State Environmental Conservation Department
(ECD), Sabah, Malaysia

Integrated Environmental Planning; A Regional Perspective

A Paper Presented at the Environmental Convention held in Kuching, Sarawak, 29-30 June 2000

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Report no. ECD-CAB Working Paper No. 1
Issue no. 02
Date of issue June 2000

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Checked Eric Juin
Approved

Abbreviations

ECD	Environmental Conservation Department (State of Sabah)
ECD-CAB	Capacity Building of the ECD Project
EIA	Environmental Impact Assessment
DID	Drainage and Irrigation Department
GIS	Geographical Information System
MYR	Malaysian Ringgit

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1 Integrating environmental issues into Regional Planning

1.1 Introduction

The final report of the Sabah Conservation Strategy published in 1992, identified that all aspects of the environment in Sabah and hence conservation and human welfare are linked intimately with the use of two primary resources: land and natural forests. Directly linked to the management of these resources is the rationale for allocation of land and approval of development plans.

Environmental Impact Assessment system (EIA) and Environmental comments on land applications and development are commonly used methods for the integration of environmental concerns into the development process. The environmental assessment of development projects in isolation, or on a case-by-case basis alone does not always amount to sufficient environmental planning. Such environmental assessments are for example, limited by the fact that they primarily apply to the assessment of larger, more formal development projects. Smaller and informal developments however often have a cumulative effect, which may amount to an overall significant impact. The present assessment procedures may bypass such developments.

Most environmental land use planning methodologies and technologies now available are based on the experience of industrialised countries. There is therefore a need to modify these approaches to make the process compatible with the realities presently confronting newly industrialising counties i.e. high population growth rates, rapid resource depletion and environmental pollution.

1.2 Regional Planning

Regional Planning usually takes place at both the national and regional levels. The physical plans produced as part of the planning process at this level normally ranges in map scale from 1:50,000 to 1:25,000.

From the national perspective, Regional Planning is concerned with optimising the use of national space in the development process. A country is seen as a system of regions each of, which constitutes a distinct geographic, socio-economic, functional or administrative component of national space and each of which comprises a system of settlements and hinterland areas. The regional

planner at the national level often concentrates on the interregional implications of patterns of development in the different regions.

In Malaysia medium term national development plans are formulated for five-year periods. The five-year plans cover all sectors of the economy and include independent chapters on the environment and this explicit incorporation of environmental considerations into development activities reflects environmental commitment and concern at the highest government level. The five-year plans provide guidelines for the achievement of sustainable development and the enhancement of the environmental quality and should pave the way for the incorporation of environmental matters into development strategies.

From the regional perspective Regional Planning is concerned with using regional resources in a way that maximises the benefits to the economy and population of the region. Regional Planning is not a neatly defined discipline; it draws on perspectives from the broad fields of economics, geography, town-planning and organisational development. Integrated regional economic-cum-environmental development plans are not simply a compilation of separate economic and environmental plans. They should show the linkages between economic development, resource use and the production of residuals and impacts on environmental quality and communities. Any regional environmental development plan, even if it is not economic-cum-environmental in scope, should give attention to regional economic considerations so that all proposed environmental projects will be economically sound.

Regional Planning potentially allows linkages between sectoral national planning and project planning and between physical and socio-economic and spatial linkages through which project impacts are expressed. Regional Planning also allows the identification of the institutional arrangements necessary to ensure beneficial integration of projects into the economy of a sub-national area. An understanding of Regional Planning is essential for defining the role that Environmental Land Use Planning can play in regional development.

Regional planning is meant to foster and sustain regional development. The success of a Regional Planning effort depends to a great extent upon the effectiveness with which geographic space and spatial relations are incorporated into development planning and management for the region. For Regional Planning to full fill its potential to contribute to regional development it should incorporate Environmental Land Use Planning as a fully integral component.

1.3 Environmental Land Use Planning

Environmental land use planning is defined as a planning process through which environmental considerations are incorporated into socio-economic development. It is only through this type of planning that the integration of environmental matters into the development process can be achieved, thereby moving part way to securing sustainable development. Measures such as environmental institutions and legislation, education and training, public awareness and

participation and the application of environmental technologies are some of the elements necessary to facilitate Environmental Land Use Plan.

In terms of physical planning environmental concerns at the regional level are normally addressed by the following:

- Nature protection/conservation
- Landscape protection
- Water protection
- Location of EIA required activities
- Specific safety zones for high risk installations
- Restricted zoning for environmental parameters i.e. light, noise etc.

For the Environmental Land Use Plan to succeed the procedure needs to be responsive to the social context of any particular setting therefore the specific goals, administration and regular practices of the society must be well understood. This allows for the purpose, approaches and strategies for the Environmental Land Use Plan to be defined in ways that strengthen existing procedures. The Environmental Land Use Plan should make as much use as possible of the existing administrative resources and institutional arrangements.

Environmental Land Use Planning should support Regional Planning as a fully integral component.

The purpose, approaches and strategies of the Environmental Land Use Plan should be defined so that whenever possible they support the existing social and administrative framework and processes. In reality, however, achieving the ideal situation of co-operation between all role players and decision-makers that drive and influence development is difficult to achieve due to the complex and sometimes unseen nature of the interrelationships.

The most difficult aspect of the Environmental Land Use Plan is achieving and maintaining the multilevel co-ordination that is required to facilitate implementation. Resources, sectors, programmes, projects, administrative levels, participants in the planning and management process, sources of funding and so on are found in a unique variety and quantity at the regional level, where administrative ability to co-ordinate is often weakest.

In developing an approach to incorporate environmental considerations into planning procedures, it should be borne in mind that the traditionally Environmental Land Use Plan should include four primary elements:

1. Assessment of the situation and preliminary identification of goals
2. Information collection and analysis
3. Co-ordinated policy formation (including integration into Regional Planning)
4. Co-ordinated policy implementation.

Traditionally the basic activities for using environmental analysis to co-ordinate regional environmental programmes include:

- *Inventorying regional environmental resources and hazards* in terms of their quantities, qualities, sources and spatial distribution, and documented in maps and text so as to be useful for Regional Planning purposes

- *Analysing regional environmental systems.* A region is a complex area of interlocking environmental systems. A common pattern is first for individual components of environmental systems to be analysed and inventoried, then for the systems to be analysed and documented and finally for the relationships among systems to be studied, e.g. deforestation in zone A will increase flood hazards in Zone B. The maps and accompanying text should be designed to be useful for an evaluation of interactions between regional environmental systems and other regional systems. Risk or sensitivity analysis performed should also be mapped (the results) and should be designed to be useful for formulation of regional environmental resource and hazard management strategies and for co-ordinating regional development programmes

- *Identifying regional environmental/development interactions*

- *Formulating resource/hazard management strategies*

- *Co-ordinating regional programmes.*

1.4 Techniques for Environmental Analysis at a regional level

1.4.1 Land Use Capability

Land-use capability analysis provides a method of determining the potential and/or management requirements of the land based upon an assessment of its physical characteristics. Land-use capability analysis is theoretically a necessity for situations when there are competing demands for land-use. The principle data sets required when determining land capability are; slope, topography, current land use, soils and soil properties, soil erosion hazards, drainage and flooding characteristics, and groundwater features, particularly depth to water tables.

Other useful information includes aerial photographs, land tenure information and other regional planning documents.

In Sabah, a five-class system of land capability classification have been in use since 1970 at a scale of 1:250 000, but instead of considering only agriculture factors, other resource groups such as mining, forestry and hydrology are incorporated (Table 1).

Table 1. The land capability classification for Sabah

Land Capability Class 1	High potential for mineral development and therefore best suited for mining
Land Capability Class 2	High potential for agriculture with a wide range of crops and is therefore best suited for a diversified form of agriculture
Land Capability Class 3	Moderate potential for forest resource exploitation and best suited for this purpose
Land Capability Class 4	Potential for forest resource exploitation and best suited for this purpose
Land Capability Class 5	No potential for forest exploitation and best suited for hydrological or wildlife purposes.

The capability classes are further subdivided into more detailed Land Exploitation Units.

Land capability classes are ordered to recognise increasing degrees of limitations or hazards associated with use and a decreasing degree of versatility of use. Land within a particular capability class can be used for purposes compatible with the lower capability classes but should not be used beyond its capability. The present day land-use capability for Sabah is limited due to the small scale. The Department of Agriculture supplement the capability data with regional soil survey data which may be at scales of 1:50,000; 1:25,000 and for some prioritised areas 1:10,000.

1.4.2 Urban Capability Criteria

Although criteria for urban capability assessment are currently not available, theoretically it is simple enough to identify the lands best suited to urban development based on a set of recognised limitations. Limitations relevant to the Penampang district should include areas subject to flooding, particularly those subject to substantial inundation depths and or high velocities. Other criteria normally should include:

- Slopes in excess of 15 degrees
- Areas of high erosion hazard
- Soils of high instability
- Wetlands and other areas of ecological importance.

Because areas most suited for urban development will often coincide with areas having a high potential for agriculture and timber extraction, there will eventually be the need to strike a balance between the competing uses, using the regional and local plans as a guide.

1.4.3 Land Use

Land use is a description of the present day land use cover as usually interpreted from the latest set of air photographs or remotely sensed data. With an

understanding of the associated land management practices, the land use information can also be valuable in identifying and evaluating the potential pollution effects caused by land use change. However, land use information alone may not be enough for regional planning because it only records the actual use of the land at a particular point in time. The land may currently be used beyond its capability.

In Sabah, the Department of Agriculture has mapped land use at a scale of 1:25,000 for agricultural areas on a priority basis. Other possible data sets are presented in Table 2.

Table 2. Data Set

Data Set	Custodian	Scale
Land use	Dept. of Agriculture	1:25,000
Soils	Dept. of Agriculture	1:50,000
Rural Land Capability	DID	1:85,000
Alienation and Gazettement	Land & Survey Dept.	1:12,500
Slope and terrain	DID	1:85,000
Areas of recent disturbance	DID	1:50,000
Modified lands	DID	1:85,000

1.4.4 Planning and Legislative Base

Laws of Sabah dealing with the use and management of land include:

1. The Land Ordinance, 1967
2. The Water Ordinance, 1961
3. The Forest Enactment, 1968
4. The Parks Enactment, 1984
5. The Fauna Conservation Ordinance, 1996
6. The Conservation of Environment Enactment, 1998
7. The Water Resources Enactment, 1998
8. The Planning Ordinance, 1969.

1.5 Additional Techniques for Environmental Planning and Management

Implementation of the Environmental Land Use Planning requires tools, aids and devices for carrying out environmental planning and management. Amongst others these include; environmental monitoring, EIA, environmental standards and environmental database management.

1.5.1 Environmental Monitoring

Environmental monitoring can be defined as a process for repeated observations and measurements of physical, chemical and or biological parameters of single or plural elements of the environment at specific places and intervals with particular objectives - supplemented with monitoring of socio-economic parameters. It is necessary to have access to consistent and accurate environ-

mental data and information before any sensible actions can be formulated for environmental management. Constraints hampering monitoring generally include inadequate legislative and institutional arrangements, limitations of budgetary allocation, insufficient coverage of indicators to be measured, low frequency of monitoring, insufficient laboratory and equipment facilities and the lack of trained manpower.

Environmental monitoring activities may target ambient parameters e.g. water and air. Monitoring activities for other natural resources are not so well organised. The continued improved access to remote sensing, however, has considerably improved the situation in this respect, particularly for the monitoring of land use and land resources.

1.5.2 EIA

Just like economic analysis and engineering feasibility studies, EIA is a management tool for decision-makers and planers who must make important decisions about major development projects. It is also a process, not a product, through which environmental considerations are incorporated into project planning, construction and operation. In some countries and for some projects the considerations are comprehensive, but in some cases the considerations may only be partial.

1.5.3 Environmental Standards

All environmental planning must be related to objectives that may be termed 'environmental standards'. These standards are minimum quality of life values acceptable for human well being. The standards usually become progressively more stringent with increasing national affluence.

Setting appropriate environmental standards is complex requiring considerable expertise and often due to this lack of expertise many countries have attempted to solve the environmental standards problem by simply copying those of other countries. The results have invariably been counter-productive, even to the point of discrediting the environmental agencies attempting to enforce them. It must be recognised that 'standard' should mean something that can actually be achieved within a country's existing system.

1.5.4 Environmental Database

A systematic information system, which might be referred to as an environmental database, is a valuable aid to decision-makers and planners in formulating and evaluating comprehensive and effective environmental policies. The system covers the natural as well as the man made environment including a wide rang of human activities, natural events and environmental impacts. Significant progress has been made in database development in recent years with the increasing availability of GIS.

2 Penampang District – A Pilot Project

2.1 Background

In December 1999 the Environmental Conservation Department was requested to comment from an environmental management perspective on the *proposed Penampang District Land Use Scheme.*

At the same time the Capacity Building of the Environmental Conservation Department (ECD-CAB) project has been initiated and two of the planned outputs under this project were: (i) Preparation of *Guidelines for environmental screening of land alienation and development* (output no. 12); and *Establishment of GIS* (output 22).

It became apparent that a link between the request and these two tasks of the Department could be established, and it was decided to proceed with the production of an Environmental Land Use Plan and accompanying Environmental Memorandum to be used in the preparation of the Penampang District Land Use Scheme.

Thereby the activities of the ECD-CAB would compliment the existing duties of the Department and the proposed Penampang District Land Use Scheme would at the same time function as a case study and as such, provide focus for two of the ECD-CAB project outputs.

This chapter describes the objectives, planned activities and concepts behind the efforts to develop an Environmental Land Use Plan for Penampang District and linked to this, develop Guidelines for Environmental screening of land alienation and development plans.

2.2 Penampang District

The District of Penampang is situated on the west coast of Sabah, forming a continuum immediately to the south and west of the capital city Kota Kinabalu. The eastern three-quarters of the District (465 km^2) falls on the steep and hilly terrain of the Crocker Range while the remainder, extending west to the coastline, has a predominantly low relief and comprises of broad alluvial plains with isolated outcrops of low hills. This provides two general classes of terrain; either flat floodplain land or steep hill slopes, thus placing severe restrictions on

development opportunities in the future. For example, in the Sungai Moyog catchment, which comprises 295 km^2 of the District, only two per cent of the lands have gentle slopes considered ideal for development, the remaining lands are either too steep or flat lying and flood prone. As a result of these constraints most of the population is concentrated on the coastal strip and inland along the river floodplains and lower hill ridges. These physical characteristics are the driving pressure for the large amount of cutting and filling in the lower catchment areas within the District (DID, 1998).

The physical constraints must also be considered alongside the demographic trends along the West Coast of Sabah in and around Kota Kinabalu. In 1997, five per cent (133,190) of the total population of Sabah lived in Penampang District while the surrounding areas of Tuaran, Kota Kinabalu and Papar account for a further 19.2 %. The lowest population projection for the year 2015 estimates an increase of 157 per cent in the overall population in the combined areas - which remains daunting as this almost trebles the population to 1 654 855 (DID, 1998). The implications for water demand water quality and overall land degradation are huge. More cutting and filling of the slopes and floodplains will occur to accommodate the growing population. Agricultural lands will fall under continued pressure to be converted to urban uses with the further loss of rice growing areas. With further industrial development, mixed industrial areas will continue to spread out and in-land from Kota Kinabalu. Discharge of pollutants to the drainage systems will continue to increase and the remaining forested areas of the Crocker Range will be further encroached upon.

To cope with the projected increase in land use pressure and maintain a good quality of life, environmental considerations should be incorporated into all matters related to land use development. Ideally good environmental management should not only respond to the problems now but will consider the effects of the increasing numbers and affluence of people on the natural resource base of the future.

2.3 The proposed Penampang District Land Use Scheme

The proposed Penampang District Land Use Scheme covers the entire District and is based upon a topographic map scale of 1:12,500, dated 1992. The scheme is accompanied by a Memorandum prepared for the District Council by the Town and Regional Planning Department, Kota Kinabalu. In addition to the District Land Use Scheme two local plans within the Penampang District exist, namely the Penampang Local Plan and the Putatan Local Plan.

Land use on the proposed Penampang District Land Use Scheme is divided into the following classes:

- Village Area
- Forest Reserve
- Countryside area
- Ridge conservation area
- Park, recreation and tourism area

- Open Space (Cemetery)
- Open Space (River)
- Open space (recreation)
- Coastal conservation
- Sea area
- Water catchment area

Land falling outside of the above classification can be assumed alienated. Environmental concerns have been covered through: (i) all ridge areas above 250 feet elevation are shown as Ridge Conservation Areas, (ii) the Padi areas are reserved as Cultivation Areas.

In the District of Penampang, much of the land disturbance related to the development of individual plots continues to take place on steeper and steeper lands, with widespread encroachment into ridge conservation areas. High population growth rates and the subsequent increase in demand for land and water are the major driving forces behind environmental problems in the District. Small-scale industrial development currently only affects the low-lying coastal plain areas nearby the spreading urban zone of Kota Kinabalu. The incorporation of environmental concerns into the Penampang District Land Use Scheme should prioritise and reflect these processes.

Furthermore, the proposed Penampang District Land Use Scheme was prepared in 1992, and considering the current rapid rate of development, updated environmental baseline information could strengthen the preparation of the Penampang District Land Use Scheme.

2.4 The role of ECD

The Department is currently charged with enforcing the *Conservation of the Environment Enactment 1996.* Development projects falling within the purview of *the Conservation of Environment (Prescribed Activities) Order 1999,* or any other development project as determined by the Director, may be requested to submit an Environmental Impact Assessment or other form of environmental assessment.

Currently the Department undertakes environmental assessment and approval of projects covered by the Prescribed Activities (the EIA system). Furthermore the ECD gives environmental comments on a case-by-case basis for other Development Plans and Land Applications, however under the present procedures the ECD will only provide comment on environmental considerations if the Land Application or Development Plan is submitted to the Department. Submission is not mandatory and is dependent upon the processing procedures of the individual Districts. Many of the land disturbance activities currently taking place within the Districts are small scale and are not subject to environmental comments from the ECD. Considering, for example, that each agricultural plot carries the entitlement to build a house, the cumulative impact of these small-scale activities can be considerable.

Environmental Impact Assessment is a planning tool and as a department concerned with environmental protection in Sabah, it is clear that in the future the ECD will need to contribute beyond the administration of the EIA process. A starting point for this could be the integration of EIA and other environmental requirements into District Land Use Schemes.

Given the complex nature of regional planning and the large number of specific and professional activities required to develop a comprehensive District Land Use Scheme, the responsibility for the development of such schemes clearly remain within the Regional Town and Country Planning Department. However, ECD could contribute to the overall planning process by providing an Environmental Land Use Plan that would provide additional guidance concerning environmental issues and legislation.

The Environmental Land Use Plan would consist of two components: (i) An Environmental Land Use Map and (ii) an accompanying Environmental Memorandum.

The Environmental Land Use Plan can be incorporated into the District Land Use Scheme, and/or provide an environmental map/memorandum for reference during the initial determination of EIA requirements and environmental screening and assessment of Land Applications and Development Plans.

2.5 Objectives and outputs

The first objective is to:

- Produce an Environmental Land Use Plan for the Penampang District, reflecting the relevant environmental concerns of the Environmental Conservation Department.

This objective is in direct response to the original request for comments on the proposed District Land Use Scheme from the Penampang District Council. The request provides an opportunity for the ECD to transfer principles of the Conservation of the Environment Enactment onto a physical plan and accompanying memorandum.

The ECD will develop the Environmental Land Use Plan in conjunction with the Penampang District Council and the Town and Regional Planning Department, to accompany the Penampang District Land Use Scheme.

The development of such an Environmental Land Use Plan will largely be experimental in nature; however, the potential benefits for environmental decision-makers could be considerable. In addition, one of the proposed activities for making the Environmental Land Use Plan, the production of an updated land use map, will create additional information on recent land use change patterns, which in turn can be used for the Penampang District Land Use Scheme. The Environmental Memorandum will provide supplementary information on zoning rationale.

Although such an Environmental Land Use Plan will prioritise the environmental legislation of the Department, it may also incorporate other relevant environmental requirements e.g. water catchments and riparian reserves. Ideally the Environmental Land Use Plan should also incorporate other relevant environmental legislation e.g. the Water Enactment. By means of spatial analysis of environmental data, the Environmental Land Use Plan will further identify areas that are environmentally sensitive. It is therefore envisaged that the Environmental Land Use Plan will provide information that will support and assist decision-making concerning Land Applications and Development Plan approval. In the medium to long term, this would allow greater control over development activities and environmental planning and management at the local and district level.

At the Environmental Land Use Plan scale of planning (1:50,000), environmental decision-making is normally concerned with the following issues:

- Identifying sites for **nature protection/conservation**
- **Landscape protection**
- **Water protection**
- **Location of EIA required activities**
- **Locations that require restricted zoning** for environmental parameters or risk e.g. high-risk installations, light, and noise.

The Environmental Land Use Plan should best represent the above environmental concerns by means of spatial zoning, thus providing guidance at an early level of the decision making process, as to the suitability of project location.

The users of the Environmental Land Use Plan would include the District Office, District Council, Land Utilisation Committee, Regional Town and Country Planning Department and ECD.

The second objective is to:

- Develop general environmental guidelines for land applications and development plans, based on the experiences gained during the development of the Environmental Land Use Plan for Penampang District.

The third objective is to:

- Develop the capacity of the ECD to process environmental spatial data, which can be used to provide environmental comments on District Land Use Schemes.

2.6 Planned activities

The procedure for developing the Environmental Land Use Plan is:

1. Preliminary analysis of issues including the drafting of the present background paper. Identify the needs and role of ECD *vis-à-vis* other stakeholders. Assessment of risks in terms of financial and time commitments

2. Initial briefing of Regional Town and Country Planning Department and Penampang District Council including discussion and presentation of proposed action plan

3. Establish working protocol with representatives from Regional Town and Country Planning Department and Penampang District Council. Identify start up activities

4. Describe and review the current administrative procedures required for land alienation and development plan approval. Identify other relevant environmental legislation (external consultant)

5. Identify, procure and establish an appropriate Geographical Information System (GIS) within ECD. Purchase of 1:50,000 digital data for Penampang District (external consultant). SPOT imagery to be purchased (Date of proposed image - 14 April 2000). Document and describe all GIS and remote sensing technical procedures

6. Production of digital elevation model (DEM)

7. Resource inventory and land use analysis. Production of new land use map at a scale of 1:50,000

8. Incorporation of other relevant data into the GIS

9. Production of overlays based on Conservation of Environment Enactment and other relevant environmental legislation e.g. slope, riparian reserves

10. Spatial analysis using GIS. Highlight areas of environmental concern

11. Highlight areas of potential rural and urban development

12. Production of a draft Environmental Land Use Plan, including environmental map and memorandum

13. Submission of a draft Environmental Land Use Plan to Regional Town and Country Planning Department and Penampang District Council

14. Production of the final Environmental Land Use Plan, including workshop if necessary

15. Provide documentation as to how the guidelines should be applied in the planning procedure including other recommendations

16. If and when necessary, provide training and support for relevant stakeholders.

2.7 Format of the Environmental Land Use Plan

Production and distribution of the Environmental Land Use Plan will be in the following formats:

- Hard copy format similar to the existing 1:50,000 map sheets - to be distributed to all relevant agencies. In addition to the hardcopy map sheet, the digital format of the Environmental Land Use Plan should be made available to all relevant agencies. Agencies will require Arc View 3.2 software. Training and technical support from ECD-CAB if required

- An accompanying Environmental Memorandum

2.8 Involved agencies

The following agencies will be including: (i) Jabatan Tanah dan Ukur, (ii) Department of Agriculture; and (iii) Department of Irrigation and Drainage.

2.9 Existing Data

The Department of Agriculture has mapped land use at a scale of 1:25,000 for agricultural areas on a priority basis. The most recent data for Penampang District is from an air survey flown in 1993. In 1998 an air survey was flown over the District and the ECD hold a complete set of the air photographs.

For the Sg Moyog Integrated Catchment Management project, the 1970 land use map was updated in 1998 with the interpretation of 1987 aerial photographs. Other data sets of relevance are presented in Table 2.

Table 2. Relevant existing data - Penampang District

Data Set	Custodian	Date	Coverage	Scale
Land use Soils	Dept. of Agriculture Dept. of Agriculture	1998 1998	District District	1:25,000 1:50,000
Rural Land Capability	DID	1998	Moyog	1:85,000
Alienation and Gazettement	Land & Survey Dept.		District	1:12,500
Slope and terrain	DID	1998	Moyog	1:85,000
Areas of recent disturbance	DID	1998	Moyog	1:50,000 (SPOT)
Modified lands	DID	1998	Moyog	1:85,000

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