A land resource assessment of the Wimmera region

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1 Introduction

Soil provides the basis for our agricultural production, acts as a buffer against environmental pollution, is a repository for wastes, and forms the hydrological interface between rainfall, runoff, recharge, groundwater storage and streamflow. Soil is therefore pivotal in the provision of fundamental ecosystem services. Land use and land management choices rely on this versatility of soil but can also compromise these services if land management is applied inappropriately. Protection, maintenance and enhancement of soil quality are the foundations for sound environmental management and necessitate the knowledge of soil differences. Land resource assessment, which provides the understanding of the variety of soils and their relationships in the landscape, is an essential tool for any land use activity, from agriculture to waste disposal.

The WimmeraCatchment Management Authority (WCMA) region encompasses almost 13 350 km^2 of western Victoria. This includes the Wimmera plains, the Western Uplands (Central Highlands) and the Western Plains, as well as a suite of rivers and creeks that travel northwards as terminal systems (Wimmera River, Yarriambiack Creek and Dunnmunkle Creek). The region is a traditional agricultural region that has been experiencing increases in agricultural intensification, especially dryland cropping systems (WCMA 2003), grazing and irrigated horticulture systems, and other forms of agricultural enterprise (WCMA 2003). While intensification in agriculture is expected, a growth in tourism and recreation is a force to be considered in future natural resource allocation, consumption and sustainability. Public land is mainly confined to the Grampians Ranges and Central Highlands where nature conservation and recreation are the main land uses, whilst the freehold land on the plains is used predominantly for dryland cropping, sheep, beef and dairy enterprises.

In 2002 work commenced on an inventory of soils and landscapes across public and freehold land within the region. Work undertaken by Primary Industries Research Victoria (PIRVic) includes a major land resource assessment (LRA) project in the WCMA region to provide detailed information to underpin any future land capability or land degradation assessment.

The work program has allowed for the development of a 1:100 000 scale land resource dataset. The land resource data in this project is a soil-landform unit dataset based upon an integration of landform, geological and soil information in the identification of unique land units. Land degradation susceptibility mapping has also been developed using expert and regional knowledge to assess soil-landform units for their inherent vulnerability to degradation processes.

The data and information derived from this work program can be used for spatial analysis of future landscapes (possibly for condition, classification or resource definition), as well as identifying land management issues including land hazards, land capability, soil decline, natural assets (e.g. soil and soil ecosystems). This information, in combination with modelling to identify areas of risk, can support priority setting for initiatives, programs or policies to manage land use change.

This report provides a consistent soil-landform dataset that will assist future opportunities to develop sustainable primary production (farming systems) and processing enterprises, as well as maintain ecosystem services within this region.

Data collected and generated as a result of this project enables all stakeholders to access key land resource information, and will help to discriminate areas suitable for various land uses and land management practices. The ability to access detailed soil point information, as well as soil and land unit spatial data will benefit many modelling applications that are currently used to assess land resource management and water quality aspects. The project will ultimately be useful in encouraging the development of a common and coordinated approach to the selection of sustainable land use options and land management practices into the future from an integrated policy and improved farming systems perspective. This inventory provides base soil and land information by which identification of threats and opportunities can be made (Figure 1). These interpreted products along with future research, are key ingredients to support policy and planning requirements of government and stakeholders.

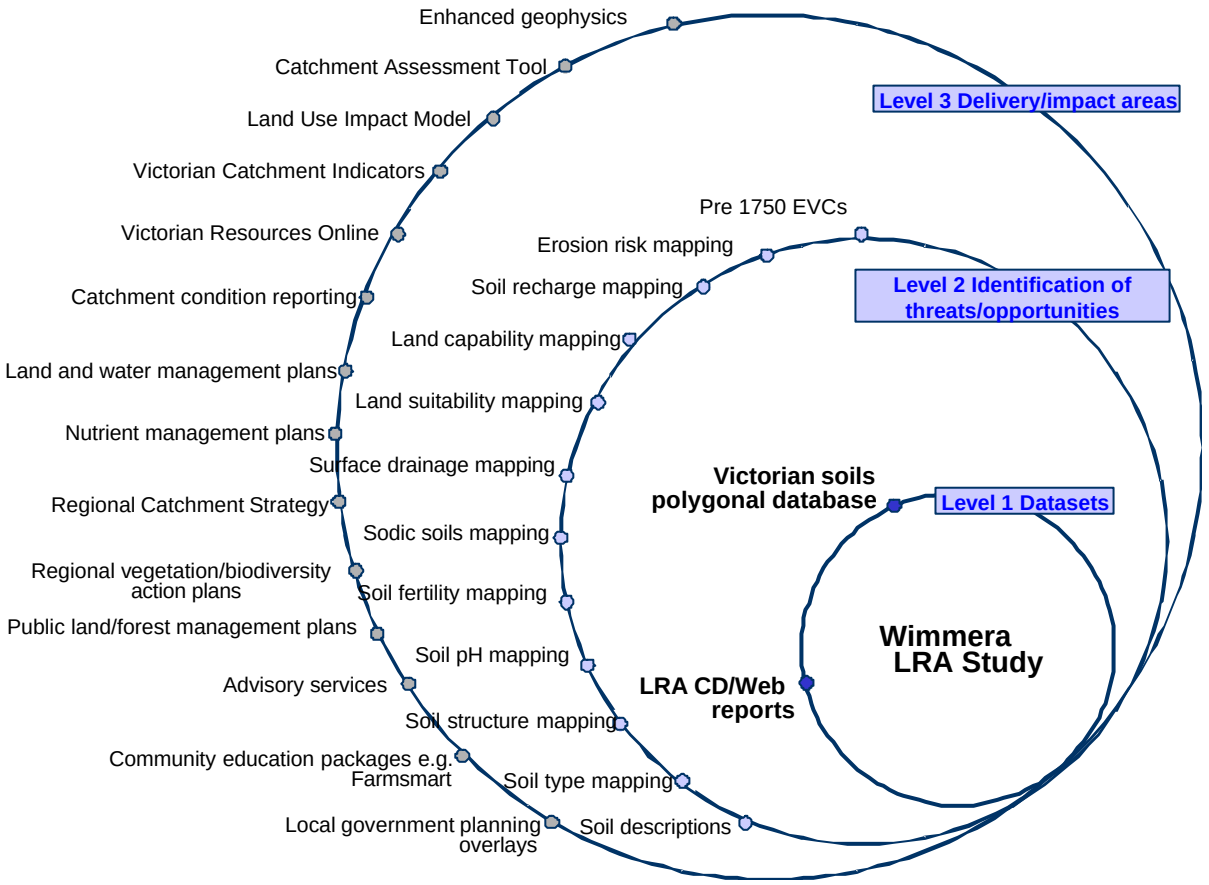

Figure 1 Relationship between WLRA, and future research, policy and planning requirements

1.1 Objectives

The primary objectives of the project were:

- To undertake an inventory of soils and landforms to establish a continuous spatial dataset for the WCMA region. As the first consolidated dataset of this type for the region, the information from

the soil point data and the spatial mapping will become key datasets for input into catchment and natural resource modelling applications.

- To provide land degradation hazard susceptibility information to identify potential on-site and off-site impacts to underpin decision making regarding current and future land use.
- To provide information that will enable future land capability assessment for the catchment, designed to attract investors to the region and to ensure that investment takes place in areas where there is low economic and environmental risk.
- To increase the efficiency and effectiveness of natural resource utilisation in the region.
- To provide specialist land resource assessment (LRA) training to DPI Catchment and Agricultural Services (CAS) staff and other stakeholders.

1.2 Location of the study area

The WCMA region in western Victoria contains the Wimmera River catchment and part of the Millicent Coast Basin to the South Australian border. The region forms the south-west part of the Murray Darling Basin and covers 23 500 square kilometres or 10.3% of Victoria's total area. It extends from the Grampians Ranges in the south to Lake Albacutya in the north, and from the South Australian border in the west to Navarre in the East. The Wimmera River (largest terminal river in Victoria) is the major waterway in the region and is the focus of many social, cultural and environmental values. (Figure 2).

1.3 Links to other projects

This project is linked to a number of key projects including Regional Data Net, Victorian Catchment Indicators and Victorian Resources Online (http://www.dpi.vic.gov.au/vro). Information collated and derived from this report builds upon concepts and background data derived in the report *Land and soil survey in the Wimmera region: Data inventory and evaluation of methodologies for soil mapping*:

- Part 1: A review of methods for surveying soils at different map scales (Robinson et al. 2003a)

  This is a desktop investigation of existing yield information and its application in land management, toposequences and the role of soil survey in land assessment.

- Part 2: Evaluating a methodology for strategic soil-landform mapping in the Wimmera (Robinson et al. 2003b)

  This study evaluates and documents procedures used in integrating Enhanced Resource Assessment (ERA) techniques in land assessment for sustainability and productivity.

- Part 3: Data inventory (Robinson et al. 2003c)

  This inventory assembles existing information to provide strategic outcomes and recommendations as a basis for future land resource assessment in the Wimmera.

1.4 Background

This study has concentrated on a comprehensive revision of soil-landform mapping and associated site descriptions. It is acknowledged that there are a number of associated datasets that contribute towards the framework for the study (such as the geomorphology, geology and climate) or complement the study at a similar scale (such as vegetation and land use).

Climatic and geological data have been sourced from geospatial datasets, many of which can be accessed electronically via Victorian Resources Online (VRO) or from relevant sources (DPI Minerals and Petroleum, Bureau of Meteorology). The information on the geomorphology provided in this report constitutes a new approach to soil-landform mapping in Victoria. This approach provides context for analysis of landscapes at a range of scales and degrees of complexity. The geomorphology provides the main framework in this study for the soil-landform units (approximates to detailed

landsystems without some of the ecological connotations). This enables the description at the soil-landform level (1:100 000 scale) to be relatively scale free as many of the contextual issues are dealt with by the geomorphology at a number of smaller (broader) scales (or tiers). Links between the geomorphology and soil-landform are further discussed in the 'Geomorphology' section of this report.

Vegetation, biodiversity and land use information used in this report is based on existing data such as the Ecological Vegetation Community (EVC) mapping. The VRO website along with the Biodiversity Interactive Map (http://nremap-sc.nre.vic.gov.au/MapShare.v2/imf.jsp?site=bnr-v1) provides a portal to these datasets and updates on progress made in vegetation mapping across the catchment.

This report's intended usage is predominantly as a regional overview and should only be used as such. Users include the wider community, however the primary users are expected to include local government and regional extension staff (DPI and WCMA), with usage expected at a higher level for statewide applications (CAT, LUIM, carbon sequestration modelling, etc.).

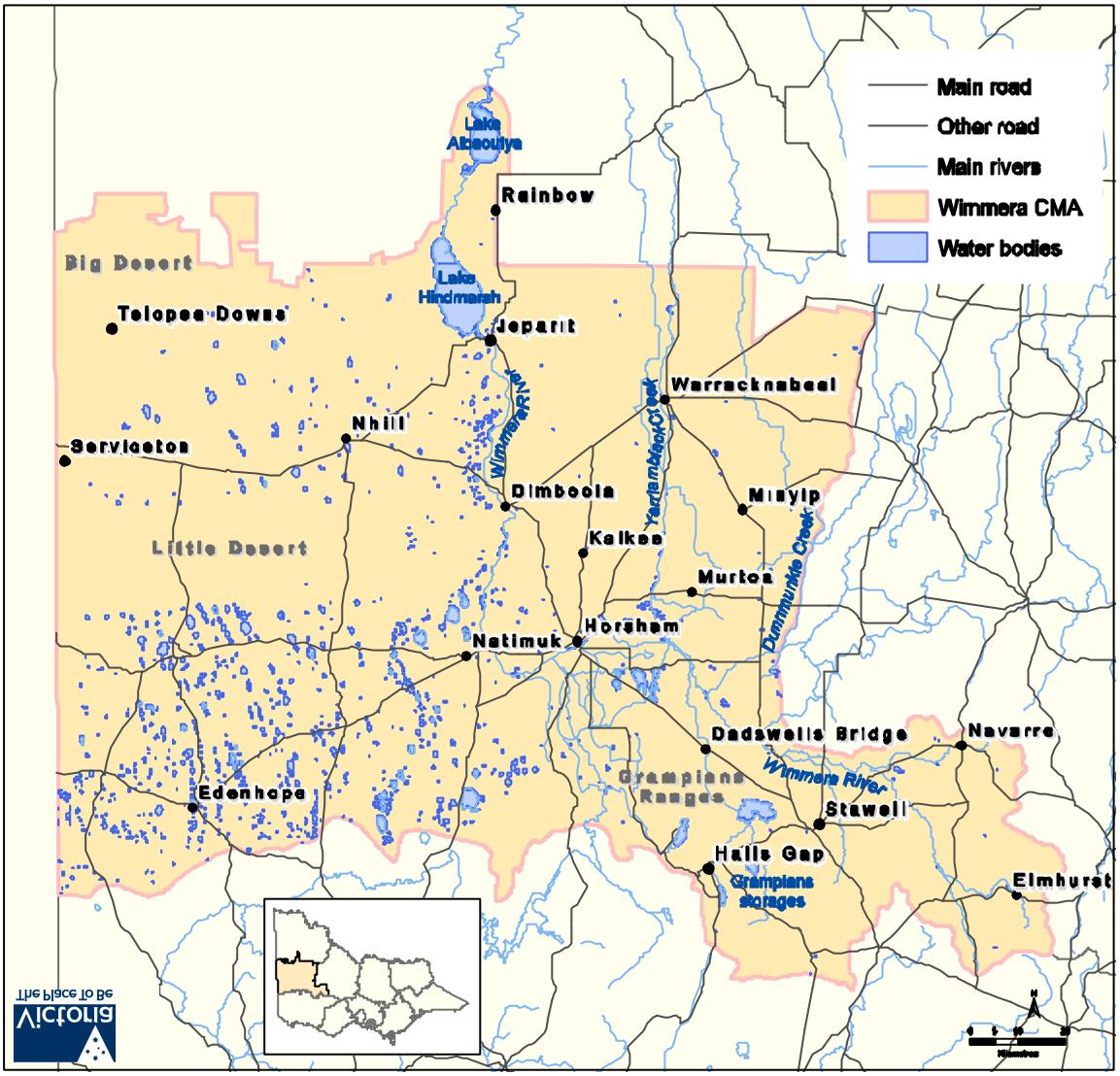

Figure 2 WCMA region and its major rivers