THE INTEGRATED APPROACH TO CONSERVATION, PUBLIC LAND AND WILDLIFE MANAGEMENT AND COMMERCIAL FORESTRY – CASE STUDY WESTERN AUSTRALIA

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Abstract

In Western Australia there is a single agency – the Department of Conservation and Land Management (CALM) – which is responsible for the conservation of wildlife (native plants and animals) and public land reserves and marine conservation reserve management. Public land management includes commercial forestry operations in native forest, coniferous plantations established on Crown land and tree crops on cleared privately-owned agricultural land funded by private companies and surpluses generated from Departmental commercial activities.

The institutional structures that have been developed in Western Australia in part reflect the scale, geography and biodiversity of the State. Western Australia occupies one-third of the continent but has a population of only 1.7 million people – that is, one person per 1.4 square kilometres. The State's conservation estate exceeds 20 million hectares and includes 2.4 million hectares of natural forest and woodlands which yield 1.4 million cubic metres of logs annually. Most of the timber produced for the privately-owned forest industry sector is derived from government owned native forests or plantations. In the past decade there has been a major increase in private afforestation on cleared agricultural land carried out by both CALM and the private sector.

The integrated approach to conservation and land management is based on the principle that policy formulation ultimately is made by politicians in response to the community, not by bureaucrats, and that a system that allows the maximum integration of skills and logistical support systems is the most efficient way to implement public land management and wildlife policies.

The integrated model also allows for the incorporation of commercial principles into natural land, wildlife management and rehabilitation of the environment and it is argued in this paper that this is an essential component of any conservation strategy for both public and private lands.

The integrated approach has been criticised by conservationists because they perceive a conflict between the conservation ethic and commercial utilisation of natural assets (particularly when foresters are involved) and by economic rationalists on the grounds that government should not be involved in commercial activities.

Critics from the conservation sector fail to distinguish between policy and management and cannot conceive that commercial utilisation of natural assets can be constrained so that long-term conservation values are not compromised. All commercial activities undertaken by the Department are subject to independent scrutiny by other agencies and the community by utilising the statutory public participation procedures contained in the Act establishing the Department.

It is acknowledged that it is more appropriate for the private sector to undertake commercial activities, but there are situations (for example, reserve and public native forests management) where private sector control would be practically difficult and politically inappropriate. The private sector has also shown a reluctance to take the risks involved in initiating new approaches to commercial forestry operations, for example the development of a tree crop industry on farmlands. In any case, the integrated model, because it embraces the commercial principles maximises the use of the private sector by contracting out services.

The advantages of the integrated approach to public land and wildlife management are illustrated by its application to native forest management, the use of fire in ecosystem management, the development of nature-based tourism and large scale regional conservation and land rehabilitation projects in Western Australia.

Introduction

The development by governments in Australia of integrated policies and management systems for sustainable conservation and multiple use of natural environments,

though long in gestation, evolved to early maturity only within the last decade.

Over the past five years or so such policies and programs, together with the structural and administrative arrangements necessary for their implementation, have been subject to challenge by certain community groups and commercial institutions whose special interests are always competitive and often quite incompatible. Pressure has been increasingly applied to advance these varying sectional interests through political representation and recourse to litigation to stay implementation of approved management plans. The increasing role which the Federal Government has taken unto itself has further complicated the issues.

In this paper I draw on the long and varied history of land management in Western Australia to –

(i) give an account of developments which have led to the existing integrated land management agency, the Department of Conservation and Land Management (CALM);

(ii) illustrate key concepts for integrated management for sustainable and affordable conservation and land repair;

(iii) outline CALM's administration, structures and responsibilities;

(iv) indicate some of its achievements and future challenges; and

(v) discuss the comparative advantages, costs and constraints of the alternative of a return to segregation of responsibility among independent agencies.

As well as combining the major elements of conservation, land and wildlife management under one agency, integration of uses – within the constraints imposed by the purpose for which reserves are vested – is also practised. While many CALM staff are specialists, the implementation of management policies is delivered on the ground in an integrated mode. Thus in Western Australia the integration theme extends throughout the organisation and is not just a coupling together of agencies.

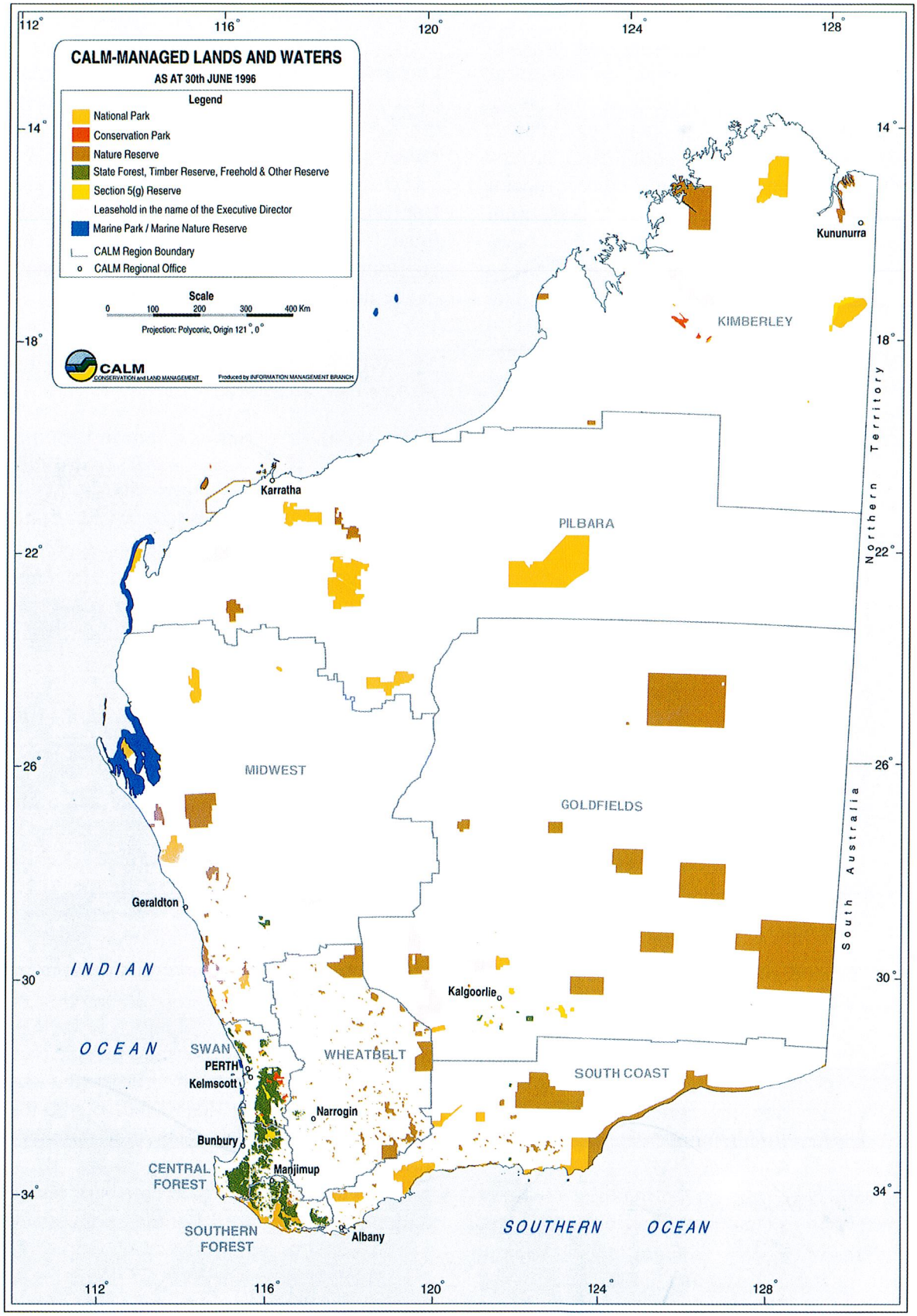
I do not believe it is possible to prescribe the optimum approach to public land management because the structures and philosophies which are most appropriate will vary with time, space and scale. Consequently, the Western Australian model must be judged in the context of the environment in which we work and the stage of the development that we are at.

The Western Australian Environment and its Natural Resources

It is widely recognised among human ecologists that our institutions and philosophies are powerfully shaped by the environment in which we live. It follows that the novel institutional structures which we have developed in Western Australia might be expected to reflect the unique geography, biased demography and extraordinary biodiversity of the this State.

Western Australia occupies one-third of the continent, and extends over 22 degrees of latitude southward of 13°S. With a population of 1.7 million people and a land area of 252.5 million hectares, there are 1.4 square kilometres per capita. CALM manages 20 million hectares of the State's reserved land and waters (Figure 1). The isolation of this land, among the oldest of all places on earth, its reworked landscapes and infertile soils, together with its diverse and variable climates have combined to facilitate the evolution of a complex and diverse biota. There are more than 12 000 flowering plant species in the State, that is half of the total Australian flora and ten times the number of flowering plants that occur in the British Isles. The majority of plant species are endemic. Among the 147 indigenous species of terrestrial mammals 29 are endemic. The coastline extends over 13 000 kilometres and is divided almost equally by the Tropic of Capricorn. Coral reefs extend further south than anywhere else in the world and include the 300 kilometre Ningaloo Reef – the largest coral fringing reef in Australia.

Figure 1



CALM managed lands and waters in Western Australia

There are eight million hectares of woodlands in the semi-arid region of the State and pockets of tropical rainforest in the seasonally dry monsoon climate in the far north of the State, but Western Australia's forests are largely restricted to the south-west of the State (which has a Mediterranean climate) where they occupy an area of 2.4 million hectares. The dry sclerophyll jarrah *(Eucalyptus marginata)* forest occupies 1 600 000 hectares and the karri *(Eucalyptus diversicolor)* forest 175 000 hectares. There are smaller area of woodlands dominated by wandoo *(Eucalyptus wandoo)* and tuart *(Eucalyptus gomphocephala).* There are approximately 100 000 hectares of plantations of the exotic monterey *(Pinus radiata)* and maritime *(Pinus pinaster)* pines and more than 50 000 hectares of exotic hardwood (mainly) Tasmanian bluegum *(Eucalyptus globulus)* plantations established on privately-owned farmland. Hardwood plantations are currently being established at a rate of 20 000 hectares per annum by private companies. The natural hardwood forests occur almost entirely on public land and over 80 per cent of the plantations are State-owned. The native forests yield 1.4 million cubic metres of logs per annum, which are processed into a variety of products from high grade charcoal to fine furniture. The softwood plantations currently yield over 300 000 cubic metres of wood annually and are expected to contribute one million cubic metres annually early in the next century. Harvesting of the hardwood plantations for high quality wood fibre for paper pulp production has recently commenced. When existing hardwood plantation proposals are realised, three million cubic metres of hardwood will be produced annually by the end of the first decade of the next century. The timber industry employs 20 000 people directly and indirectly.

The Western Australian tourism industry generates $1.9 billion per annum and employs 160 000 people – eight per cent of the workforce. The State's unique biota and landscapes constitute a major recreational tourist asset. Most of the State's significant natural attractions occur in the conservation estate which has a visitation of 5.5 million people days per year.

History

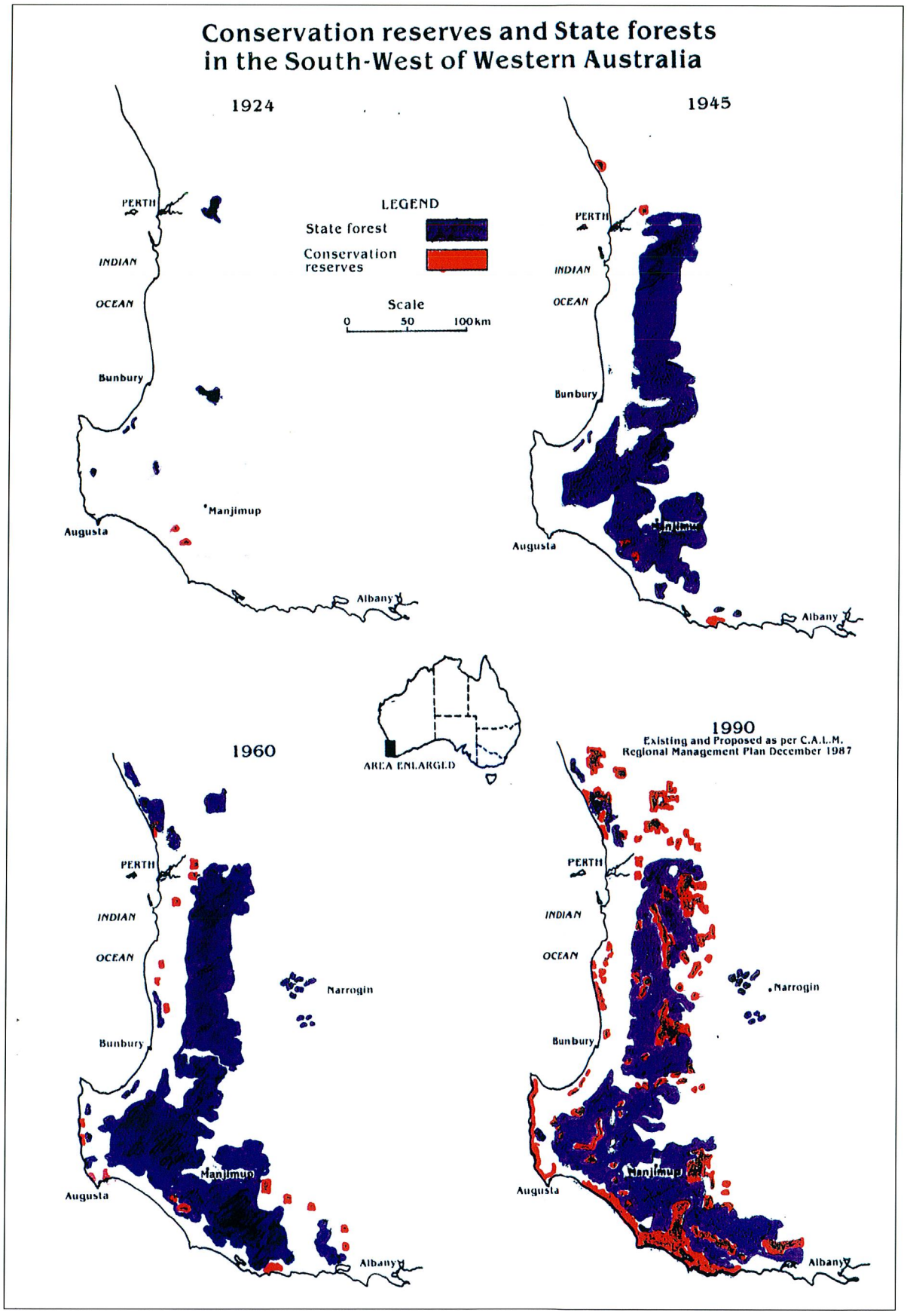
For most of the first century of European settlement after 1828 government involvement in land management was focused almost entirely on allocation of lands to private development.

Legislation establishing the Western Australia Forests Department was enacted in 1919. The principal concerns of the early foresters were to protect the forest estate from clearing from agriculture (Figure 2). The first parks reserved were gazetted in 1845 but they were controlled primarily by local boards and not actively managed. A State Gardens Board established in 1920 was replaced by a National Park Board in 1956. A National Parks Authority was formed in 1976. Early protection of fauna was administered by a series of Game Acts. It was not until 1950, however, that a Fauna Protection Act (FPA) gave protection to all vertebrate fauna in the State. The extant Wildlife Conservation Act 1950 has been amended a number of times since.

It was not until after the Second World War that concerns for nature conservation began to emerge within the community. It was not until the 1970s, however, that the Forests Department's general working plan set aside areas within State forest for conservation purposes exclusively. These areas were called "management priority areas" to distinguish them from multiple use forest.

Reservation of public land outside the forest estate either as national parks or nature reserves progressed steadily after the Second World War. In the 1970s the newly formed Environmental Protection Authority initiated a major review of the State with the aim of determining the adequacy for conservation reserves throughout the State (Mulcahy 1988). During the 1980s environmental issues emerged as a major political issue. As in other States of Australia and New Zealand the environmental movement focused on forest management.

Figure 2



The development of forest reserves and conservation reserves in the South West

Initially, debate crystallised around the question of the reservation of the basin at Shannon River (Thomas 1988). Some of this extensive forested area of unalienated Crown land had been partially logged but much of it remained undisturbed. The Forests Department had set aside areas within the Shannon River basin for reservation as management priority areas for conservation on which timber harvesting was excluded. The Conservation Reserves Committee Report (1972) recommended that the entire catchment be reserved. The proposal was enthusiastically adopted by the conservation movement and used as a conservation icon to rally the community. A subsequent report by the Environmental Protection Authority stepped back from the total Shannon Basin reservation proposal but made an additional recommendation that all of the areas set aside in the Forests Department General Working Plan as management priority areas should be given a tenure and purpose which could only be revoked by the Parliament (Environmental Protection Authority 1976).

The proposal to reserve the Shannon River basin was rejected by the Conservative Government but the environmental movement succeeded in having the reservation of the Shannon basin and the proposal for increased security of tenure and purpose of the Forests Department management priority areas included in the policy platform of the then opposition Labor Party.

While the proposal to reserve the Shannon basin was the subject of intense debate in the community and within the Labor Party, the proposal to change the status of the Forests Department reserve system was more significant. The only way that a government could implement this proposal without changing the existing land management legislation was to transfer management responsibility from the Forests Department to one or other of the two other land management agencies. This would have resulted in the other land management agencies managing the forest reserves while the surrounding forest was managed by the Forests Department.

When the Labor Government was elected in 1983 it adopted the proposal to reserve the Shannon River basin as a national park but established a land resource task force to review public land management throughout Western Australia. The taskforce recommended the amalgamation of all existing land management agencies (Task Force on Land Resource Management in Western Australia 1984). The government accepted the recommendations and proceeded with the amalgamation of the Forests Department, National Parks Authority and the Wildlife section of the Department of Fisheries and Wildlife to form CALM and legislation was passed to establish the Department in 1984.

The Principles on which the Concept of an Integrated Agency is Based

The principles which underpin an integrated approach to land and wildlife management are –

Public land and wildlife policies are determined ultimately by politicians in response to the views of the community

Failure to distinguish between public land management policy and the process of public land and wildlife management has been one of the factors that has contributed to the irrational debate about the merits and demerits of varying approaches to public land management. Public land policy under the Westminster system is determined by the community through its elected representatives and ultimately the Minister responsible. Public land and wildlife management is the process by which the policy is implemented and can only be carried out effectively by a professional agency or agencies.

For example, it is the government that determines whether timber harvesting should, or should not, occur in native forests and under what conditions. It is the government agency's responsibility to devise the prescriptions and operational procedures that meet the government's policy objectives.

As the environment has become progressively more important as a political issue, ideology has driven policy formulation into what are essentially technical and management issues. For example, in Western Australia prescribed burning, a comprehensively researched management tool which has been shown over a period of four decades to be an essential component of wildfire control, has become a major political issue (Lewis *et al* 1994).

Integrated management is more effective and efficient

Land and wildlife management are essentially about understanding and manipulating ecosystems. While the suite of skills required may vary with management objectives and the environment, the basic skills and logistical support systems required are the same to manage a desert or a forest ecosystem. No single profession or discipline has all the knowledge required to manage ecosystems. Consequently, there are very large efficiencies and synergisms that can be gained if the knowledge, skills and logistical systems are readily available to the land manager in a single agency.

In an ideal world it might be expected that it would be a simple exercise to tap freely the knowledge and skills across all agencies. Three decades of involvement in public land management have led me to conclude that the territorial imperative in the *Homo sapiens var. apparitor* (public servant) is more refined than in any other member of the animal kingdom. For example, prior to the foundation of CALM the three land management agencies operated three different radio systems which were not compatible.

In addition to the efficiency resulting from amalgamation, an amalgamated agency has sufficient critical mass to undertake projects at the scale that is required to be effective.

Integrated management provides the opportunity to apply commercial principles to public land and wildlife management

Lack of financial resources is one of the most significant factors preventing the restoration of landscapes and the conservation of biota in Australia. The rise of "the environment" as a prominent political issue has not seen a proportional increase in funding to environmental management agencies. In Australia, the allocation of $1.25 billion over a five-year period by the Federal Government from the partial sale of a public utility has been hailed as a major advance. But as welcome as this initiative is, the amount is still small when, for example, it is compared to the $3 billion that it is estimated will be required to address effectively the single problem of salination in Western Australia's agricultural region (Agriculture Western Australia *et al* 1996).

If health, education and law and order continue to dominate government budgets even during periods when polling shows the environment is a major political issue, it is unlikely that environmental management will ever be resourced adequately if it remains dependent entirely on allocations from central treasuries.

Integrated management in Western Australia provides an example of how income from natural assets can fund conservation and rehabilitation of landscapes. In addition to providing funds for management, the creation of opportunities for wealth creation from natural assets provides a tangible incentive to private individuals to practise conservation. This incentive is vital to conservation of the biota and soils outside the public reserve system. Even if it is assumed that 20 per cent of the landscape will eventually be reserved (that is nearly three times the area currently reserved in Western Australia), unless there are major changes to the way that the 80 per cent of the landscape is managed by private individuals outside of the reserve system, a large proportion of the reserves and the biota in them will be destroyed (Shea *et al* 1997).

Rural communities have long passed the "development at any cost" phase and are very sympathetic to the idea of environmental protection and rehabilitation

and conservation of the plants and animals. Yet they do not have the financial resources to undertake the management at the scale required. The application of commercial principles to public and wildlife management and the rehabilitation of degraded landscapes must form an essential component of any successful conservation strategy for both public and private land.

The Legislative and Administrative Basis for Public Land and Wildlife Management

Legislation

Public reserve land management and the conservation of wildlife (plants and animals) come under the jurisdiction of the CALM Act 1984 and the Wildlife Conservation Act 1950.

The CALM Act, in addition to describing the powers and functions of the Department, established "controlling bodies" with majority representation from the community and a prescribed public participation process.

The controlling bodies – one for forests (the Lands and Forest Commission supported by a Forest Production Council which has only advisory powers), the other for national parks and conservation reserves (the National Parks and Nature Conservation Authority) – are the vesting bodies for reserved land. But under the Act the powers conferred by vesting are constrained so that the controlling bodies are not involved in the day-to-day administration of the Department. The controlling bodies can provide advice directly to the Minister and provide a link between communities throughout the State, the Minister and the Department. Their principal statutory function is to oversee the preparation of management plans which are the principal means of translating land management policy into land management prescriptions. The Act requires that management plans be produced for all lands vested in controlling bodies. Public participation and complete disclosure of draft plans, submissions to final plans and even changes to final plans imposed by the Minister are prescribed in the CALM Act.

The Wildlife Conservation Act 1950 makes all native plants and animals on public and private lands subject to regulation by the Department. Consequently, all commercial trade in native plants and animals is subject to regulation by CALM.

Amendments to the CALM Act, currently before the Parliament, provide for management of all marine conservation areas by CALM and create an additional controlling body – the Marine Parks Authority, which will have powers and functions identical to its terrestrial equivalent, the National Parks and Nature Conservation Authority.

Associated legislation and agencies

CALM is not a completely monolithic agency free of external scrutiny. Public land and conservation issues are also subject to the provisions of other State and Federal legislation. The State Environmental Protection Act (1986) gives extensive powers to the Environmental Protection Authority (EPA) – an independent board – to review both public and private activities which have the potential to have an adverse effect on the environment. The EPA can also issue policy documents. The forest management plans prepared by the Department for the Lands and Forest Commission and the environmental impact assessment prepared by the private company which exports woodchips from State forests have been comprehensively reviewed by the EPA. The Department also has internal and external audit processes. The latter is undertaken by the Auditor General who reports to the Parliament.

The Federal Government, through its external affairs powers, its power to control export of products from forests and through power conferred on it by the Australian Heritage Commission Act 1975 has the legal capacity, which it exercises, effectively to prescribe land management practices in forest areas which produce products that are

exported and land areas that are subject to external powers (for example, areas listed as World Heritage).

Administration

The major administrative features of the Department are (Figure 3) –

1. CALM has an annual budget of $180 million and a permanent staff averaging 1250, which is supplemented by 300-500 contract and casual staff.

   Finance and operational functions are channelled and monitored through three programs – tourism and recreation, forest production and nature conservation. Each program has a director who is a member of the corporate "board".

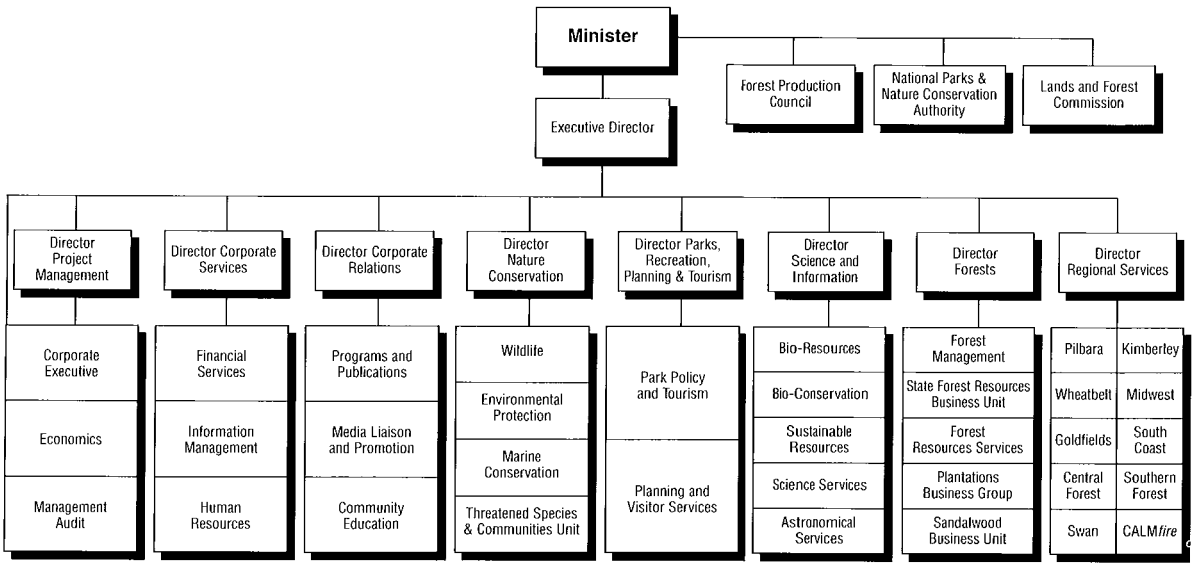
2. It was recognised from the time that CALM was formed that rigorous financial management would be critical to its success. Even though in the first years after its formation revenue generated by the Department was retained by Treasury, a systematic program was initiated to increase revenue. This involved overcoming a deep-seated culture in some parts of the Department which was opposed to revenue collecting.

   CALM now receives a "net appropriation" from the government each year for undertaking community service functions, such as fire control and conservation management. All other expenditure is met from revenue which is retained by CALM. Revenue generated in a region from the tourism and recreation program above a base level is retained by the regional groups to provide an incentive for revenue collection.

   The dramatic effect of providing incentive is illustrated by the increase in revenue collections from the Nambung National Park after the retention of revenue policy was introduced (Figure 4).

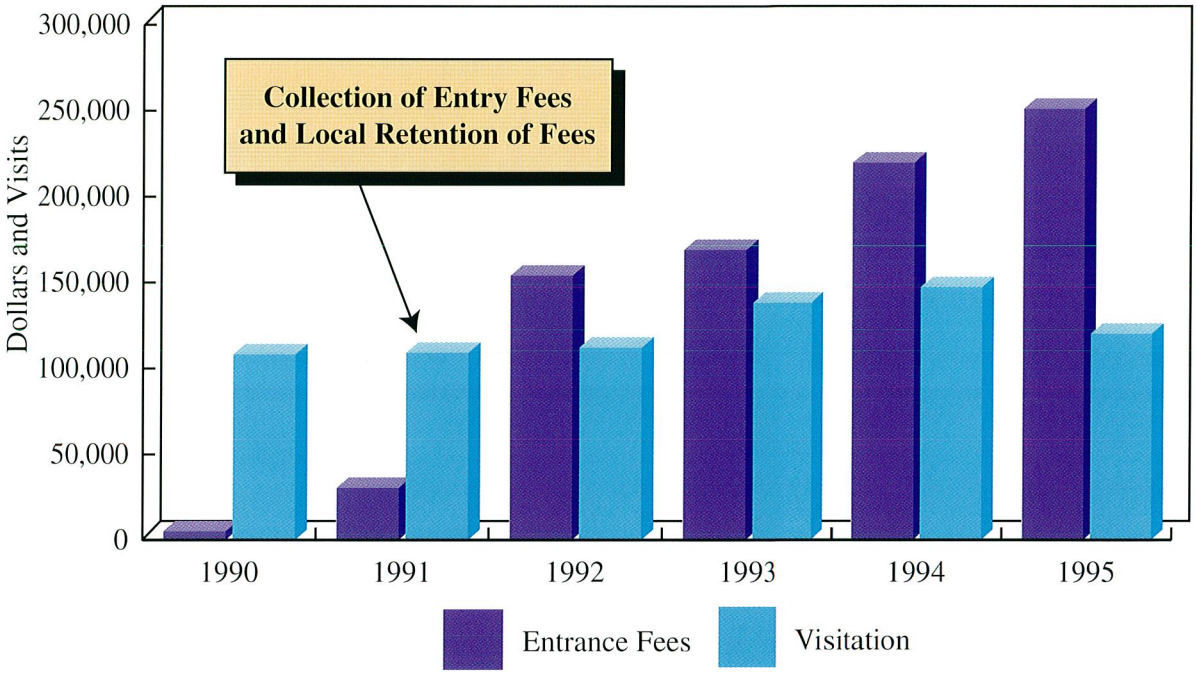
   Since the formation of the Department in 1985 the percentage of the total budget covered by revenue has

Figure 3



Department of Conservation and Land Management organisational structure

Figure 4

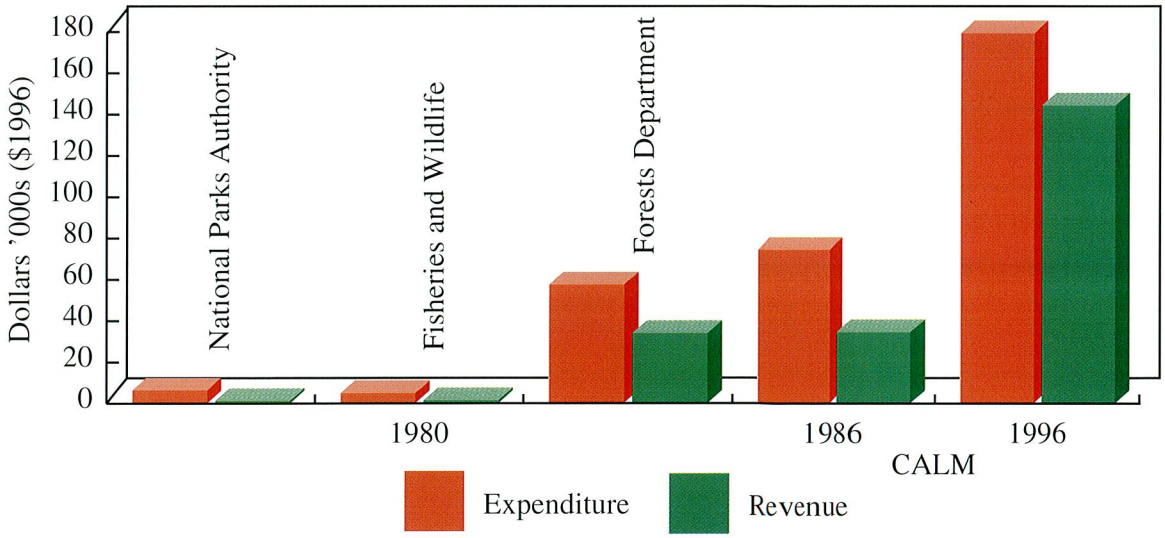


The increase in revenue collection following the introduction of a local revenue retention policy – Nambung National Park

increased from 46 per cent to 80 per cent (Figure 5).

As an integrated agency, CALM has recognised the need for accounting systems that accurately measure cost and performance in programs, sub-programs and specific projects. In 1989, CALM was one of the first agencies in Western Australia to introduce a modern accounting system (Oracle Financial Systems) in place of the centralised government accounting system. CALM's budget is presented using

Figure 5



Expenditure and revenue on conservation and land management

output based management principles, clearly identifying the outputs to be achieved by each program, their cost and performance measures.

One of the legitimate criticisms of integrated use (or multiple use management) is the difficulty of attributing costs and benefits to these activities undertaken for both commercial and community service obligations (Kirkland 1989). CALM has developed systems and reports that ensure that such allocations are accounted in an open way, that is, subject to external audit and can be reviewed by each program manager.

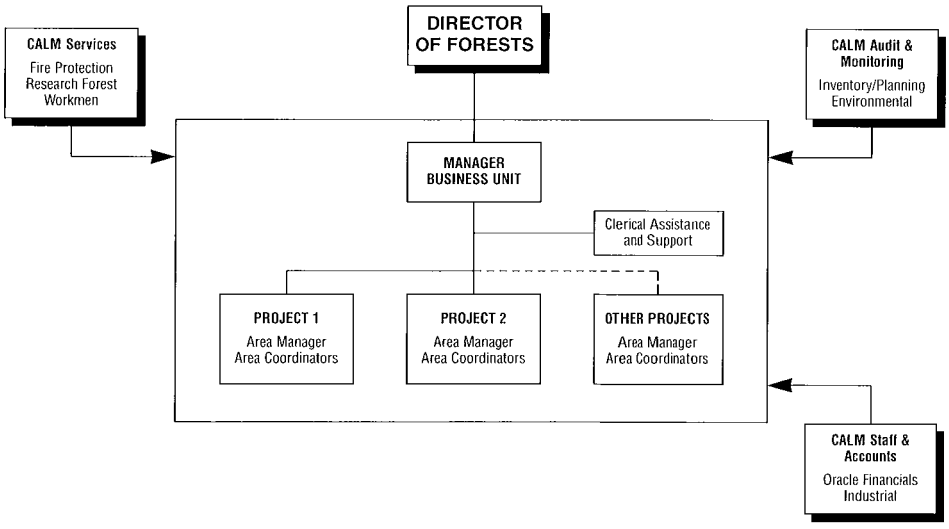
3. Land management plans are a critical part of the management process because they are the principal means by which policy is formulated and translated to managers in the field. They provide a formal mechanism for community input. Legislation ensures that their formulation and final publication are transparent. The policy parameters contained in the management plans are further prescribed for "managers on the ground" by specific policy statements, codes of practice and administrative instructions.

   Since 1985, CALM has produced area management plans and regional management plans giving specific or general policy guidelines to over 400 areas of the conservation estate in national parks, State forests, conservation parks/nature reserves, marine and other reserves. Prior to the formation of CALM the only plan produced for public land was the General Working Plan for the State's forests and there was minimal community participation during its formulation (Western Australian Forests Department 1982).

4. Operations are coordinated and delivered through a regional structure. There are 11 regions each with a regional manager who reports to a director who is a member of the corporate "board".

   Specialist functions, such as fire control and research, operate as units but contribute in CALM's operational objectives through the regional units. Within each regional group there is

Figure 6



Business Unit Structure – Hardwood Plantation Business Unit

usually a representative of each of the programs and in large regions there are representatives of other specialist functions (for example fire management).

5. All commercial operations undertaken by the Department are carried out within business units (Figure 6). These units are independent of the regional groups in that they report directly to a director and operate their budgets as if they were a private company. However, they are embedded within the structure of CALM. Consequently, they have direct access to departmental infrastructure and staff and can provide and receive services to the regional and specialist groups under an internal contract system.

   For example, the Department undertakes extensive (6 000 hectares per annum) commercial tree planting programs for three groups of overseas companies. Each program is run as an independent business unit but each unit has access to departmental specialised central services and regional staff under an internal contract system. These units also can employ regional staff for seasonal work, a process which significantly reduces the cost of maintaining a fire fighting force in the south-west of the State capable of fighting high intensity forest wildfires.

The integrated approach requires that managers and staff are able to adapt to flexible management while at the same time maintain accountability. In some situations, for example during periods when there is a wildfire emergency, rigid lines of command are maintained. But regional managers must also be capable of balancing the sometimes conflicting requirements of different program directors. The integrated model is particularly similar to tasks that can be packaged as projects, because of the ease of that personal skills can be assembled and because of the CALM's familiarity with flexible management.

The development of a commercial culture has also been a critical factor. Not surprisingly, even public servants respond to financial incentives even when the financial reward is in the form of more resources to undertake their tasks, not personal financial gain.

Examples of the Integrated Approach

Native forest management

In Western Australia, the principles of multiple use management had been adopted by one of CALM's predecessors, the Western Australian Forests Department, for more than a decade prior to the formation of the integrated agency in 1985. In many respects the Western Australian native forest management system was more advanced than any other in Australia. For example, a comprehensive system of reserves from which timber harvesting was excluded had been established within State forests. While there was still a culture in some sections of the organisation that resented public use of forests, major recreational developments in the forest had commenced. Wildlife conservation research initiated by the Forests Department in the late 1960s and 1970s is recognised internationally. Forested areas of the public estate have become a major refuge for wildlife in stark contrast to regions outside the forest zone (Table 1).

The Western Australian Forests Department was vulnerable, however, to attack from the same forces that were affecting similar agencies in other States of Australia, New Zealand and other affluent western democracies. The absence of a formal public participation process (the General Working Plan contained a confidential section that was not available to the public), the reality that timber was still the dominant use in forests, the paucity of investment to add value in the timber industry, and the inequitable and inadequate log pricing system provided ammunition for both the growing conservation movement and the newly emerging economic rationalists. It was ironic that the Forests Department had not received any credit for the fact that it had withdrawn significant areas of native forest from timber

Table 1(a)

Decline of the original mammal fauna (excluding bats) at various localities in south-west Western Australia (After Shea et al 1997)

Locality	Area (ha)	Original number of mammal species	Number now locally extinct	% species extinct
State Forest	1 500 000	22	0	0
Fitzgerald River National Park	329 039	33	11	33
Stirling Range National Park	115 661	28	13	46
Dryandra Woodland	27 947	22	10	46
Tutanning Nature Reserve	2 140	25	10	40
Wongan Hills Nature Reserve	1 750	27	21	78
Kings Park	400	25	24	96

Collated from Abbott and Christensen (1994), Chapman (1995), Friend and Muir (1993), Morris and Dell (1977), G Friend (pers. comm.), T Friend (pers. comm.), and R How (pers. comm.).

Table 1(b)

Species extinctions in Swan Coastal Plain, State Forest, and Wheatbelt of Western Australia since European settlement in 1829 (after Armstrong and Abbott 1995)

Taxonomic Group	Swan Coastal Plain	State Forest	Wheatbelt
Vascular flora	2	0	18
Birds	15	1*	8
Mammals	9	0	17
Total	**26**	**1***	**43**

*Species also extinct outside State Forest.

harvesting to be managed as conservation reserves because the reserve system that it had created did not have, in the opinion of some sections of the community and the Environmental Protection Agency, adequate security (Mulcahy *et al* 1988). The problem was that the only way the reserved areas that could receive legislative security demanded by the conservation organisations (that is, change of tenure and purpose requiring parliamentary approval) was for the reserves to be transferred to either of the other two existing land management agencies.

The creation of an integrated agency with a commercial philosophy has made it possible to capitalise on advances made by the Forests Department, and to remedy the obvious deficiencies that made it and its forest multiple use management strategies so vulnerable to attack.

The major native forest management initiatives that have been initiated by CALM in the 12 years since its formation are –

- The elaboration of the reserve system to ensure that it represented all ecosystems and its legitimisation by providing that the reserve purpose as well as its tenure could not be changed without reference to the Parliament. Forty six per cent of the karri forest and thirty three per cent of the jarrah forest occurs in reserves from which timber harvesting is excluded (Table 2).

- Major statutory forest management planning exercises were undertaken – in 1987 and 1994 (CALM 1987, CALM 1992, CALM 1994). Each involved a systematic and pro-active campaign to involve the community. The 1994 management plan was carried out in parallel with a study of National Estate

Table 2

Summary of jarrah and karri forests managed primarily for nature conservation

Tenure	Jarrah Forest	Karri Forest
National Park	134 000	50 000
Conservation Park	114 000	1 000
Nature Reserve	83 000	2 000
Other reserve	53 000	———
Sub Total (Conservation Reserves)	384 000	53 000
State Forest		
Riparian zones	117 000	19 000
Travel route zones (fixed)	11 000	6 000
Mature forest patches	———	3 000
Total areas managed primarily for nature conservation	512 000	81 000
Total area of forest (all CALM managed land)	1 564 000	174 000
Proportion of total forest managed primarily for nature conservation	33%	46%

values in cooperation with the Australian Heritage Commission (CALM/ Australian Heritage Commission 1992). Forest management practices have also been reviewed by the State Environmental Protection Authority.

- The 1994 Forest Management Plan further refined management practices by including the maintenance of a balanced forest structure as a prime objective. This is achieved by, for example in the karri forest, reservation of "old growth" and retention of regrowth stands until they reach the mature/senescent stage of development. Current silvicultural practices in the karri forest ensure that 40 per cent of the forest will always be at the "old growth" stage of development. Thus one of the most powerful criticisms of native forest timber harvesting – the destruction of old growth – has been addressed.

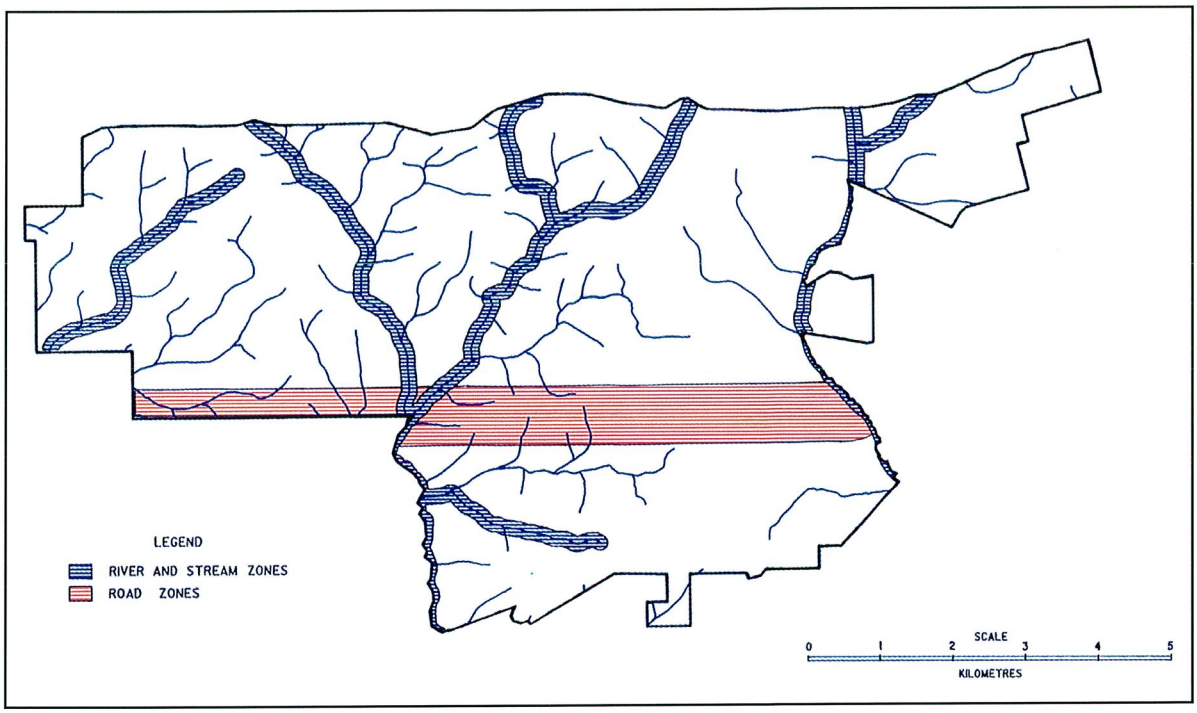
- Progressively over the period, more sophisticated and sensitive prescriptions have been developed and applied to forest areas that surround the reserves which are managed for multiple purposes, including timber harvesting. For example, a river and stream reserve system has been extended throughout the forest (Figures 7a and 7b). Silvicultural prescriptions include specific requirements to protect conservation values such as the provision of habitat trees; the size of the area affected by harvesting and the spacial and temporal and dispersal of harvesting areas within the forest, both of which reduce visual impacts.

- Wildlife research programs in forests have been undertaken at realistic scales to test the relevant effects of different disturbances on wildlife. The Kingston study (Figure 8) is an excellent example of an integrated research program within CALM (Morris in prep.). This project is examining the impact of timber harvesting on the vegetation and flora, abundance of tree hollows, invertebrates, small terrestrial vertebrate fauna, medium-sized mammals, and birds in the medium rainfall jarrah forest in south-west Western Australia over an area of 27 000 hectares. It involves scientists from several disciplines and operational staff with fire management and silvicultural skills. As several species of threatened mammal persist in the Kingston forest block, much of the focus of this study has been on this group. Abundances of mammals on grids and road transects were assessed for 12 months prior to logging and since logging, every eight-12 weeks. Abundances on control and impact sites can be compared. No significant detrimental impact on mammal abundances has been observed (Figure 8).

- Within 12 months of the formation of CALM, a comprehensive review of log pricing was undertaken. The review showed that the price being paid for logs did not cover the cost of growing the forest, there were serious inequities in the pricing system (some companies were paying significantly less for logs than others) and the pricing system was, in some cases, irrational – for example, second grade logs were sometimes priced at a higher rate than first grade logs. As a consequence of the review log prices were increased substantially to levels that would cover the cost of growing the forest over a rotation, including the requirement that the internal rate of return on the investment required was at least five per cent real.

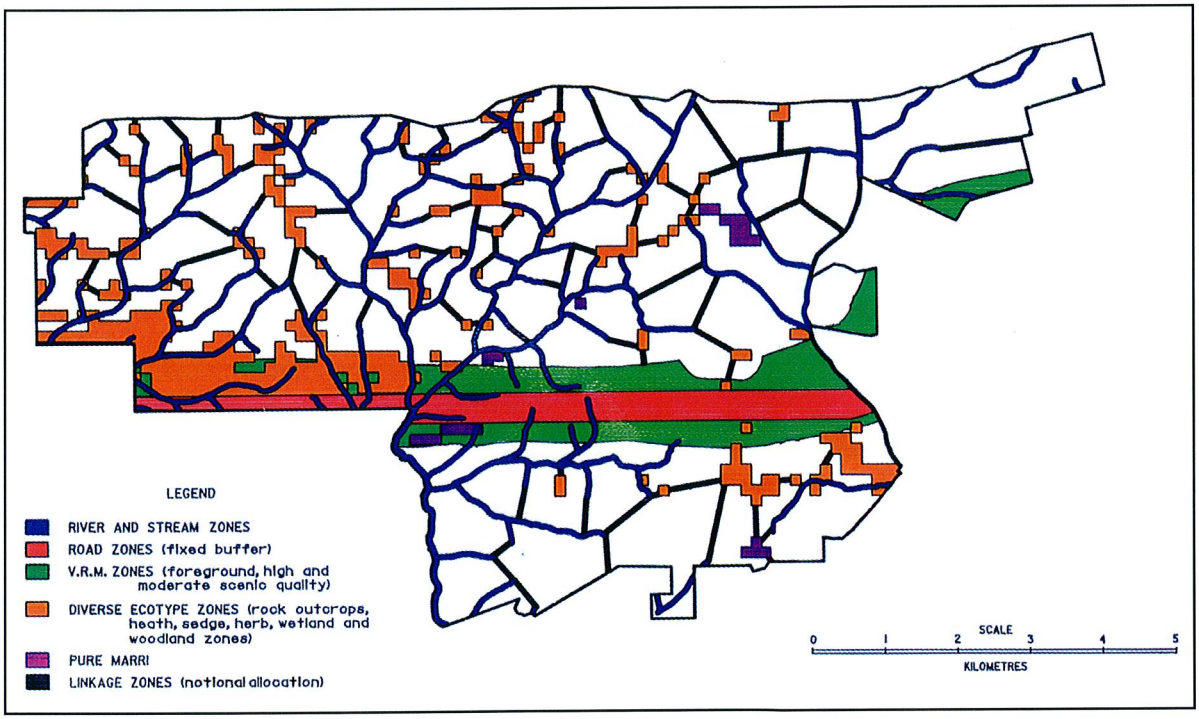
In the year prior to the formation of CALM (1984), the annual return from native hardwood log sales was $17 million. In 1995/96, despite significant reduction in log quantities and after adjustment for inflation, revenue from log sales has increased to $38 million. The Department's native forest business unit, after absorbing all costs from maintenance and regeneration of the forest, generated a surplus of $20 million per annum.

Figure 7a



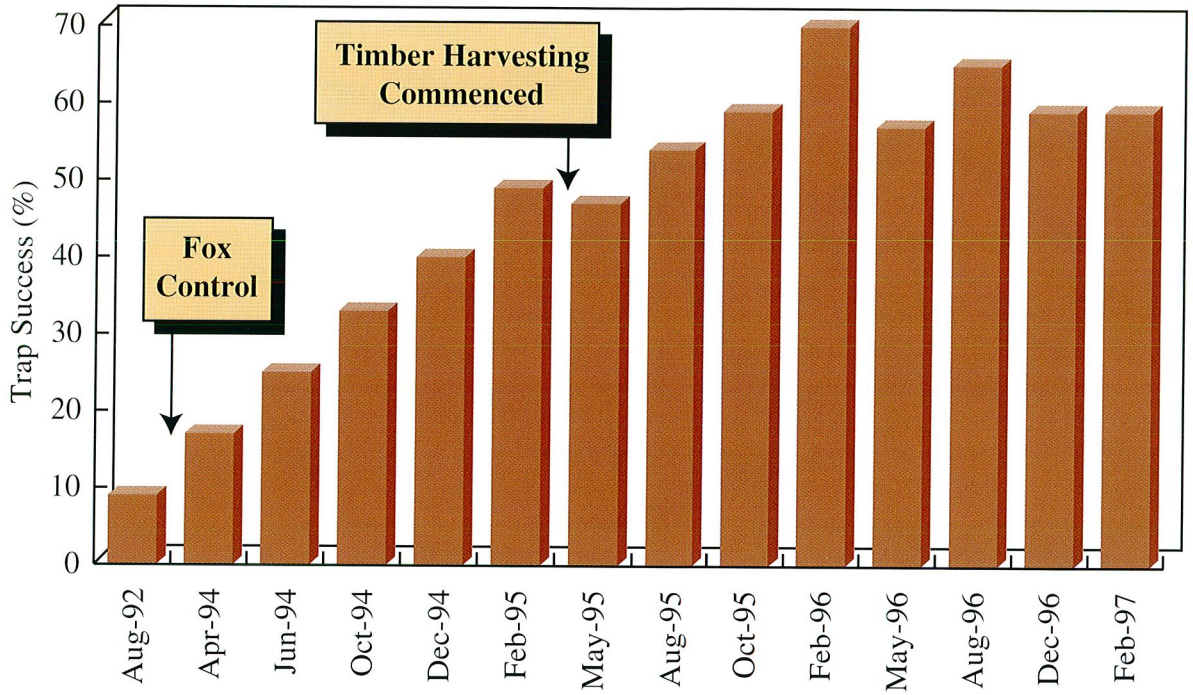
Distribution of road, river, stream and other zones, Jane Forest Block, Pemberton District, prior to 1994

Figure 7b



Distribution of road, river, stream and other zones, Jane Forest Block, Pemberton District, in the 1994 Management Plan

Figure 8



The effect of timber harvesting on mammal populations in the jarrah forest

- The failure of the timber industry to invest in new technology and marketing required to capitalise on the ornamental values of the hardwood timber has been a major issue. Groups opposed to the use of native forest for timber production questioned why native hardwood forests were being logged for use as structural timber when these products could be derived from softwood plantations. The significant increase in hardwood log prices also was an incentive for the industry to move towards the production of a higher-valued product than green sawn structural timber. But the timber industry was reluctant to invest because they did not have resource security. Mills receiving allocations of logs from public native forests were allocated logs on one-year contracts and the small sawmilling sector was not given access to any resource from public forests.

In 1987 CALM developed a timber strategy which featured a proposal to provide long-term log resource security to the timber industry. The signing of these five-15 year contracts was a stimulus for a major investment in sawmilling and kiln technology. The proportion of jarrah, *Eucalyptus marginata,* the major sawn timber species in Western Australia that is value added has increased from less than ten per cent to over 60 per cent.

Research into seasoning technology by both the Department and private companies has resulted in the development of drying schedules for the other major native hardwood species.

These developments have led to the initiation of a new manufacturing sector based on the secure supply of high quality ornamental kiln-dried sawn timber. The economic and employment generating potential of this sector is illustrated by a Western Australian outdoor furniture manufacturer located in the south-west region who receives 4 000 cubic metres of kiln dried jarrah, employs 60 full-time staff, turns over $7.5 million annually and has developed export markets in North America and Europe.

- Major tourism and recreation development programs have been undertaken in the native forests (see below).

Although these varied initiatives have resulted in a significant increase in the values in the conservation, timber and recreational assets of the forest, timber harvesting remains a major environmental issue. Even the CALM/Australian Heritage Commission study, which formed the model for the regional forest assessments which are currently being undertaken throughout Australia, failed to withstand political intervention (Foss 1996). Though timber harvesting in native forests has been endorsed by successive Labor and Conservative Governments, its future in the longer term will be determined by political rather than technical factors.

While the government policy is to utilise native hardwood forests for timber production, there are even more reasons for forest management to be undertaken by a single integrated agency than by separate conservation and timber production agencies, as has been advocated by some sections of the conservation movement.

One of the features of the integrated approach to forest management developed by CALM over the past several years is that forest areas surrounding reserves are managed to maintain conservation and recreation values (Figure 7b). This means that the reserve system is embedded in a landscape that is managed sympathetically and consequently, unlike the agricultural region where reserves are effectively islands in a sea of threatening process, the forest reserve system is substantially buffered. Apart from the economic problems which would result from the duplication of resources, it is difficult to accept that an agency dedicated to forest production would be predisposed to practise forest management practices in the forest surrounding the reserves which were sympathetic to conservation and recreational values.

Management of Damaging Agencies

Fire is a feature of Western Australia's environment and has a major effect on all Western Australian ecosystems (Christensen and Kimber 1975, Lewis *et al* 1994). Uncontrolled fire is a major threat to life and property. In the most populated areas of the south-west region of the State the combination of long dry hot summers and highly flammable vegetation, including tall closed eucalypt forest, which accumulates at rates between one and four tonnes of dry matter per annum, makes this region one of the most wildfire-prone areas in the world (Peet 1972, McCaw *et al* 1996).

In the absence of fire for periods as short as five years in some vegetation types, litter and debris accumulate to levels which make control of wildfires impossible. Consequently, prescribed burning on a five-12 year rotation (depending on vegetation type and rainfall) is practised across public reserves in the south-west of the State (Underwood 1985). Fire is also used for forest regeneration. In the south-west CALM prescribe burns approximately 200 000 hectares each year. Although Western Australia has an excellent volunteer fire brigade organisation, CALM is the only professional fire fighting agency outside of the major cities. On average, the Department fights 300 wildfires per year and has constrained the area burnt by each wildfire to an average of 54 hectares. In contrast to other regions of the world with a similar wildfire-prone environment there has been no loss of life directly attributed to wildfires over the past 40 years.

Fire recognises no tenure boundaries and the location of a fire management and fire fighting capacity in one agency results in major logistical and economic efficiencies. The fire fighting service within CALM can draw on a range of specialist supporting services, such as radio communications, mapping, stores, engineering, etc. The Department can draw on 500 personnel for wildfire control and has the capacity to fight three large wildfires concurrently. The fire management protection service provided by

CALM costs approximately $8 million per annum. In New South Wales, where separate land management agencies are responsible for fighting wildfire on public land, the cost is $18 million. The New South Wales bush fire brigade also has an annual budget of $105 million compared to $9 million for the Western Australian equivalent.

Apart from efficiencies resulting from lack of duplication, the major cost savings have been made possible because it is possible to provide winter employment for staff who are required for fire fighting and management duties during the summer months. For example, CALM employees are used to undertake tree planting activities during the winter months (which are funded by private companies) and are also available to undertake development of recreational and tourist facilities.

The fire regimes employed in State forests and national parks and conservation reserves are determined by the land management plans. Comprehensive fire management plans based on these plans have been developed for all conservation reserves and a large proportion of small reserves.

In addition to use of fire to reduce fuel loads, increasingly wildlife management experts within CALM are linking with the fire control service to implement special habitat burning programs. For example, in the western desert CALM has used its sophisticated aerial ignition burning techniques and fire behaviour models to duplicate the burning regimes which were once undertaken by Aboriginals (Burrows and Van Didden 1991, Christensen and Burrows 1994).

Phytophthora cinnamomi (Rands), an introduced soil-borne pathogen, is another threatening agent that crosses all tenure boundaries in the south-west of the State (Wilson *et al* 1994, Podger *et al* 1996). The fungus has the capacity to cause the inevitable destruction of a large proportion of the flora in many ecosystems. The only method available to ameliorate the effect of this disease is a comprehensive management system which minimises the spread of contaminated soil. Even more than fire management, disease management of a highly pathogen soil borne fungus requires a coordinated and rigorous management system.

Nature-Based Tourism

Tourism in Western Australia generates $1.9 billion and employs directly and indirectly 160 000 people, or about eight per cent of the current workforce. Surveys of visitors to Australia consistently show that they want to experience a biota and landscape not available elsewhere in an environment in which the density of humans is low. Most of these attractions occur within the conservation estate that is managed by CALM.

Some conservation agencies regard tourism as a threat to natural assets, but CALM has adopted a policy that encourages nature-based tourism because of its potential to assist conservation of biota and landscapes as well as its contribution to the State's economy. In addition to its role in making the community aware of our natural assets, nature-based tourism can be used to generate funds for conservation and by ensuring that conservation assets are valued automatically increases the probability they will be conserved (Shea and Sharp 1992).

The integrated approach to land management with its commercial philosophy and support for balanced tourist developments has resulted in major benefits for nature-based tourism. For example –

- Over a ten-year period the number of visits to the CALM estate has increased from two million to 5.5 million annually.

- The development of commercial tourism and licensing agreements that provide a fair return to the State and security for private investors. (The public return from a restaurant located on a prime recreational area has increased from $1 500 per annum in 1984 to $250 000 per annum in 1996).

- The redevelopment and upgrading of more than 200 recreation areas throughout the State.

- Over a ten-year period the expenditure of $15 million on tourism infrastructure, including the development of several new tourist icons.

- The training of more than 700 staff in recreation planning and management, visitor communications and interpretation, and the coordination and management of a small army of volunteers.

The existence of an integrated agency has also made it possible to enhance the "value added" component of the nature-based tourism industry. Increasingly, visitors to natural areas want to know more about what they are looking at rather than just experiencing the beauty of a place, plant or animal. The existence of a large scientific division within CALM and professional corporate relations staff in the same agency has made it relatively simple to provide the information about Western Australia's natural assets in a form that is readily understood by visitors with no scientific training. For example, in a 12-month period the Department has published and sold 40 000 booklets which enable visitors to identify plants, animals and even landscapes throughout the State.

The potential to utilise the full suite of our flora and fauna for nature-based tourism is large. An important component of CALM's feral animal control program is the development of opportunities for the community to see the animals that are being reintroduced to areas from where they have been made locally extinct by fox and cat predation. For example, the potential for reintroduced native animals to provide a major nature-based tourism asset to complement the dolphins at Monkey Mia played a key role in developing strong community support for the eradication of feral animals from the Peron Peninsula in Shark Bay (Thomson and Shepherd 1993). Once feral animals are controlled, it is proposed to reintroduce 12 mammal species which once occupied the peninsula. If the 100 000 tourists who visit Monkey Mia extend their stay by one day to view the mammals of the Peron Peninsula, an additional $5 million each year could be generated in the Shark Bay region (Shea and Sharp 1992).

The construction of a 400 metre canopy walk which rises to a height of 40 metres from the ground through the canopy of the tingle forests *(Eucalyptus guilfoylei* and *Eucalyptus jacksonii)* in the southern region of the south-west of the State, is an example of the benefits the community can derive from the application of integrated management principles to public land management. The $2 million structure was funded from surpluses from native forest timber harvesting operations, was conceived and designed by a range of CALM staff working with private sector engineers and architects and was built under contract by the private sector. In its first eight months of operation it has attracted 140 000 visitors yielding gross returns of $650 000.

Regional Land Rehabilitation

Conservation agencies in Australia have focused most of their limited resources on the creation of a conservation of a reserve system. Funding for reserve management has been limited so it is not surprising that very little resources have been devoted to dealing with threatening processes originating outside the reserve system which have the potential to seriously degrade reserves and their biota (Shea *et al* 1997). For example, recent studies of salination in the agricultural zones of Western Australia have shown that 1.8 million hectares of land are affected by rising saline water tables and that, unchecked, this area could increase to six million hectares and in the process destroy up to 50 per cent of the remaining native vegetation reserves and on private land. The rate of increase in the area affected in some catchments exceeds 50 per cent over a six-year period (Agriculture Western Australia *et al* 1996).

The cause of salination is well documented. It results from the removal of native vegetation and its replacement with annual agricultural crops which do not consume the winter surplus rainfall because they are not present to transpire over the summer months. The excess water generated in cleared agricultural areas is transmitted to a water table which in large proportion of the south-west of the State contains large salt loads. Inevitably, the water table rises to the surface mobilising significant salt loads in the soil profile which are eventually discharged in the soils of the valley bottoms. CALM and one of its predecessors, the Western Australian Forests Department, participated in comprehensive field trials with other State agencies over a period of 20 years which has demonstrated that the process could be reversed by replanting cleared agricultural land with trees (Western Australia Water Authority 1989, Farrington and Salama 1996).

Prior to the 1980s (Shea and Hewett 1997), there had been comparatively little plantings of commercial tree species on agricultural land and there had been no recognition of the potential to link commercial tree crops with land reclamation. During the 1980s for the first time the growing potential deficit in wood fibre production in the Pacific Rim countries was identified (Groome 1987, Groome 1989). CALM saw the potential to link the increasing demand for high quality wood fibre to the need to rehabilitate agricultural lands with perennial crops (Shea and Bartle 1988, Shea and Hewett 1990, Shea *et al* 1994).

Despite the obvious potential for developing a commercial tree crop industry on farmlands, attempts to attract investors from both within Australia and overseas failed. The principal reasons given for the disinterest of investors was that they perceived too many risks in the scheme because it had not been attempted on an operational scale. CALM then undertook scientific investigation of the relationship between site and climatic conditions and tree growth throughout the agricultural region and developed economic and legal arrangements which were acceptable to farmers and investors.

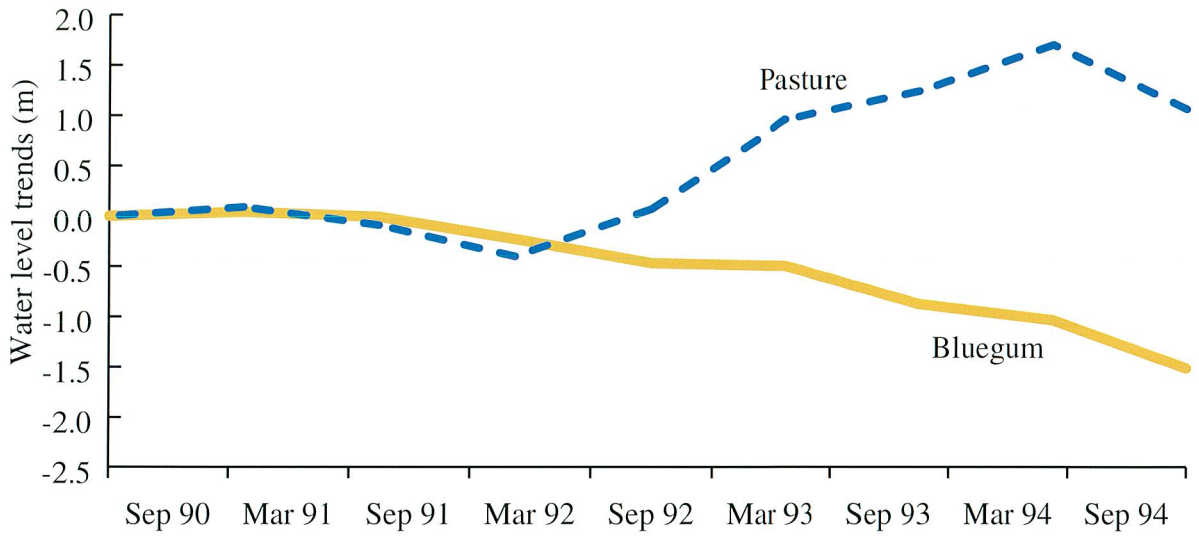
Consequently, CALM used loan funds to establish 10 000 hectares of tree crops on farms over a four-year period to demonstrate the viability of the project. Subsequently, three separate consortia of Asian pulp and paper companies have appointed CALM to establish 60 000 hectares of *Eucalyptus globulus* plantations on private agricultural land. Since 1987, CALM has established, in partnership with 918 farmers, 34 000 hectares of tree crops on farmland. It is estimated that private companies (principally Bunnings, a subsidiary of Wesfarmers) have established a similar area over this time. It is anticipated that if current planting rates are maintained (20 000 hectares of *Eucalyptus globulus* plantations are currently being established per annum in the south-west of the State) that by the early part of the next century wood fibre exports from this new industry will exceed $500 million per year.

The impact of these operational tree plantings on broadscale reduction of saline groundwater tables has already been recorded (Figure 9).

CALM has withdrawn from establishing new *Eucalyptus globulus* plantations in the high rainfall zone of the State because the private sector has now demonstrated its capacity to undertake commercial tree crop plantings with this species. There is currently no government funds expended on establishing *Eucalyptus globulus* plantations in the south-west of the State – all of CALM's tree crops on farms programs are funded by private companies.

The Western Australian Government has endorsed a proposal by CALM to undertake the establishment of commercial tree crops into the lower rainfall zones in the south-west of the State as part of its salinity strategy. It is proposed to establish 500 000 hectares of maritime pine and a lesser area of specialised hardwood species in the intermediate 400-600 millimetre rainfall zone of the State. The initial funding for this program will be derived from surpluses generated from CALM's commercial forestry

Figure 9



The decline in groundwater levels on agricultural land as a consequence of commercial tree planting

operations, including the sale of *Eucalyptus globulus* plantations which were established to demonstrate the viability of the tree crops on farms program in the higher rainfall zone (Shea and Hewett 1997).

The success of the commercial tree crops on farms program provides a tangible example of the benefits of linking commercial and conservation philosophies, scientific and economic skills in an agency with a logistical capacity to undertake large scale operational programs. CALM is applying the same principles in the pastoral region of the State which is also facing land degradation and feral animal and weed problems (Shea *et al* 1997).

Wildlife Conservation

One of the concerns of opponents to the formation of CALM was that funding for wildlife conservation would be decreased in an integrated agency with a commercial philosophy. Prior to CALM's formation in 1985, it is estimated that the combined expenditure of the three agencies on wildlife conservation was $8 million in 1996 dollars. In 1995/96, CALM expended $29 million on wildlife conservation (CALM 1996).

In addition to the development of specific initiatives such as recovery plans for threatened plant and animal species (62 recovery programs have been adopted), the wildlife conservation program benefits significantly from being part of an integrated land management system. For example, area and regional management plans, whether they be nature reserves, national parks or multiple use reserves such as State forest, include in them specific wildlife conservation objectives.

CALM's contribution to the State's salinity strategy (salination is one of the most significant threats to nature conservation values in the south-west of the State) includes major expenditure on the establishment of native species as well as commercial tree planting schemes. The reduction in water table levels is essential if internationally-recognised wetland systems are to be preserved (Agriculture Western Australia 1996).

The coordination of scientific, operational and communication skills to achieve a major rehabilitation of mammal species in the south-west of the State is another example of the benefits to wildlife conservation of the integrated approach to land management.

A series of studies initiated by CALM scientists has shown conclusively that the fox has been a major cause of the decline of mammal species in Western Australia (Christensen 1986, Kinnear *et al* 1988, Friend 1990, Morris 1993, Start *et al* 1996). (Figure 10).

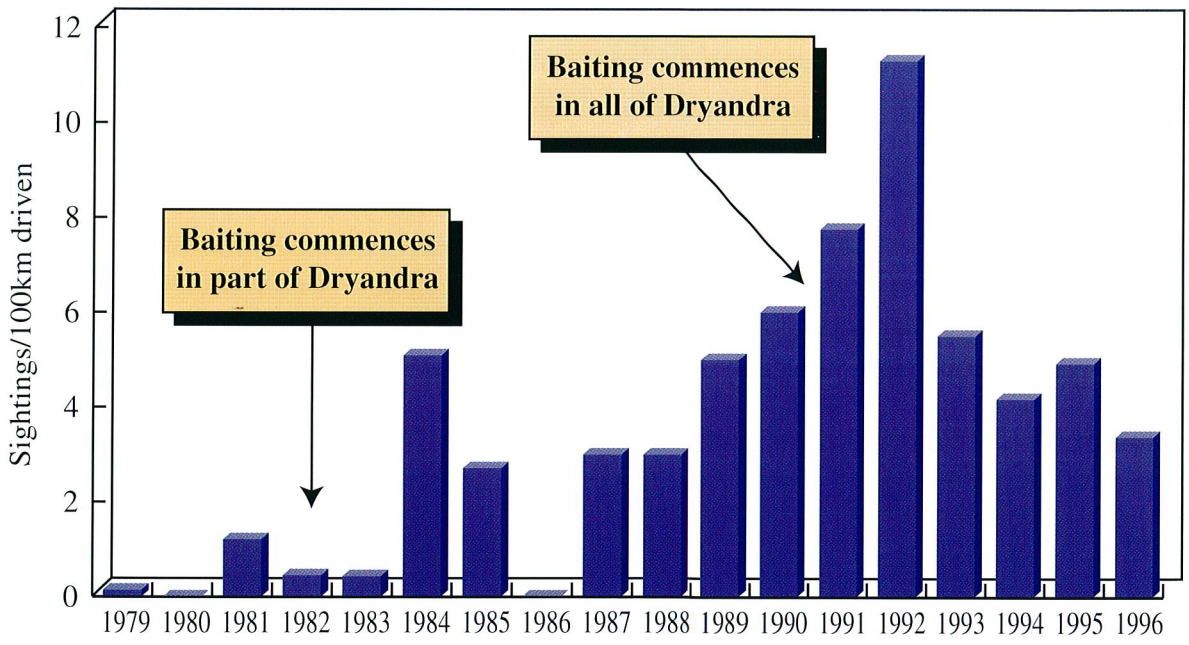
The cat *(feles)* has been shown to also contribute to the decline of mammal species in arid and semi-arid regions (Christensen and Burrows 1994).

Having established the role of predators in the decline of native animals, CALM has developed the capacity to control foxes over large areas. Using a naturally-occurring poison to which native animals have a high level of tolerance, poison baits will be applied over five million hectares (including all public forests) in the south-west region of the State. Feral animal recoveries and invasion from unbaited areas will be prevented by the maintenance of the bait application program. Once fox control has been confirmed, 20 species of mammals will be introduced to 40 different locations. The reintroduction program has commenced in some areas.

The feral animal control program has resulted in the removal of the woylie *(Bettongia pencillata)* from the endangered species list (Start *et al* 1996). Based on the results of research trials, it is anticipated that this program will result in 30 animals currently threatened with extinction being restored to natural levels within ten years.

It would not have been possible to implement this program without the logistical capacity, the skills and financial resources that exist in an integrated agency. The program costs $1.5 million per year to administer and while some funds are obtained by sponsorship from private mining companies, the majority is derived from surpluses generated from CALM's commercial forestry operations. The major proportion of the baiting program is undertaken from the air using systems developed over 30 years ago for aerial ignition of prescribed burns. It has been possible to reduce costs and improve application procedures by using CALM's regional organisation which is available throughout the target areas.

Figure 10



Increase in numbat population levels following fox control – Dryandra forest

The Case Against Integration

The integrated approach to public land and wildlife management has been the subject of criticism from some elements of the conservation movement and by some private sector interests. The former group has a specific concern with foresters being involved in conservation management and a general concern that the inclusion of commercial skills, philosophies and operations in an integrated agency contaminates the purity of the conservation ethic. The latter group, usually, objects to government being involved in commercial activities. Some of the practitioners of land management (particularly foresters) also question whether an integrated management system can operate on scientific and commercial principles and also claim that the system is predisposed to political influences (Kirkland 1989).

The commercial vs the conservation ethic

There is abundant evidence that unrestrained profit maximisation will destroy the conservation assets and the "commons" in the process (Hardim 1968). But even private and public companies have demonstrated a willingness to constrain profits in order to maintain conservation assets. The principles of ecologically sustainable development, in essence, are about integrating economic and environmental goals. Ecologically sustainable development does not exclude the application of commercial principles to conservation management (Redclift 1987).

There are many more constraints imposed on the commercial operations of public land management agencies than those imposed on the private sector. For example, CALM's commercial operations must be within the guidelines set by the policies in management plans. In the case of hardwood timber harvesting, the amount taken annually from native forests is prescribed by management plans which have been subject to a comprehensive public review process. All of CALM's commercial activities which potentially affect the environment can be independently reviewed by the State's Environmental Protection Authority and the Department's commercial operations are also subject to internal and external audit.

The opposition by some sections of the conservation movement to commercial activities based on natural assets and the strong anti-commercial cultures of some conservation agencies in Australia is understandable when placed in the context of the excesses of the post war "development at any cost" ethos. Unregulated development (particularly clearing of native vegetation) has done immense damage to our lands and biota, but it is questionable whether the conservation strategies that have developed in reaction to the development era is an appropriate way to deal with the environmental and conservation problems that confront society today.

The traditional approach to conservation management with its anti-commercial bias and its almost total focus on the creation of a reserve system is incapable of dealing with threatening processes, such as salination, that are generated outside the reserve system. Nor is it readily able to support conservation outside of the reserve system yet, for example 70 per cent of the threatened plant populations occur outside the reserve system in Western Australia (Hopper *et al* 1990).

The traditional approach has resulted in single purpose conservation agencies being dependent on the dregs of the central consolidated revenue fund with insufficient resources to manage the reserves and biota. For example, in Western Australia ten mammal species are extinct and 30 species are threatened.

Using commercial principles, CALM has been able to generate significant funds from natural assets according to the principles of sustainable development. This has resulted in a more than 300 per cent increase in funding over a ten-year period to non-profit generating wildlife conservation projects, such as feral animal control. But in addition to generating more funds for conservation projects on public reserves, the adoption of commercial principles to land rehabilitation

and conservation outside the reserve system has stimulated private sector support for conservation (Shea *et al* 1997).

Government has no place in business

Anybody who has attempted to run a business enterprise within the public sector would acknowledge that commercial enterprises whenever possible should be carried out by the private sector. It is difficult to conceive a situation, however, even with the most conservative governments, when public agencies were not responsible for public land and wildlife management. If government agencies are required to do these tasks it is illogical not to apply commercial principles to management provided that commercial activities are compatible with the sustainable conservation of biota and public land.

In most situations, CALM coordinates and regulates commercial activities rather than operates them. For example, accommodation and recreational facilities on public land are leased by the private sector. All logging operations in native forest and plantations are coordinated by CALM but undertaken under contract by private companies. In some situations, CALM has undertaken new commercial forestry operations when, despite comprehensive attempts to involve the private sector, companies were unwilling to participate (Shea and Hewett 1997).

The application of commercial principles to public land and wildlife management also results in savings for the community. CALM's wildlife conservation budget has increased by more than 300 per cent in ten years, but the net appropriation (that is, funds derived from taxpayers) to the Department to enable it to fulfil its community service obligation over the same period has decreased in real terms by $5 million.

Focus and accountability in an integrated system

Maintaining a focus on specific objectives (ie, avoiding the "do everything but nothing properly syndrome") and measuring performance so that individuals, units and the organisation is accountable, is more difficult in integrated organisations than single purpose agencies or private companies. But nature conservation operatives, regardless of whether they are in a single purpose or integrated agency or non-government organisation, have always been much more predisposed to measuring the general decline in conservation assets of the nation rather than the development of methods by which practical conservation initiatives can be assessed.

However, it is possible to create administrative structures (such as business units) and strategic plans which do provide focus for individuals and units even when required to undertake a variety of tasks. Modern accounting systems and computer technology are also making it possible to impose tight financial and performance criteria. CALM is also demonstrating that it is possible to measure the success of nature conservation initiatives (Figure 10).

Politics and public land management

One of the most difficult adjustments that public land managers (particularly in forest management agencies) had to make in the early 1970s was their exposure to the political process. In the mid 1960s a single parliamentary question was a major event in the Western Australian Forests Department which effectively ground the Department's executive to a standstill until it was answered. From the mid-1970s onwards 20-30 questions a day were, and are, not unusual.

The political naivete of professional foresters in forest agencies contributed significantly towards the demise of government forest departments and the influence of the profession in Australia. Privately, and in their publications, foresters who participated in the traumatic changes to forest policy and institutional structures which commenced in the 1970s constantly portray a sense of surprise and hurt at the way political processes drove the changes.

But it was inevitable that once the community was alerted to the importance of the environment to their wellbeing and in particular the many values of forests, there would be conflict over use and management which would be reflected in the political process. Given that the lands and wildlife are owned by the community, it is appropriate that, with all its imperfections, the conflict is ultimately resolved by the political process. That is not to deny that tactics used by some groups and individuals to denigrate foresters and forest agencies were grossly unfair and unethical.

It is difficult to understand, however, how a single use/single agency approach to public land management would significantly diminish the influence of politics in the process. For example, placing different forest uses into rigid compartments managed by different agencies, in addition to being inefficient, increases the level of conflict because of the increase in boundary length (Shea 1992). The integrated model at least removes the conflict from within government and allows resources to be devoted to ensuring that communities, rather than public agencies with territorial ambitions, have the opportunity to have their views on land use accommodated.

Even the theoretic fundamental flaw inherent in the multiple use concept – the fact that all constituents will be dissatisfied because of the level of every use will be sub-optimal relative to its potential if it was the only use – can be ameliorated by skilful integration that maximises the potential of all values or uses. Given the inefficiencies of a single use approach, in many cases this will mean that individual constituencies will achieve more under an integrated system than a single use one even if they are the use permitted.

It is more difficult to operate commercial business or even apply commercial principles within government. But the disadvantages in CALM's experience do not come from political intervention. In the 12 years since CALM was formed, none of its ten Ministers from Labor and Conservative Governments ever attempted to intervene in commercial negotiations.

It is not possible, nor desirable, to quarantine public land management from the political process. It is possible, however, to maximise the probability of rational outcomes by providing for total transparency by a statutory public participation process, ensuring that all interested groups are involved in the process and that all politicians from across the political spectrum are well informed about the issues.

Conclusion

Notwithstanding the frustrations imposed on land managers by the intrusion of policy into technical and operational issues and other imperfections, public land management policy determination must rest with politicians. It is the role of the bureaucracy to provide the technical advice and to implement the policies. If this dichotomy is maintained and policy formulation and implementation are open to public scrutiny, claims that a particular agency management structure and composition are required to manage public land seem to be based more on ideology than a concern for nature conservation.

The increase in innovation and productivity that result from the synergisms which are unleased when institutional barriers are removed is remarkable. Similarly, the positive effect of implanting a commercial incentive into a public land management agency and, where appropriate, utilisation of natural assets by the public and private sector is dramatic.

The Western Australian integrated approach to management of public lands and wildlife will remain controversial, not the least because there is little evidence that the forces that put ideology ahead of performance are showing signs of diminishing. But the removal of ideological constraints on the way we manage and use our natural assets and rehabilitate landscapes has the potential to generate great benefit for nature and mankind.

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