

NATURAL and CULTURAL ENVIRONMENT

I. Dobrzinski*

Chapter 2

NATURAL ENVIRONMENT

Climate

The Eromanga Basin underlies a region which is part of a large desert complex (Lake Eyre Basin) incorporating the northeast deserts of South Australia. It is characterised by long extended droughts interspersed with relatively high rainfall periods and occasional extreme rainfall events.

The average rainfall is ~100–150 mm per year. Although it is often infrequent and highly variable, there is a seasonal tendency for rains to occur in late summer (Fig. 2.1). Annual evaporation rates are extremely high, often exceeding rainfall by an order of magnitude or more throughout the year (Allan, 1990). It is estimated that only 33% of average annual rainfall is effective (Jessop, 1960).

Seasonal and diurnal temperature variations can be extreme. In summer, maximum temperatures often exceed 40°C in the shade. In winter, the days can be mild with maximum temperatures averaging around 18–24°C. July is the coldest month of the year with minimum temperatures averaging between 3–5°C and occasional sub-zero conditions.

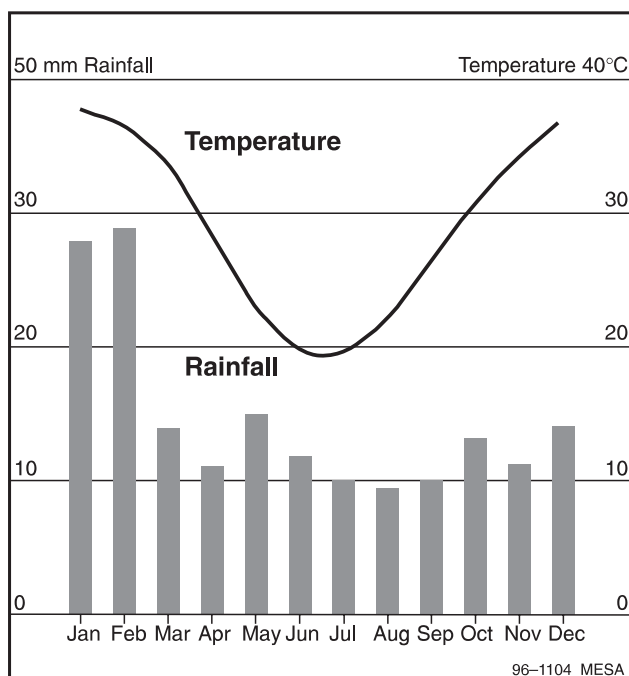


Fig. 2.1 Average rainfall and temperature data for Oodnadatta (for all years of record to end 1992; South Australian Year Book, No. 28 1994).

The windiest months occur in September through to December. Prevailing winds are from the south-southeast during spring to autumn and more variable in winter.

Landforms

The Eromanga Basin region covers almost 360 000 km² of South Australia which, although broadly designated as being within the arid zone, is by no means environmentally homogeneous. There is a wide variety of major landforms within which many minor landform patterns or environmental units occur. The major landforms include:

- Dunefields — which vary in height, spacing, alignment and shape.
- Gibber plains — sometimes described as gently undulating stony plains which occasionally fringe the various uplands and silcrete capped plateaux and ridges.
- Undulating plains — which tend to join the dissected tablelands, hills and ranges and sand dune areas.
- Floodplains — which are generally only inundated following high rainfall events in the upper catchment area rather than due to local rains. They can be diverse in their features ranging from fields of parallel dunes and extensive systems of interconnected claypans that are periodically flooded, to broad floodplains which may contain sinuous channels, low levees and braided channels partly overlain by dunes.
- River channels and alluvial fans.
- Salt lakes and clay pans.



Desert sand dunes and interdune. (Photo 43828)

*MESA (email: idobrzinski@msgate.mesa.sa.gov.au)

- Dissected tablelands, hills and ranges.
- Mound springs produced by vertical leakage from the GAB. These are small but important sources of permanent water providing foci for plant, animal and human life in the desert environment. The largest of these springs is located at Dalhousie which discharges 90% of the total spring flow in South Australia.

The occurrence of minor landforms can vary depending upon the detailed morphological characteristics of a major landform based upon the local geology, soil type, topography, drainage patterns and biota. The degree of landform diversity in the Eromanga Basin, together with a highly variable rainfall and flooding regime has resulted in a diverse array of vegetation and animal habitats which are themselves in a continuous state of change.

Native vegetation

Due to the climatic extremes experienced throughout the Eromanga Basin vegetation is sparse over relatively large

areas, which during drought periods, may often appear quite barren and lifeless. Throughout these areas, small differences in habitat such as depressions or drainage lines may produce slightly more growth and a greater variety of species.

Perennial plants have adapted to endure long dry spells and extreme temperatures whilst the appearance of herbaceous plants can be episodic and infrequent depending upon suitable climatic combinations. Differences in landforms and soil type account for some of the major differences that appear throughout the vegetation within the region.

The vegetation associated with water courses, floodways or mound springs generally consists of permanent shrubs and trees or herbage which are independent of rainfall. Vegetation associated with floodplains relies more on the incursion of floodwaters and rainfall events in the upper catchment area rather than on local rains, whereas in sand dune country local rainfall is often sufficient to stimulate plant growth. Plant responses to rainfall in the interdunes may differ.

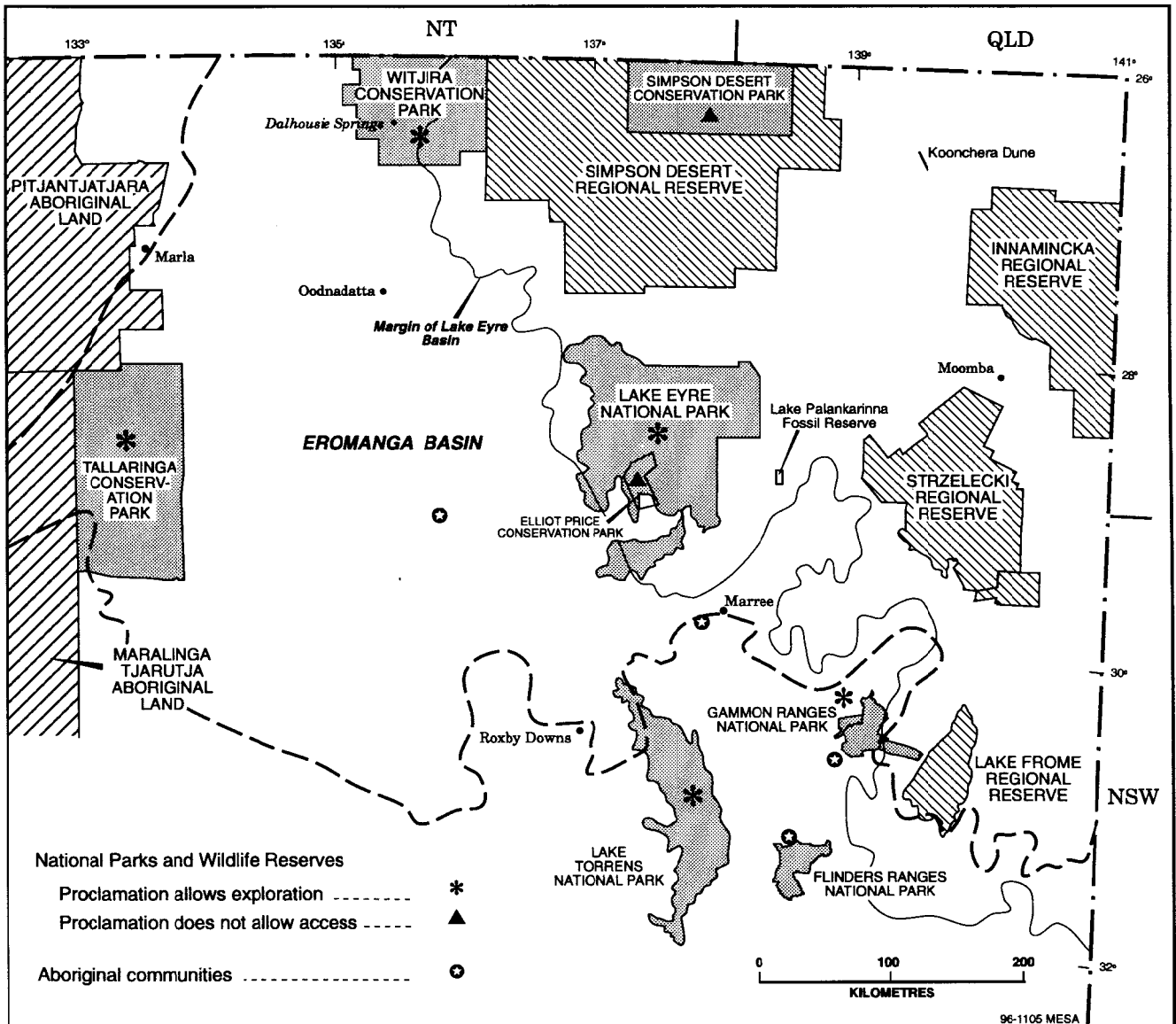


Fig. 2.2 Areas having conditional access for petroleum exploration and development at 1 May 1996.

Land access

National Parks and Reserves

There are ten parks and reserves located within the South Australian part of the Eromanga Basin (Fig. 2.2). These were created to conserve the best examples of vegetation and landforms in the region. Access for exploration and production is allowed in all parks other than the Simpson Desert and Elliot Price Conservation Parks. The conditions of access vary from park to park, based upon the type of reserve classification (Conservation Park, National Park or Regional Reserve), the activity proposed and the impact it is likely to have on the environment.

An 11 500 hectare (ha) Control Zone exists within the Witjira Conservation Park which encompasses the Dalhousie Springs and the related environs. Exploration and production in this zone are subject to administrative and management procedures agreed to by MESA, the Department of Environment and Natural Resources and exploration companies.

National Estate

There is a number of areas such as Lake Palankarinna and Koonchera Dune which are listed on the Register of the National Estate. Access is normally allowed to these areas based upon the same principles as for parks and reserves.

World heritage listing

An assessment of the world heritage values of the Lake Eyre Basin (Fig. 2.2) is currently being undertaken by the Federal Government. Nomination of the Lake Eyre Basin for world heritage listing should technically not preclude exploration or any other form of development proceeding within the area. The present Government has promised to consult closely with the States on this issue.

Pastoral land

Access to pastoral land is negotiated with the landowner. The most common issues are vehicle and equipment hygiene to ensure that weeds are not spread, and the repair of any damaged tracks, fences or gates. There are standard techniques for managing such issues and landholders generally accept exploration and production activities.

HUMAN ENVIRONMENT

Aboriginal heritage

In South Australia it is an offence to disturb or destroy Aboriginal sites, objects or remains. Standard procedures for determining the presence of Aboriginal heritage prior to the commencement of activities have been determined. These involve consulting with the relevant Aboriginal organisation and maintaining a watch for sites, objects or remains during



Undulating stony plains fringing the Arckaringa Hills. (Photo 43829)

exploration. The sites are generally no larger than a few hundred square metres and are easily avoided. Since the inception of the *Aboriginal Heritage Act 1988*, there have been no conflicts between Aboriginal heritage sites and exploration or production activities. MESA can provide advice to companies on Aboriginal heritage.

European heritage

There are numerous sites of European heritage significance such as historic buildings and structures, graves and geological monuments. These are indicated on environmental sensitivity maps which can be purchased from MESA. The majority of sites are small and easily avoided by exploration and production activities.

ENVIRONMENTAL REGULATION

A number of environmental issues are pertinent to petroleum exploration in the Eromanga Basin, all of which can be resolved by proper operational planning in the initial stages. In order to ensure that activities are undertaken in a manner which minimises environmental impacts, a number of documents are required before approval to commence operations is given. First, a Declaration of Environmental Factors (DEF) is required from the licensee. This is the licensee's assessment of the environmental impact of an activity. In addition to the DEF, a Code of Environmental Practice (CEP) is also required by regulation. The code describes procedures that the proponent will adopt during the planning, assessment, field management, auditing and monitoring phases of the operation.

Santos and partners, the major oil and gas producers within the Eromanga and Cooper Basin, have jointly developed with MESA, CEPs for exploration and production. The codes provide guidance to licensees on environmental issues that need to be taken into consideration in planning a project for PELs 5 and 6. These codes are currently being revised in a move towards an outcomes based approach, however in the interim they provide a good basis from which to start. A company may either adopt these codes or use its own CEP subject to approval by MESA.

Although a number of documents are required, the approval process is not onerous. MESA is able to assist licensees by providing examples of the documentation and advising on their scope.