastern Region, in conversation.

CO 4.1   Internal Management and Corporate Services.
              Information related Key Outputs include: EDP(61), Library(63), Draughting graphics(67) etc.

<u>Northern</u>   Land Register; mapping estate.

<u>Eastern</u>   Implementation of Land Register; prepare maps.

<u>Nels/Marlb.</u> Land Register.

<u>Canterbury</u>   Land Register; estate mapping.