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DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

NATURAL RESOURCE MANAGEMENT: PRINCIPLES, CHARCTERISTICS AND THEMES

Purpose

The purpose of this paper is to establish a Departmental position on sustainable use and management of natural resources as this relates to the Department's operations and legal responsibilities. The Department has broader goals than have traditionally been recognised in the scope of Natural Resource Management (NRM).

The paper is intended to underline the breadth of the Department's involvement in NRM, and will inform the work being undertaken by Department officers when contributing to regional NRM strategies, as required under the National Action Plan for Salinity and Water Quality and extension of the Commonwealth's Natural Heritage Trust. The definition developed here builds on and extends the present understanding of NRM as covered by State NRM Council, incorporating concepts of sustainability being promoted through the draft State Sustainability Strategy.

Introduction and background

Natural resource management is undergoing profound changes in Western Australia. Where we have historically managed single resources or land uses, usually in isolation from each other, we are now attempting to manage entire resource systems in an integrated fashion at a regional or ecosystem[1] level. Towards this end, there have been a number of definitions constructed to give meaning and a scope to the term NRM.

Traditionally, the term natural resource management has been regarded as the relationship humans have with a particular resource, or set of resources. This has tended to exclude the consideration of intrinsic natural values – the right of other beings and natural processes to exist for their own purposes. There is an obvious anthropocentric perspective or utilitarian aspect to the word "resource", which usually refers to either a stock or reserve of that particular resource type that can be made available when necessary, or a means of supplying a human need. "Natural" refers to resources that are not manufactured by humans and occur as part of the environment. Often, natural resources have been modified to various degrees. Functionally, natural resources have been described as "the resources derived [for human use] from the land or sea".

In a legal sense, the term natural resources encompasses a number of areas, and may include a resource: found below the surface of the land (e.g. minerals, petroleum, subterranean water); physically attached to the land (e.g vegetation, soil, rocks), or; that has a mobile relationship with its substrate (e.g. animals, tidal waters, air). Accordingly under law, NRM has been restricted to the conservation, use or development of physical substances having an affinity to land or land covered by water.

At a more practical level, the term NRM is often poorly defined and loosely used. Current popular use of the term is influenced by a number of historical trends including the development of the Landcare model, which is largely derived from a desired move towards sustainable agriculture, and the recognition for the need to integrate management of different land uses at different scales, and across different themes. In this context, the use of the term NRM frequently excludes the use and management of non-renewable resource such as minerals, sand and gravel, and often only refers to a single resource type or landscape, such as agriculture.

Western Australia[2] has defined natural resource management as being:

> The ecologically sustainable management of land, water and biodiversity resources for the benefit of existing and future generations and for the maintenance of life support capability of the biosphere. It does not include mineral or marine resources.

[1] In this context, ecosystem is defined as a complex of living organisms and their associated abiotic environment (habitat). Ecosystems range in size from microcosms to systems covering an extensive area.

[2] Government of Western Australia. 1999. Western Australia Government Framework to Assist in Achieving Sustainable Natural Resource Management. Draft Version 25 July 1999. Standing Committee on NRM.

This definition divides resources into three themes, and introduces the notion of sustainability and the concept of biodiversity. However, the definition is restricted to the management of terrestrial and freshwater systems.

While NRM has come to mean different things to different people and institutions, for the purposes of this paper, NRM is concerned with the sustainable use and management of the living components[3] of the environment along with associated physical parts of the environment that support those living things. In the following sections, this concept is explained.

The changing paradigm of natural resource management

As noted above, the focus of NRM has started to shift from maximum sustained yield practices, often optimising the production of select commodities from a single 'land' use, for example agriculture or forestry, to ecosystem sustainability where maintaining resource condition is a primary goal. This shift has been accompanied by a number of management characteristics, including a landscape or regional approach, and a concern for ecosystem health. The emerging regional NRM paradigm will involve integrating scientific knowledge of ecological relationships within a complex sociopolitical and economic values' framework, which supports the general goal of protecting ecosystem integrity over the long term. This will require managing to protect total natural diversity (genes, species, populations, communities and ecosystems) and the ecological patterns and processes that maintain this diversity.

Key characteristics of NRM.

1. Sustainability

The notion of sustainability[4] is considered as the central goal or objective of NRM. The recently released draft State Sustainability Strategy defines sustainability in terms of a set of principles. Broadly, these elaborate the desire to balance economic aspirations with the maintenance of social and environmental values – to achieve a triple bottom line - while also recognising provision for future generations and the need to deal cautiously with risk. Achieving sustainability is an integrating concept that ensures that a broad range of considerations is taken into account in any decision. Underpinning sustainability is the maintenance and recovery of biodiversity at all organisational levels, including providing for its evolutionary potential and productive capacity.

2. Goals

Humans are inextricably part of nature and ecosystems. NRM is a socially defined process that determines management goals and selection of criteria for measuring ecosystem integrity and other elements of NRM. Goals for NRM reflect social values or value judgements of humans. However, goals under this context are not explicitly aimed at outcomes to solely benefit humans, but also recognise long term sustainability criteria that benefit all living organisms. Thus, two types of goals can be recognised; those that focus on the desired state of ecosystems being managed (substantive goals) and goals to achieve that desired state (procedural goals). By focusing on ecosystem integrity, NRM reaches beyond protection of resources to maintain productive capacity to benefit humans to include conserving ecological components and the relationships that occur among them.

3. Sound ecological models and knowledge

Underpinning NRM are sound ecological principles that emphasise the maintenance of ecosystem processes and function. As NRM emphasizes the relationship of both natural and social systems, knowledge of social processes is also important. Accordingly, research needs should reflect all levels of organization, i.e. individuals to landscapes. This is often referred to as a systems approach or holistic, integrated science.

4. Complexity and connectiveness

NRM recognises the complexity and interconnectiveness of ecosystem functions, and the important role that biodiversity plays in contributing to ecosystem resilience from disturbance and providing the capacity to adapt to long term change. It is important for management to recognise the openness of ecosystems and the transfer of material across boundaries including across tenure categories.

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[3] This refers to resources that are not manufactured by humans and occur in a natural state as part of the environment

[4] The term sustainability is used in the draft State Sustainability Strategy as shorthand for 'ecologically sustainable development', and also in recognition of the need to clearly incorporate the social dimensions of decisions and activities.

5. Dynamic character of ecosystems

Emphasis on ecosystems as dynamic entities that are subject to periodic disturbances and evolution is well recognised. Hence, NRM accepts and recognises the invariability/inevitability of change. This poses a challenge for natural resource management as traditionally it has focused on reaching a desired state.

6. Scale

Management scales are specific for each system and are dependent on social values and goals. Appropriate scale for natural resource management also needs to recognise biological organization levels, as well as consideration for ecological components, patterns (spatial arrangements of components) and processes (changes to components and patterns) that occur at multiple spatial scales. NRM frequently requires consideration over larger spatial and longer temporal scales, as well as local scales. At coarser scales, this will involve management across ecological, administrative and political boundaries. Cooperation between resource managers and across human conceived NRM boundaries is necessary to achieve effective planning and management towards ecosystem sustainability. As environmental problems occur at various scales, both in a spatial and temporal sense, no single boundary will be appropriate for all management issues.

7. Adaptability

As the knowledge base for decision-making is incomplete, particularly for some systems and processes, NRM recognises the need for adaptive management, as mangers need to respond to new information and adapt to circumstances of a particular area. Adaptive management has the following features: it is based on the concept that most management is experimental; it accepts uncertainties; it requires quantification of objectives; and it incorporates a monitoring and evaluation component with rapid feedback to management that provides the basis for informed redirection of management.

8. Managing for results

NRM is a process of diagnosis, objective setting and strategy building that aims to provide a results-orientated management, and promotes communication. It relies on careful consideration of capacity (including knowledge), and leads to targeted resource allocation that will maximise outcomes irrespective of individual needs.

9. Scope of NRM

For planning purposes NRM is often divided into major themes, such as water, land, vegetation, marine, coastal and biodiversity. While this may offer a convenient way to conceptualise the physical reality of natural resources for management and policy makers, in reality these components are inseparable and collectively form ecosystems that are complex, dynamic, and constantly changing over space and time. Hence, a resultant theme of NRM at a regional or ecosystem level is the need to work collaboratively across boundaries and scales to achieve sustainability of terrestrial, freshwater, marine and subterranean ecosystems.

In summary, the emerging paradigm of natural resource management is greater than managing selective resources with a view to sustain production or maintain industry sectors. It is built on the tenet of pursuing sustainability goals and maintaining ecosystem integrity through targeted biodiversity conservation across multiple biological organization levels and geographic scales. NRM applies across all tenure and land uses, and requires an integrative and interdisciplinary approach between all parts of the community[5], including government agencies, conservation interests, industry, and private and public land managers. Implementation recognises all ecosystems, without exclusion. It may be viewed as comprising both on and off reserve management.

[5] Community is a term commonly used in NRM. This paper recognises 3 types of community: communities of place, which represent individuals within a geographic location at any particular time; communities of identity, which are often related to social circumstances, such as farmers; and communities of interest which may reflect a common interest to a particular ecosystem but may occur from outside a given area.