AUSTRALIAN ACTIONS TO COMBAT DESERTIFICATION AND LAND DEGRADATION

NATIONAL REPORT BY AUSTRALIA
ON MEASURES TAKEN TO SUPPORT IMPLEMENTATION
OF THE UNITED NATIONS CONVENTION
TO COMBAT DESERTIFICATION

AUSTRALIA

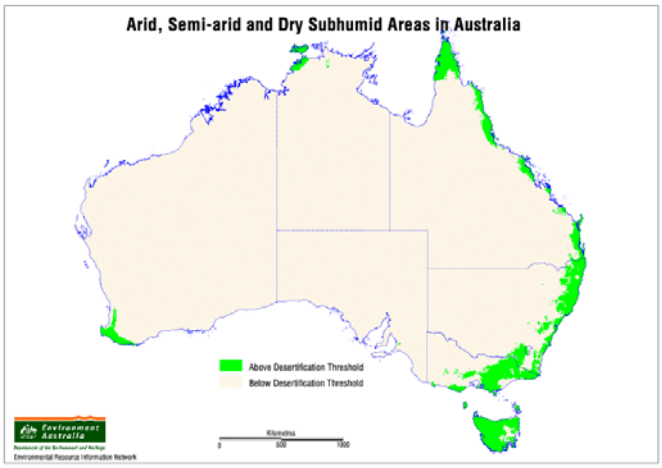
Purpose of this report

The United Nations Convention to Combat Desertification in those Countries experiencing Serious Drought and/or Desertification, particularly in Africa (UNCCD) was signed by Australia on 14 October 1994. The Australian Minister for Foreign Affairs deposited the instrument of ratification with the UN Secretary General in New York on 15 May 2000, signalling Australia's agreement to become a Party to the Convention. Ratification was complete in September 2000.

As a developed, affected Party to the Convention, this national report has been prepared with particular reference to parts 2, 3 and 5 of Article 26 of the Convention. It is intended to provide an overview of actions in Australia for the First Session of the Committee for the Review of the Implementation of the Convention
in Bonn, 18 – 29 November 2002.

This report was prepared by the Commonwealth (Federal) Intergovernmental Working Group for the UNCCD. The report draws on information provided by the Working Group agencies, existing information prepared to support Australia's ratification of the Convention, published reports on the status of the Australian environment and natural resource management and case studies as provided by the relevant organisations. These sources of information are listed in the 'References' section of the report.

All monetary figures are quoted in $AUD unless otherwise specified.



Map 1. Indicative application of UNCCD rainfall benchmarks to identify arid and semi arid areas as defined by the Convention

Commonwealth Intergovernmental Working Group for the UNCCD

Department of Environment and Heritage (Chair)

Department of Agriculture, Fisheries and Forestry

Department of Foreign Affairs and Trade

Australian Agency for International Development

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Summary

Australia has well-established domestic initiatives to address the global challenge of combating desertification in addition to providing support and assistance to other affected countries. Domestically, the diversity of Australian landscapes, and the continent's erosion prone soils and climatic extremes has necessitated a coordinated and strategic approach to sustainable natural resource management. This approach centres on collaborative approaches between all levels of government, industry and the community. While agricultural and pastoral activity are critical components of our national economy, Australian landscapes are generally not well suited to many of the land use and management practices imported from other continents over the last 200 years. This has catalysed governments, research institutions, industry and communities to find ecologically sustainable approaches to land management. As a result, Australia has amassed considerable experience and expertise in managing and, where possible, reversing the decline in our natural resource base.

Australia has in place a substantial body of legislation, programs and strategies for sustainable natural resource management and has developed a range of domestic policy initiatives to encourage and build capacity in communities to address land degradation. The highly successful Australian Landcare model of community-based action is being internationalised through the International Secretariat for Landcare (based in Hamilton, Victoria). It has been adapted to establish 'Landcare South Africa' and there is a growing interest in the movement from many other countries.

Australia has also been proactive in assisting other countries affected by desertification with a range of financial, technology transfer and capacity building support measures. Australian expertise in the management of arid and semi-arid landscapes has gained an international reputation for excellence. In southern Africa, Australian research on the El Nino/Southern Oscillation complex has been cooperatively applied by the Australian Bureau of Meteorology to develop drought-forecasting systems. Through the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and other research institutions.

Case Study - Grassy Ecosystem Management Kit: a guide to developing conservation management plans

Principal authors: Sarah Sharp (Environment ACT), Josh Dorrough (Arthur Rylah Institute) and Reiner Rehwinkle (NSW National Parks and Wildlife Service). (Funded by: WWF/NHT Grassy Ecosystems Grants)

1. Problem

Grassy ecosystems are subject to current and continuing threats likely to lead to their extinction. They are among the most modified and reduced ecosystems in Australia, due to the intense pressures on the areas that support them for settlement and agricultural practices. Less than 5% of the endangered natural temperate grassland remains in south-eastern Australia and less than 10% of box woodlands remain. While some of these sites are in reserves, and others could be added to the reserve system, management actions in many other sites may be adequate to retain these sites, both for conservation and other land uses.

Many grassy sites do not have management plans specifically prepared for them and existing management guidelines for grassy ecosystems do not provide adequate information for the majority of landholders to develop an integrated management plan. They provide recommendations, but usually contain little guidance in how they can be implemented.

2. Location/landscapes/landuses

Treeless grasslands and grassy woodlands once covered vast areas of southeastern Australia.

Since early European settlement, these grassy ecosystems have been recognised for their values for agricultural production, and as ideal sites for cities and towns and their associated roads and railways despite the seasonal lack of water. Periods of drought and overgrazing, infestations of rabbits and weeds, and the cultivation and pasture improvement boom since the Second World War have all resulted in dramatic changes and, at times, complete losses of the original grassy ecosystems. Even the least disturbed sites have been invaded by introduced plant species. Regionally, many native plant and animal species have declined or become extinct.

Many animals occur in grassy ecosystems, some in particular communities, others are found more broadly, and use grassy communities for only part of their needs, such as for migration, feeding or breeding. Some species that are unique to particular communities, especially those that have severely declined or have been greatly modified, are also threatened with extinction. Many have been declared threatened under Commonwealth, State and Territory legislation. Retaining existing bushland that includes grassy ecosystems will also retain habitat for many of these species.

3. Social information

Support from the community and government agencies is required to ensure that landholders are not financially and socially impacted by decisions to change current practices. The Commonwealth, State and Territory Governments, as well as several Non-Government Organisations, provide opportunities for landholders to apply for funding to assist in making changes that have outcomes for conservation and/or sustainability.

Increasingly, there is more information on the economic and social advantages in retaining grassy ecosystems. This includes the part grasslands play in sustainable agriculture and their roles in retaining water quality and the prevention of salinity. There is a demand to use native grasses for landscaping and for low-input farming. The scenic values of these ecosystems too, have often only recently been recognised. Some lowland grassland sites rival the alpine herb-fields in their wildflower displays, and areas dominated by native grasses have a subtle beauty, especially as they change from season to season.

Case Study - Grassy Ecosystem Management Kit (cont.)

4. What was done

The project is to develop a kit for implementing adaptive management in a range of sites that are privately owned or managed by public authorities. The kit will facilitate the implementation of best practice management in the most significant sites, to be developed with the assistance of grassland liaison officers.

The project addresses and meets the following aims:

- An improvement in understanding and application of best practice management across a range of sites and tenures;
- Increased community involvement in the management of grassy ecosystems across their range; and
- Knowledge generation about the distribution and conservation status of grassy ecosystem remnants, particularly those on private land.

The Management Plan development process is a series of decision steps, identifying what is there, issues, actions required, responsible bodies, and a timetable of when actions are to be implemented. The form of recording of these enables the process to be used to review the actions. It can be applied at a site level or landscape level. Collation sheets and a database on a CD or disks will be supplied to enable landholders to easily develop species lists, list issues and actions and collate and review data graphically.

The methods used to monitor species and the ecological communities depend on our objectives and required outcomes, our level of expertise, and the availability of resources. Monitoring methods range from checking that a species (or ecological community) is still present, determining whether intended actions have been undertaken (which may not necessarily assess what the actions have achieved), or retaining photographic records over time. More complicated monitoring methods involve detailed repeated surveys and analysis of the abundance of species over time.

5. Who was involved

The project draws on the expertise of a wide range of grassy practitioners (ecologists, agronomists and landholders) within the Southern Tablelands and elsewhere, to refine the process of decision-making.

Landholders have been involved in the design and testing of this kit to ensure that it remains relevant. Involvement was sought also from a range of scientists and practitioners. The kit was presented via workshops with individual Landcare groups, rural extension officers and conservation service rangers and comment sought on the content. The kit was trialed in a range of sites subject to different land uses. Training will be provided to extension officers to assist them to work with individual landholders and community groups such as Landcare.

For the kit to work, the landholders need to take responsibility for identifying issues and taking action within their resources, thereby taking ownership of the process. Most of the remaining grassy communities occur outside reserves so the actions of landholders has enormous influence as to whether these communities are maintained, improve in quality, or become further threatened.

6. Value of outcomes for ecologically sustainable natural resource management

The kit is still under preparation. It is envisaged that the kit will assist a wide range of landholders to apply conservation management in grassy ecosystems. In some cases assistance will be provided by extension officers, although the kit is being developed for landholders to develop and implement conservation site action plans independently. As landholders implement the site action plans developed using the kit they will increase their understanding of ecologically sustainable natural resource management.

Australia has had a long-term advisory role in desertification-related work in several Middle East countries, including Jordan, Iran and Libya. Australian expertise is also being engaged in cooperative research partnerships to address severe land degradation problems in a number of Asian countries.

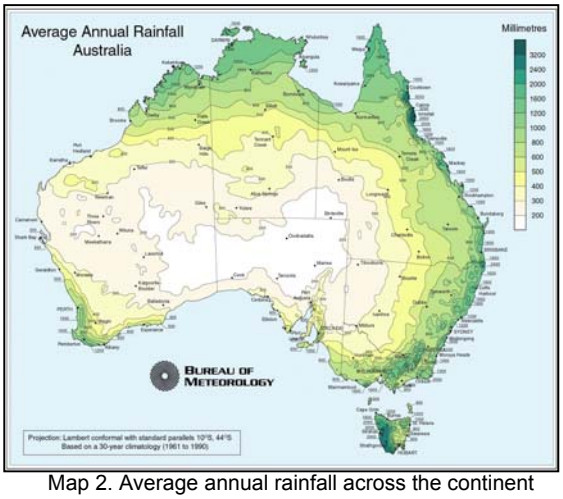
Australia has, for many years, been working with developing countries affected by land degradation and desertification. Recognising that prevention of environmental degradation is essential to alleviating poverty and fostering sustainable development, the Government's Australian Agency for International Development (AusAID) is currently supporting a range of programs to combat desertification in developing countries worth approximately $58.5 million. Additionally, the Australian Government provides contributions to a range of multilateral organisations, which either directly or indirectly combat desertification.

The Australian Centre for International Agricultural Research (ACIAR) also participates in desertification and land degradation mitigation through funding agricultural research projects executed collaboratively by research institutions in Australia and developing countries. ACIAR has funded a range of projects related to desertification. These projects are concentrated in southern Africa, China, India and South-East Asia and involve a total funding commitment of $11 million.

Domestic Initiatives to Combat Desertification

Environmental Issues and Challenges

Australia is one of the twelve most biologically diverse nations in the world, the only developed nation to have this 'megadiverse' status. Australia is also the world's driest continent, excluding Antarctica, and has a high degree of rainfall variability from one year to the next. (Map 2 shows the average annual rainfall over a 30 year time span).



Map 2. Average annual rainfall across the continent

Very few of Australia's soils are naturally suited to agriculture, with most being shallow, high in salt stores and low in nutrients. Only 6 per cent of the land is arable without irrigation and large areas are naturally affected by salt, sodicity, waterlogging or acidity.

Australia's natural environment reflects the effects of at least 50,000 years of human management. Since the arrival of the Aborigines, their hunter-gatherer activities and use of fire have changed the environment and its flora and fauna. European settlement over the last 200 years has led to further, often very rapid, changes.

Agriculture is Australia's most extensive form of land use, occupying 60 per cent of the total land area (461 million hectares). Cities and towns take up less than 1 per cent of the total land area (7.6 million hectares), but greater than 80 per cent of the Australian population live in these areas. Livestock grazing is by far the most extensive use of agricultural land, and areas of arid or semi-arid lands held under grazing licences make up 88 per cent of agricultural land use (406 million hectares) across the continent. Grazing intensity on these areas can be as low as one beast per 100 hectares. Other land uses, in order of area utilised, include conservation reserves, sown pastures, forestry, and other uses, such as urban.

Case Study – Climate Risk Management

1. Problem

Australia's highly variable rainfall from year to year and the occurrence of droughts that may last for many seasons and cover large areas, have a huge impact on the environment, agricultural production and the income and well being of farming families and rural communities. Extended drought can result in devastating agro-ecological impacts including crop failures and huge stock losses. Soil loss and long-term changes in vegetation where weed species invade native perennials can result in long-term land and pasture degradation.

Drought was once regarded as a catastrophic and unpredictable event for which little could be done to mitigate its impact. It was possible for many affected farmers to receive financial relief when drought was declared. This, and the associated farming practices which these circumstances encouraged did little to ensure the long term sustainability of much of Australia's agricultural and grazing lands.

2. Location/landscapes/land uses

Cropping and grazing across areas of Australia with low and variable rainfall.

3. Social information

A new approach adopted by the Commonwealth, State and Territory Governments in the 1990's recognised drought as an accepted part of Australian farming. Financial relief is provided only in *Exceptional Circumstances,* i.e. where the event is rare (a one in 20 or 25 year event), severe, and lasting more than 12 months. Under this policy, primary producers and other sections of rural Australia are encouraged to adopt self-reliant approaches to managing climatic variability and to maintain and protect Australia's agricultural and environmental resource base during periods of extreme climatic stress. This approach has focused property managers on adopting risk management strategies to manage climate and decrease the impact of drought on agricultural production and the environment.

4. What was done

Farmers and graziers now have access to a range of crop, grassland and pasture simulation models, developed by various agricultural and natural resource agencies, to assist in monitoring agricultural conditions such as pasture cover, nutrient availability and meteorological conditions. In stressed conditions, action may be taken, e.g. by reducing stocking rates, to reduce the long-term impacts. Using an Australian-wide network of around 7000 rainfall stations to monitor rainfall deficiencies, conditions are reviewed nationally on a monthly basis to identify areas where serious or severe rainfall deficiencies exist.

Monitoring of current conditions is complemented by a Seasonal Outlook Service (http://www.bom.gov.au/climate/ahead), issued monthly by the Bureau of Meteorology. This forecast service maps probabilities of above, below or near average rainfall and temperatures over the coming three month period. It also gives the probabilities of selected regions receiving certain thresholds of rainfall and provides information on the status of the El Nino-Southern Oscillation (ENSO), which has a major influence on much of Australia's climate. The outlooks, together with estimates of their reliability, enable property managers to employ risk management techniques in planning cropping schedules and stocking rates for the coming season. These management practices can reduce the environmental stress imposed by climate extremes such as prolonged drought.

5. Who was involved

Farmers, graziers, and scientists from various agricultural and natural resource agencies and the Australian Bureau of Meteorology.

6. Value of outcomes for ecologically sustainable natural resource management

This risk management process involves using monitoring and prediction information on which decisions can be based. Through identifying areas with serious or severe rainfall deficiencies, monitoring agricultural conditions such as pasture cover and nutrient availability, and using probabilistic forecasts of seasonal rainfall and temperature the environmental stress imposed by climate extremes can be reduced.

Despite being one of the driest continents, Australia has the highest per capita consumption of water in the world. Some 70 per cent of this consumption is used to support agriculture. Average rainfall, at 469 mm/year, is not especially low, but only 12 per cent of this runs off to collect in rivers. River flow is also highly variable and these factors are exacerbated by a high degree of variability in climate.

Much of Australia's land remains publicly owned, with only 13 per cent privately owned. Most of Australia's agricultural activity takes place on long-term government (or Crown) leases that are managed by private individuals. In the rangelands, which encompass some 75 per cent (570 million hectares) of the continent, only a very small area is privately owned. The more fertile, coastal areas generally have a much higher proportion of privately owned land.

The semi-arid and arid rangelands include native grasslands, shrublands, woodlands and the tropical savanna woodlands. Map 3 represents the rainfall benchmark areas as defined by the Convention. Pastoral industries occupy 58 per cent of the rangeland area. However, the mining and tourism industries are now economically more significant than pastoralism and drive most of the infrastructure development. Aboriginal stewardship of lands is increasing, especially in central and northern Australia, with a move towards more traditional cultural use of their land. The Australian Defence Force also utilises extensive Crown pastoral leases for training purposes.

Much of Australia's agricultural land is under pressure from either soil erosion, loss of natural vegetation cover, over-use of irrigation water and the impacts of introduced invasive species. Problems such as soil salinity, acidification and rising groundwater all appear to be on the increase. The environmental impacts of agricultural activity are the result of a complex chain of biophysical and other factors, which are linked to the natural characteristics of the land. Soil fertility is declining in 33 per cent of all cropped land, more than offsetting the improvement in the fertility of 10 per cent of the land through application of fertilisers. Map 4 highlights those areas of most concern with regard to salinity and water quality issues.

The main causes of land degradation in the rangelands include over-grazing by introduced and native herbivores (total grazing pressure), mechanical removal of vegetation cover, woody weed invasion and land management without regard to climate variability. The effects of these processes include increased soil erosion, soil degradation, altered stream flow regimes, increased soil salinity and loss of biodiversity.

Since the early 1970s, there has been an increasing awareness of and concern for environmental issues in Australia. These concerns have found expression in a broad range of community led activities. They have also led to legislation, regulation and expenditure by governments, at national, state and local level, to protect the environment.

Despite a dedicated effort from governments and the community and the range of policy initiatives to promote sustainable natural resource use, Australia still has some significant challenges ahead to achieve ecologically sustainable land management. The key challenge influencing progress is the recognised need to increase the involvement of regional communities and landholders in policy and planning initiatives to ensure ownership in and adoption of the outcomes.

There are no singular solutions for addressing land degradation and achieving ecological sustainability in Australia. The problems are numerous, varied and often site-specific and interrelated. Hence, Australia's response has been to develop an integrated package of mutually reinforcing measures that recognise this complexity.

Case Study - Regional Forest Agreements

1. Problem

Prior to the development of the Regional Forest Agreements (RFAs) there was a long history of conflict over the use of public forests. The main protagonists in the conflict were the forest industry, who wanted secure access to forest areas for timber production, and the conservation stakeholder groups, who wanted more forests placed into secure reserve and better off-reserve harvesting practices.

Previously, the Commonwealth regulated the international export of woodchips under the Export Control Act, accrediting only those forest coupes from which timber could be removed for woodchip production. This accreditation, or refusal, would follow a full assessment of the National Estate values in that coupe. The situation was not ideal, and the solution was to develop a program in which enough forest was reserved to protect current and future conservation values, and enough left as a secure resource for the forest industry.

In 1992, the Commonwealth and the States agreed on a National Forest Policy Statement, which established a framework for the conservation and sustainable use of forests in Australia. It was agreed that future forest use would be determined on the basis of a detailed assessment process of conservation, forest management, social and economic issues. The results of this process would be incorporated in a number of RFAs.

This package incorporates:

- Comprehensive and integrated regulatory frameworks;
- Processes to manage the use of surface and ground waters, including specific allocation for the environment;
- Measures to improve water quality;
- A range of incentives for improved vegetation management, retention and protection;
- Diversifying the commercial use of agricultural land;
- Measures to encourage conservation and remediation;
- Reform and strengthening institutional delivery;
- Programs to build decision making capacity at all levels through improved access to information; and
- A range of community based, voluntary programs targeted at reducing land degradation.

Legislative and Jurisdictional Arrangements

The Australian Constitution does not deal explicitly with environmental powers. Most responsibility for the environment rests with the State and Territory governments. The Intergovernmental Agreement on the Environment of 1992 coordinates the approach to environmental management by the three tiers of Australian government: federal, state and local.

At the Federal level, the Department of Agriculture Fisheries and Forestry - Australia and the Department of the Environment and Heritage are the main agencies responsible for environment and natural resource management policy. The Federal Government has responsibility for environmental issues of national significance, national environmental reporting and the implementation of international treaties and obligations.

States and Territory governments are involved in the management of land and water use and environmental protection. While the severity and extent of environmental problems vary across jurisdictions, they generally have similar land management and environmental legislation and programs. The amount of land management and environmental legislation in each State and Territory is substantial, totalling some 300 individual Acts. All jurisdictions have legislation covering aspects of natural resource management, including land use planning, water quality and management, environmental protection, soil conservation and biodiversity conservation.

At the local and regional level, Local Government plays a key role in planning and management decisions, such as land-use zoning and tree preservation or clearing by-laws.
Coordination of environment and natural resource policies and decision-making within Australia is

Case Study - Regional Forest Agreements (cont.)

2. Location/landscape/land uses

The RFA regions covered all forest and vegetation types from tall high production forests to open woodlands, heath lands and cleared land. The landscape ranged landscape ranged from coastal dunes, moist nutrient rich coastal valleys, steep escarpment country and dry inland tablelands.A wide range of land uses occurred in each region, including timber production, recreation and conservation reserves, mining, agriculture, tourism, and cottage industries such as honey production. Most of the land was either State owned land (managed by the State Government or leased to private individuals), or privately owned land. The Commonwealth owned small tracts of land in the some regions.

3. Social Information

The RFA regions all contained small timber towns whose primary means of employment was linked to the forest industry. Eco-tourism was also a primary employer in the regions. A full social assessment was undertaken for each of these towns, and the economic and social impactswere taken into account when developing the RFA. The communities were encouraged to participate in the process of developing and deciding the outcomes of the RFAs.

A Monetary Industry Structural Adjustment Help Package was available to individuals and industries affected by the RFAs, to help with upgrade of business facilities, to aid in value-added wood production, for retraining individuals or other associated costs.

4. What was done

All available information on environment, heritage, social and economic values of the regions was gathered. Gaps identified, and projects (jointly funded by the Commonwealth and the State Governments) created to carry out the necessary research and surveys. While this information was being collected over a period of several years, interim agreements were put in place to control which areas were available for forest harvesting.

A reserve design criteria were developed to set targets for wilderness, forest ecosystems, and old growth forest values including reserve design guidelines. A negotiation and public consultation process was then undertaken, leading to the signing of the RFAs for eleven regions, covering parts of Western Australia, Tasmania, Victoria, and New South Wales. The regions averaged 3.6 million hectares in size and are valid for 20 years.

The RFAs were designed to:
- create new formal reserves, and accredit off-reserve harvesting practices, so that where possible reserve targets were met, sufficient endangered species habitat was protected, and National Estate values were protected to an acceptable level;
- provide or accredit a program for the further protection of values on private land;
- provide security of access to timber resource for 20 years, which in turn would encourage the development of timber markets;
- determine what the sustainable level of timber harvesting was for the remaining unreserved forest, and
- set in place a monitoring and evaluation program.

5. Who was involved

The RFAs were signed by the Commonwealth and State governments. The process involved consultation with industry, conservation and community stakeholders. The formal consultation process was supplemented by ad hoc consultation by governments, stakeholder groups and the public through meetings and correspondence.

Public consultation, an important part of the RFAs, was undertaken throughout the process. Information and feedback sessions were organised around the regions, and continuing public consultation was provided by membership on technical groups and steering committees of key stakeholders groups.

Calls for written submissions were advertised in the newspapers, at strategic times, such as after the release of interim forest agreements, discussion papers and options reports. Tens of thousands of submissions were received for each region and used to inform the State and Commonwealth Governments during negotiations.

6. Value of outcomes for ecologically sustainable natural resource management

The RFA process contributed to our knowledge of forests values, the requirements necessary to protect these values, and how to effectively involve the community in the process. It was the first process to quantify targets for the protection of environmental values, which traditionally have been difficult to value in multi-use resource management.
The public consultation process was one of the most comprehensive, multi-faceted undertaken on environmental issues.

In particular the RFA was a prototype for the full comprehensive assessment of regional forest values, collating and initiating surveys, models and assessments ordinarily undertaken by separate State/Territory and Commonwealth agencies. A forest yield assessment was also undertaken for each region, on which ecologically sustainable forest management and harvesting could be based on.

Lessons learnt from the RFA process have contributed to the design and effective running of regional natural resource management programs, such as the Commonwealth-State/Territory National Action Plan for Salinity and Water Quality.

achieved in a number of ways. Ministerial Councils, which comprise Ministers from the relevant portfolios of the Federal, State and Territory Governments, play an important role. These Councils include:

- the Council of Australian Governments (COAG), composed of First Ministers from; Federal, State and Territory Governments and a representative of local governments;
- the Natural Resource Management Ministerial Council (a recently formed council that subsumed the Natural Resource Management issues from the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), the Australian and New Zealand Environment and Conservation Council (ANZECC) and the Ministerial Council on Forestry, Fisheries and Aquaculture (MCFFA));
- the Environment Protection and Heritage Council (a recently formed council that subsumed the National Environment Protection Council (NEPC), the non-NRM component of ANZECC and the Heritage Ministers' Meeting); and
- the Ministerial Council on Energy.

These councils are supported and coordinated through inter-governmental committees of officials.

National Strategies and Programs

Australia has in place a substantial body of legislation, programs and strategies for sustainable natural resource management at national, regional, local and farm levels.

Australian governments seek consistency between policies and programs aimed at natural resource management, industry development and drought. Many initiatives link ecological, social and economic objectives through development of integrated regional approaches to resource management. A range of strategies, such as the National Strategy for Ecologically Sustainable Development, agreed between the Federal and State Governments, have had significant influences on land management practices in the rural sector.

Arid areas have received particular attention through agreement on a set of National Principles and Guidelines for Rangeland Management. The **National Strategy for Rangelands Management** was prepared by a working group comprising representatives from key stakeholder groups, including government, industry, conservation, indigenous peoples and scientists. Rural and urban communities, industry and other interest groups provided significant input. The Strategy sets out a vision for Australia's rangelands based on the need for ecological sustainability and commercial viability of industry in the region. It identifies actions needed to protect and enhance the natural resources base that underlies most activity in the rangelands.
One of the key initiatives called upon in this strategy was the establishment of a system to monitor the trend and condition of Australia's rangelands. This initiative, being progressed through a partnership between the Federal and State governments, is known as the Australian Rangelands Information System and provides a model for other countries as they establish systems to monitor the trend and condition of their resources while simultaneously providing management orientated information to resource users.

STANDARDS AND TARGETS

Australia is facing natural resource degradation through increasing salinity, deteriorating water quality and loss of biodiversity. These have direct and indirect impacts on agricultural production, towns and infrastructure and the viability of Australia's regional communities.

The Commonwealth and State and Territory Governments, in partnership with regional communities, are implementing two initiatives, the Natural Heritage Trust and the National Action Plan for Salinity and Water Quality, to tackle natural resource management (NRM) problems. Under these programs, Governments will invest in priority actions under agreed natural resource management plans developed for Australia's catchments and regions.

Regional communities will establish targets as part of their plans, based on an assessment of the current state of the natural resources, and the outcomes we are seeking.

NRM regional targets are tools to:

- help communities set strategic regional objectives for their on-ground activities;
- focus action on priority issues and locations; and
- measure the success of efforts made though joint government and community investment.

Regional targets will set out a particular actions or outcome to be achieved by a specific date. Long-term targets will establish the resource condition outcome a region believes it can achieve within say 10-20 years, for example, changes to groundwater levels; stream salinity and vegetation cover. Short-term targets will identify the steps that will contribute to achieving the long-term targets, and focus largely on management actions or capacity-building, for example, the length of riparian zone protected; percentage of farms with whole farm plans in place; or area of revegetation.

The Commonwealth and State / Territory Governments will invest in the implementation of accredited regional plans, including the achievement of regional targets. Program investment will support both on-ground action, and also capacity building, including the development of skills, knowledge and information required for regions and individuals to respond effectively to the new challenges posed by integrated planning and target setting.

Agreed regional targets will help align activities at the local regional, state / territory and national levels, so that effort is more strategic and effective.

The **National Drought Policy** was agreed between the Federal, State and Territory Governments in 1992. The Policy aims to encourage primary producers and other sections of rural Australia to adopt self-reliant approaches to managing for climatic variability, maintain and protect Australia's agricultural and environmental resource base during periods of extreme climate stress and ensure early recovery of agricultural and rural

industries, consistent with long-term sustainable levels. A review of drought measures triggered under the National Drought Policy was initiated as a result of the intensification of Australia's drought situation in 1994-95. Subsequent developments in drought policy have strengthened the emphasis on self-reliance and focused on the importance of drought research and development of programs aimed at maintaining a sustainable farming sector and minimising the impacts of drought on the environment.

Federal State and Territory Governments have developed a **National Weeds Strategy** in an attempt to better coordinate control efforts by the different spheres of government and landholders in addressing nationally significant weed species. A number of weeds including Prickly Acacia (*Acacia nilotica),* Rubber Vine (*Cryptostegia grandiflora),* Mesquite (*Prosopis spp),* Parkinsonia (*Parkinsonia aculeata)* and Athel Pine (*Tamarix Aphylla*) are serious pests in the rangelands and have been included in the inaugural list of 20 Weeds of National Significance.

Management of total grazing pressure is of concern to rangeland pastoralists. Total grazing pressure comes from the grazing and browsing of herbivores including stock, native species and feral pests. Grazing intensity of stock can be managed through best practice grazing management, and populations of native species are regulated through natural processes. However grazing by feral animals has an enormous influence on the ecology of the rangelands. Compounding this, the management of feral pests is very difficult over extensive areas. The 1996 release of the rabbit calicivirus disease has reduced the grazing impact of this pest species with subsequent environmental benefits. Efforts are also being made to better manage feral populations of the larger ungulates such as horses and donkeys by population reduction and exclusion from watering points. A greater challenge is the management of populations of the smaller herbivores, such as goats.

Many rangeland areas contain habitat for rare, threatened and endangered species and have a significant number of endemic species or exhibit high species diversity. Biodiversity in these areas has been adversely affected by factors such as feral animals and weeds, modification of habitat by grazing, vegetation clearing and land degradation. The **National Strategy for the Conservation of Australia's Biological Diversity** and the recently introduced *Environment Protection and Biodiversity Conservation Act 1999* are helping to address these issues.

Case Study - Australian Bird Atlas

1. Problem

Over the last 20 years there have been many changes within the Australian natural environment. Native vegetation has been cleared, coastal development has expanded, population has increased, pastoral development is changing northern Australia, and the creation of roads, dams, irrigation projects and tree-planting programs all have effects on birds and other wildlife. Biodiversity values are particularly hard to measure across the landscape, the Bird Atlas project provides and utilises data to monitor the maintenance of biodiversity values across Australia.

The first Bird Atlas, undertaken in 1977-1981, was a strongly supported, community based volunteer project coordinated by Birds Australia. The additional data from the second Atlas (1998 –2002) provides a valuable means for measuring changes to the status and distribution of bird species across the whole of Australia from a known benchmark.

2. Location/landscapes/land uses

So far over 255,000 surveys have been carried out in 130,000 different locations covering 99% of the 1° blocks across Australia. Surveys have been carried out in remote locations, from ocean vessels and specific monitoring carried out at internationally recognised Ramsar sites. An intensive survey component (involving the completion of habitat forms) has also been carried out, particularly in grazing and extensive cropping areas (eg wheat/sheep country), providing us with further information on the interaction between birds, and land use.

3. Social Information

The project has encouraged community interest in bird watching and facilitates community education in biodiversity monitoring.

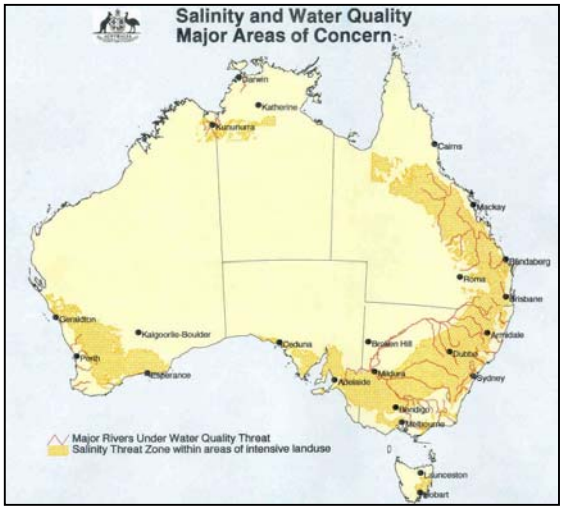
4. What was done

The Bird Atlas utilises volunteers to collect information on the distribution, abundance and habitat requirements of birds. They also collect more specific information on threatened and exotic bird species, habitats, breeding and land use.
The data collected enables us to:

- collect and analyse data on the distribution and relative abundance of Australia's bird species (including rare and threatened;
- compare the distribution and abundance of bird species over a 20 year period;
- to explore relationships between birds and land management practices and changes in habitat;
- investigate the effect of tree planting and revegetation programs on birds; and
- examine regional and seasonal variation in the occurrence of bird species.

Governments have invested in a range of natural resource and environmental management programs to address the issues involved in the sustainable use of our natural resource base. The principal Federal Government vehicle is the **Natural Heritage Trust**. Since 1996 $1.4 billion has been invested in the Trust and related programs for more than 11 900 projects. A further $1 billion has been committed to extend the Trust for the next five years. The extension of the Trust will be delivered through four programs; Landcare, Bushcare, Rivercare and Coastcare. The Trust is administered through partnerships between the Federal, State and Territory Governments with the bulk of funding distributed through annual grants. The Trust has focussed on encouraging communities to address the underlying problems of land degradation, rather than just the symptoms, and to form partnerships and support networks to help build capacity in land managers to undertake the tasks required. Australia's community based partnership approach, the landcare movement, has proven effective in empowering communities to address the environmental and sustainable agriculture problems facing them.

The **National Action Plan for Salinity and Water Quality in Australia** builds on work established under the Natural Heritage Trust, the Murray-Darling Basin Commission, State/Territory salinity strategies and the COAG Water Agreement.



Map 3. Areas of concern from the effects of dryland salinity and reduced water quality

Case Study - Australian Bird Atlas (cont.)

The first Atlas of Australian Birds project documented the distribution and relative abundance of Australia bird species between 1977 and 1981, including historical bird records from a variety of sources. It formed the largest environmental mapping project ever to have been carried out in Australia. More than twenty years later, the need to refresh our knowledge of bird distributions led to the new bird Atlas project. On completion of the new atlas project, 55,000 bird surveys have been carried out, with nearly 4,300,000 bird sightings and 759 bird species recorded.

Birds Australia is currently comparing the two atlases. They are mapping bird species distributions, past and present, to study and quantify any changes over time and to examine whether patterns of change are consistent across different regions.

5. Who was involved

Over 7,000 volunteers including state and regionally based bird clubs, naturalist clubs, landholders and other interest groups from the Australian community carried out 255,000 surveys and submitted 4.3 million bird records.

Government agencies, researchers, schools and the community in a wide range of conservation planning and land management applications use the information collected through the Atlas extensively.

The Commonwealth Government, and all Australia's state governments, have fully supported the project and will use its results to help with conservation planning in the future. Information from the Atlas project will help identify Australia's Important Bird Areas as part of a worldwide conservation program headed by BirdLife International.

6. Value of outcomes for ecologically sustainable natural resource management

The Bird Atlas assists us in the conservation and management of Australian birds by:

- documenting the distribution and relative abundance of birds across the Australian continent;
- identifying broad changes in the distribution of bird species by comparing the data collecting in the first atlas project with those in the new one;
- recording detailed data on occurrence of threatened species as listed by the Commonwealth and State Governments;
- recording the habitat affinities of bird species;
- providing information to assist in directing and evaluating the re-vegetation activities funded through Bushcare to maximise conservation benefits; and
- using birds as a surrogate for biodiversity by establishing a long-term, community based on-ground monitoring program to monitor maintenance of bird populations across a range of land-uses.

The Bird Atlas data enables us to see trends in the distribution of birds and in some cases use birds as indicators, such as for the presence of particular food resources. It enables us to identify hotspots of bird diversity and core areas that need to be protected, as well as danger areas where birds are in decline from various threatening processes. All of this information provides an essential framework for directing and evaluating the activities funded through the Bushcare Program.

Dryland salinity and associated water quality are recognised to be among Australia's most severe natural resource degradation problems. The Action Plan aims to motivate and enable regional communities for coordinated and targeted action to prevent, stabilise and reverse trends in dryland salinity and improve water quality and secure reliable allocations for human uses, industry and the environment.

Progress is being made in discussions currently being held with State governments regarding implementation of the Action Plan, with particular attention being given to providing institutional arrangements that will allow effective regional level planning and action. Bilateral Agreements are currently being negotiated between the Commonwealth and State or Territory Governments, with four such agreements already in place. Several foundation projects are currently underway. Funding of $1.4 billion over seven years will be provided by the Commonwealth and the States, principally to undertake targeted action in 21 highly affected priority regions.

There is concerted action to improve the health of Australia's river and groundwater systems. The Federal, State and Territory Governments, through COAG, have agreed on a reform framework to achieve efficient and sustainable management of Australia's water industry. This is supported by action at the regional level, such as agreements on water use and catchment management in the Murray-Darling Basin, and a $32 million initiative to improve efficiency of water use in the Great Artesian Basin by capping bores and replacement of open bore drains with piping, and complementary changes in water user attitudes.

Case Study – Murray-Darling Basin Initiative

1. Problem

The development of water, land and other environmental resources of the Murray-Darling Basin has created numerous economic and social benefits. However, the use of these resources has also caused significant environmental degradation. Over-allocation of water, the regulation of rivers and the removal of native vegetation has created many environmental problems including increasing land and water salinisation and the loss of important riverine, wetland and floodplain habitats and their associated ecosystems. These environmental issues are being addressed as part of the Murray-Darling Basin Initiative.

2. Location/landscapes/landuses

The Murray-Darling Basin covers 1,061,469 km^2, which is equivalent to 14% of Australia's land area. The Basin is Australia's most important agricultural region, supporting approximately 75% of Australia's irrigated agriculture, and accounting for 41% of the nations gross value of agricultural production. The Basin's natural resources are also rich in biodiversity and cultural heritage values. A number of the Basin's wetlands are recognized under the Convention on Wetlands of International Importance. The Murray-Darling Basin is also home to icon species including the Murray cod and Murray crayfish.

3. Social information

The 1996 census reported a Basin population of almost 2 million, which was 10.95% of Australia's total population. The Basin is administered by five State/Territory governments, the Commonwealth, and more than 200 local governments. These governments manage the resources of the Basin in partnership with catchment organisations, landcare groups and numerous other community organisations.

4. What was done

The Murray-Darling Basin Initiative is the name given to the partnership between the governments and the community to give effect to the 1992 Murray-Darling Basin Agreement. The Agreement aims to *promote and co-ordinate effective planning and management for the equitable, efficient and sustainable use of the water, land and other environmental resources of the Murray-Darling Basin*.
In response to the declining health of the Murray-Darling system, the Murray-Darling Basin Initiative has produced a number of key actions including:

- The cap on water diversions in the Basin, which was seen as an essential first step in establishing management systems to achieve healthy rivers and sustainable consumptive uses;
- Environmental flows to improve the ecological condition of the River Murray. The Murray-Darling Basin Ministerial Council has directed the release, for public comment and further analysis, of three environmental flow scenarios, the return of 350, 750 and 1500 gigalitres of water to the River Murray;
- The Sustainable Rivers Audit, a broad river health assessment tool that will assist in identifying the effectiveness of current river management initiatives; and
- Integrated Catchment Management in the Basin complementing other Commonwealth and state Programs including the National Action Plan for Salinity and Water Quality and the Natural Heritage Trust. The Initiative has produced a number of linked strategies, including the Basin Salinity Management Strategy and the Native Fish Strategy, which include specific actions and targets to improve the health of the Murray-Darling Basin's natural resources.

5. Who was involved?

The entire Basin community is involved in the Initiative. The Initiative is a partnership between the Basin governments and the community.

6. Value of outcomes for ecologically sustainable natural resource management

The Murray-Darling Basin Initiative contributes towards ecologically sustainable natural resource management by:

- Using an integrated catchment management approach for assessing and improving the health of the Basin's natural resources;
- Targeted investment in on-ground actions and research that will result in improvements in the ecological health of the entire system; and
- Creating a partnership approach to the management of the Basin's natural resources, which is inclusive of the entire Basin community, and encourages governments to work together for a common goal.

Research and Monitoring

The strategic policy work of the Federal and State Governments is complemented by a range of research and monitoring work examining the effects and developing innovative approaches to reducing the impacts of land degradation. Universities and a variety of Federal and State bodies are undertaking research into natural resources management. These include: the CSIRO, Land and Water Australia, the Bureau of Rural Sciences and a number of joint industry-government funded research and development corporations such as the Cooperative Research Centres (which includes a Tropical Savannas CRC). Land and Water Australia funds and manages research programs to help develop better and more sustainable use of Australia's natural resources and thus help to maintain the industries and people reliant on those resources. Meat and Livestock Australia, an industry and government funded organisation, manages a range of research and development activities in the rangelands focussed on improving productivity and environmental management in the grazing industry. The Australian and New Zealand Land Information Council is making geographical data more accessible to the community through the coordination of policy, the development of data standards and the implementation of a national data directory system. There are many other institutions and agencies that make a substantial contribution to our understanding of status and change in the rangelands.

State and Territory governments, with an interest in the rangelands, are also undertaking research into rangeland management issues. The establishment in 1995 of the Cooperative Research Centre for the Sustainable Development of Tropical Savannas is an example of the cooperation being undertaken between organisations working in the rangelands of Australia.

The National Land and Water Resources Audit, a program of the Natural Heritage Trust, is finalising a comprehensive audit of existing information on the status and condition of Australia's land and water resources. Included in the Audit is an assessment of the condition of Australia's rangelands. The final report of this assessment is attached to this National Report. In conjunction with other national scale reporting processes, such as State of the Environment Reporting, we are quickly developing a better understanding of the extent and causes of land degradation. This will lead to improved decision making in addressing the impacts of land degradation.

Case Study - Remote sensing of grazing impact in northern South Australia & Barkly Tablelands, NT

Principal investigators: Gary Bastin & Vanessa Chewings, CSIRO Centre for Arid Zone Research, Alice Springs, NT 0871. Gary.Bastin@csiro.au
(Funded by: National Landcare Funding, South Australian Govt, Northern Territory Govt, and CSIRO)

1. Problem:

Measuring change over vast areas of land and separating real trends caused by grazing impacts from background noise caused by climatic variability.

2. Location/landscapes/landuses

Cattle grazing on the floristically simple, extensive, black soil plains of the Barkly Tablelands in the north, and cattle grazing the more complex landscapes of northern South Australia.

3. Social information

Both regions are occupied by a small number of large pastoral holdings, under leasehold tenure with ultimate responsibility in the public interest resting with State Governments and their respective Pastoral Boards. The Pastoral Boards are concerned to have methods to determine whether there are long-term deleterious effects of grazing in different paddocks. Existing ground-based techniques are inadequate in separating grazing effects from seasonal variability across the vast areas involved. Remote sensing methods are more cost-effective for administration agencies given the relatively low income they receive from lease rentals from this land. Pastoralists are also concerned to know the effects that their grazing may be having, but have only very subjective methods to keeping track of this over such large areas.

4. What was done

Satellite-based methods originally developed and applied in central Australia were transferred and modified to suit these two new environments. This involved a deliberate policy of agency personnel initially working closely with CSIRO scientists, and then returning to their home agencies with subsequent support from CSIRO when necessary. This proved effective in transferring the technology and its use into the agencies that need to use it.

Summary of the outcomes:
• index of vegetation cover developed for each region that allows levels of vegetation cover to be monitored through time;
• customised analysis software adapted to the specific requirements of each client; and
• training and documentation to provide clients with confidence in independent use of the technology
(See Bastin *et al* 1998 and McGregor *et. al.* 1999)

5. Who was involved

CSIRO staff from the Alice Springs Centre for Arid Zone Research, agency staff from the former SA Department of Environment, Heritage & Aboriginal Affairs and NT Department of Infrastucture, Planning & Environment, with cooperating pastoralists from each region.

6. Value of outcomes for ecologically sustainable natural resource management

Ability to track changes in the long-term across extensive regions, using methods that are now accepted to provide a robust measure of land condition. Implementation by agencies has sought to supplement remote sensing analyses with more detailed information about vegetation and soil collected at fixed monitoring sites.

Indigenous Issues

Indigenous peoples have a special relationship with the rangelands and are substantial stakeholders within the region, managing approximately 18 percent of the total land area. Indigenous peoples can have concepts of conservation and land use which differ from those of other rangeland users. Uluru-Kata Tjuta National Park, owned by the region's traditional Aboriginal custodians and managed jointly with Department of the Environment and Heritage, provides an example of how indigenous knowledge is being used in rangeland management.

Case Study - Indigenous Land Management Facilitators

1. Problem

Until recently there has been a lack of practical two-way links between Indigenous land managers and other individuals and agencies involved in sustainable land management and nature conservation activities. Consequently there was often a lack of awareness between indigenous communities and Commonwealth Government policy makers with regard to particular land management issues and initiatives within regions.

2. Location/landscapes/landuses

All regions of Australia.

3. Social information

The Federal Government recognises that Indigenous (Aboriginal and Torres Strait Islander) Australians are a major stakeholder in the management and protection of Australia's natural and cultural resources.

4. What was done

To help Indigenous Australians address their land management needs, contribute to national objectives and to gain access to the $1.5 billion Natural Heritage Trust funding, the Federal Government has established a national network of 13 Indigenous Land Management Facilitators. The Facilitators provide assistance to Indigenous people involved in land management. They are funded through the Bushcare and National Landcare Programs, and are employed through regionally based host agencies covering all regions.

The role of the Indigenous Land Management Facilitator is to:
- Act as a link between Indigenous land managers and other individuals and organisations involved in promoting sustainable land management and biodiversity conservation;
- Ensure that Indigenous communities within a region are aware of the land management issues and initiatives in their region;
- Provide information to the Indigenous community about the Natural Heritage Trust and other programs of support available;
- Provide feedback to Commonwealth Government policy makers on land management issues of concern to Indigenous communities; and
- Raise awareness by Government agencies and non-Indigenous communities of Indigenous values, aspirations and capacity in land management.

5. Who was involved

Indigenous land manager facilitators, indigenous and non-indigenous communities, and government policy makers.

6. Value of outcomes for ecologically sustainable natural resource management

The goal of the Indigenous Land Management Facilitators Program project is to encourage Indigenous communities to participate in Natural Heritage Trust projects on land under their care, or in which they have an interest.

The facilitators provide information to Indigenous communities about the types of support and technical advice that is available to assist them with the land management issues on their lands. The facilitators also provide feedback to Commonwealth Government policy-makers on land management issues that are of concern to Indigenous communities, and help to raise awareness within Government agencies and the non-Indigenous communities of Indigenous values, aspirations and capacity in land management.

Land management projects involving Indigenous communities include:
- establishing nurseries for revegetation with native plants;
- rabbit and weed control;
- reducing the extent and effect of seasonal wild fires;
- fencing out stock from ecologically sensitive areas such as river banks; and
- developing interpretation trails to inform the broader community about Indigenous land management practices and the benefits of protecting cultural sites.

Through the Natural Heritage Trust, funding has been provided for a support network of Aboriginal land management facilitators. Duties of the facilitators include: raising awareness and providing information on land and nature conservation issues; facilitating the formation of group activity appropriate to Aboriginal people; assisting groups to plan and implement enterprise development and landcare activities; and assisting in the development of linkages between community groups, government agencies, non-Aboriginal landholders and private enterprise.

The Trust has also provided funding for indigenous groups to improve the management of land under their control. Activities funded include: improving fire management, revegetation for dust suppression in semi-arid communities, fencing to exclude feral animals from water sources, and planting of species suitable as native bush food sources.

Case Study - RiskHerd

RISKHerd: taxation policy instruments and grazing management in the rangelands (funded by Land and Water Australia's Climate Variability in Agriculture Research & Development Program with CSIRO).
Principal investigator: Mark Stafford Smith, CSIRO Centre for Arid Zone Research, Alice Springs, NT 0871. Mark.StaffordSmith@csiro.au

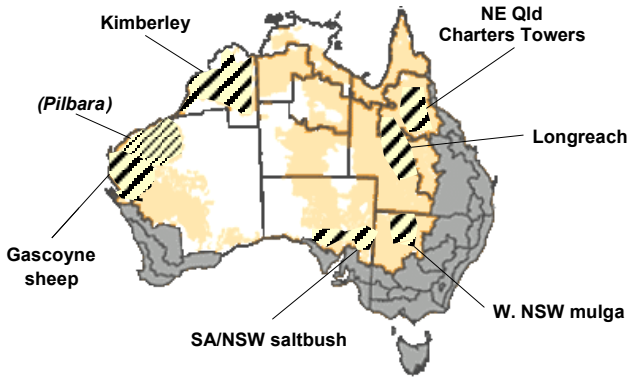
1. Problem

The ***RISKHerd*** project evolved out of concerns expressed by producers and policy stakeholders that federal government taxation-policy instruments designed to assist farmers and graziers in managing production risks were actually undermining efforts for sustainable resource management within the pastoral industry.

2. Location/landscapes/landuses

The project looked explicitly at 6 regions of the rangelands of Australia, including sheep and cattle enterprises on vegetation systems with different degrees of resilience, with different levels of climatic variability and different access to markets.

The rangelands of Australia showing areas occupied by sheep or cattle, this region was the scope of the RISKHerd project



3. Social information

The project sought to link policy-makers at a national level with regional farmer groups in a way that permitted some two-way flow of information and understanding.

4. What was done

The project had 3 interwoven strands – policy consultation, producer consultation, and modelling – operating at national and regional levels. The involvement of a national policy steering group guided preliminary analyses based on existing data and thereafter provided direction to the remainder of the project. Consultation with producers in six main regions around the rangelands involved surveying their use of tax instruments then discussing these in more detail with a subset of people in each region. From this information (and other sources), we constructed models of typical enterprises in each region and analysed the implications of using different tax instruments on these, looking at a stochastic analysis of thousands of realistic climatic sequences coupled with sensible probability distributions of prices and other financial and biophysical drivers. The models were coupled models of pasture production and condition, animal production and farmer level management decision-making, with farm-level economics and a taxation module which accounted for the policy options. Error propagation between model modules was managed with great care! The regional surveys and discussion provide a rich source of understanding about why different instruments may or may not be popular in different regions, thereby helping us to interpret the modelling results. These have been finalised in 7 major reports but are still being summarised into a 16-page policy-maker communications document and on to a CD-ROM.

5. Who was involved

Innovatively, the project engaged federal policy-makers and lobbyists as well as individual farmers in regions with different production characteristics around the rangelands. The federal steering group included senior participants from the National Farmers Federation (the national farmers' lobby group), Agriculture Forestry Fisheries Australia (the national department of agriculture), the Department of Treasury, the Australian Taxation Office (federal agency responsible for collecting tax within Treasury's policy guidelines) and NSW Agriculture (a state department of agriculture). Some 150 pastoralists were surveyed across the continent, and about 30 of these interviewed in detail to provide data for modelling. Where possible, pastoralist groups were involved to broaden the involvement. Tax issues turned out to be close to the heart of many.

6. Value of outcomes for ecologically sustainable natural resource management

The findings showed that there are some notable opportunities to consider changes that could reduce tax-related public investment in the grazing industries, whilst benefiting the long-term future of the industry and its natural resource management. An eventual move towards a more market-oriented herd valuation system could permit the removal of livestock elections and even re-consideration of income averaging, thus dramatically changing three major current tax instruments. Benefits could include better signals in relation to sustainable resource management, a better ability to respond to emerging technologies that assist with self-reliance, and a reduction of cost to the public purse.
The retention of farm management deposits (another tax-related instrument) would help with some issues not covered by these changes. Such a change would be at a short term financial cost to pastoralists which can be argued to be comparable to the long-term financial implications of the resource changes promoted by low valuations, at least in the regions where we have been able to formally assess these. However, thereare major transition costs, which industry would not be likely to accept in their entirety. The project showed why this is so and why it might still be in the public interest to consider such a transition.
The study focused on grazing management in the more remote and lightly settled parts of the continent. Obviously changing the system would have implications for agriculture in other regions, and the findings do not necessarily apply equally to these. Because of this it was not expected that there would be instant policy changes as a result of the project, especially given the contentious transition issues. However, the study has added to the increasing weight of evidence in favour of some policy changes in this area, and the abbreviated policy-maker summary is expected to stay on the shelves of the participating agencies towards the day when the political environment allows a new review of taxation policy to occur. The study has also highlighted how the implementation of some other investments in self-reliance for agricultural industries is being blocked by out-of-date taxation conditions.
More information: www.cazr.csiro.au

Initiatives to Combat Desertification funded through Australia's Overseas Aid Program

Australia's overseas aid program assists developing countries in reducing poverty and achieving sustainable development. Many aid activities address the environmental causes of poverty, including desertification. The Australian Government, through the Australian Agency for International Development (AusAID), is currently supporting a range of bilateral programs to combat desertification in developing countries with a total funding commitment of approximately $58.5 million. AusAID also administers contributions to a range of multilateral organisations and Australian NGOs with a mandate for addressing desertification.

Australia's experience in tackling land degradation has been important in helping other countries to address their resource management problems. The Australian Government, through the Australian Centre for International Agricultural Research (ACIAR), funds agricultural research projects executed collaboratively by research institutions in Australia and developing countries on subject areas that are of high mutual priority. Land degradation and desertification are important focal points for this research. The Australian Government also funds international agricultural research centres, many of which operate within the framework of the Consultative Group on International Agricultural research (CGIAR). Several of these centres are active in desertification research, and are supported by Australia both through core funding and funding for specific desertification related projects.

At present ACIAR has 16 projects related to desertification, involving a total funding commitment of over $11 million. These project activities are concentrated in China, India, southern Africa and Southeast Asia. In 2001/02, ACIAR distributed core contributions of $1.55 million to four international agricultural research centres active in desertification research.

Case Study - Assisting India

Title: Integrative technologies for assessing the extent and cause of degradation in arid community rangelands, Rajasthan, India
Principal investigator: Dr Margaret Friedel & Gary Bastin (CSIRO), Dr Suresh Kumar (Central Arid Zone Research Institute, Jodhpur, India)
(Funded by: ACIAR, CSIRO)

1. Problem

Increasing human and animal (sheep, goat, cattle and buffalo) populations are placing extreme pressure on the soils and vegetation of arid northwest India. However, as in arid Australia, rainfall variability from year to year makes it very difficult to determine the extent and precise causes of land degradation. Remote sensing technology developed by CSIRO for monitoring land degradation is being modified and evaluated for its effectiveness in assessing land degradation in this environment.

2. Location/landscapes/landuses

Jodhpur region (central Rajasthan), India. Main landuses are subsistence dryland cropping based on monsoonal rainfall and grazing of communal lands.

3. Social information

Socio-economists and livestock experts are establishing relationships with village people (village entrée) and collecting economic, social and livestock data that will assist in interpreting trends derived from remote sensing analyses. These scientists are the conduits to explain our (scientific) assessments of degradation to village people and obtain information from them to help explain spatial and temporal patterns detected through our analyses.

4. What was done

The project is midway through its fourth year. The main work areas are:
• apply and adapt Australian-developed techniques, using remotely-sensed data, for assessing land degradation, to Indian desert environments;
• gather ground-based survey data on socio-economic factors, the natural resource base and animal production for interpreting the results of remotely sensed analyses;
• develop means of information exchange with village communities in order to explain land degradation; and
• develop capacity with Indian colleagues for their independent use of all methodologies.

5. Who was involved

CSIRO scientists at the Alice Springs Centre for Arid Zone Research (Margaret Friedel, Gary Bastin, Vanessa Chewings, Janine Kinloch) and a multi-disciplinary team of scientists at the Central Arid Zone Research Institute, Jodhpur (Rajasthan, India).

6. Value of outcomes for ecologically sustainable natural resource management

For India: Ability to separate human-induced degradation of vegetation due to grazing and timber collection from that due to natural causes (climatic variation). It is possible to do this over large areas in a repeatable manner.
For Australia: Knowledge that Australian developed technology is applicable/useful in the arid regions of other countries, and extension of the conceptual models on which the methodology is based to encompass additional environments that may contribute to future uses in Australia.

Desertification related activities currently supported by the Australian Government through AusAID

Bilateral Partnerships

Country	Activity Name	1999/00 Expenses	2000/01 Expenses	2001/02 Estimated expenses	2002/03 Estimated expenses	Total Estimated Expenses ($millions)
China	Alxa Environment Rehabilitation	$1,335,511	$936,817	$2,733,061	$2,603,078	$14.2
China	Inner Mongolia Grassland Conservation – Phase I	$1,390,477	$519,435	$43,588	$0	$6.6
China	Inner Mongolia Grassland – Phase II	$0	$9,357	$303,000	$2,300,000	$5.8
China	Tarim Basin II	$892,190	$0	$0	$0	$3.0
Pakistan	Agroforestry/Salinity Control	$662,668	$1,029,310	$106,741	$375,000	$4.2
India	Himachal Pradesh Sustainable Rural Livelihoods	$280,206	$40,000	$610,101	$500,000	$1.1
Nepal	Community Resource Management Conservation	$2,175,660	$2,306,149	$1,600,878	$1,000,000	$10.1
South Africa	Institutional Strengthening for the Department of Agriculture	$105,365	$293,624	$1,399,634	$1,049,248	$3.9
Zimbabwe	Smallholder Dry Areas Resource Management – Phase I	$532,975	$200,282	$0	$0	$3.9
Zimbabwe	Smallholder Dry Areas Resource Management – Phase II	$561,800	$1,098,154	$1,700,000	1,200,000	$5.7
Total		**$7,831,487**	**$6,139,504**	**$8,497,003**	**$9,027,326**	**$58.5**

China: Alxa Environment Rehabilitation Project

Commenced May 2001; estimated completion June 2006.

This project aims to control desertification and eventually restore ecological balance to degraded land through improved environmental management techniques. It is intended that this will improve living standards of the rural poor. This should especially be the case in desert fringe areas where poverty leads to overexploitation of natural resources and puts excessive pressure on already degraded eco-systems.

China: Inner Mongolia Grasslands Conservation

Commenced June 1996; Phase I completed April 2001; Phase II estimated to commence in late 2002

The objectives of the first phase of this project were to: introduce a range of sustainable and profitable village level enterprises; assist with the development and implementation of policies and strategies designed to improve the sustainable management and utilisation of grasslands; upgrade the standards of animal husbandry; and strengthen the Xingan Animal Husbandry Bureau.

The objectives of the second phase are:

- To analyse and monitor policy relating to sustainable grassland management and influence the ongoing development of regulations;
- To implement grassland management policy in selected sumu with an emphasis on community education and participation;
- To develop and effectively extend appropriate farm management practices to stimulate behavioural change and support user rights implementation; and
- To effectively manage, co-ordinate and monitor the project.

This project will build on the achievements of the original project, with the continuing goal of sustainable utilisation of Xingan League's grassland resources for livestock production. The original design for this phase has been significantly revised, placing greater emphasis on the institutional strengthening required to ensure the sustainability of grassland management policies implemented during the original project and expand the established system of user rights. The project will also refine the focus of a Chinese-funded credit scheme, explore rural capital formation and further improve livestock productivity.

China: The Tarim Basin II Project

Commenced July 1998; estimated completion April 2003

The Tarim Basin II Project, located in Xinjiang Uighur Autonomous Region, is intended to: increase incomes of poor minority farmers through sustainable irrigated agricultural development (irrigation system rehabilitation, land reclamation and low yield improvement using water saved due to system improvements); establish mechanisms for sustainable development and management of water resources in the Tarim Basin; and partially restore the "green corridor" (riverine forests and pastures in the lower reaches of the Tarim River). The total cost of the Tarim II project is around $US 300 million, the majority of which is being financed by the World Bank. Australia is contributing $US 2 million.

Pakistan: Agroforestry/Salinity Control

Commenced April 1998; estimated completion March 2003

The goal of the Project is to develop and promote sustainable biological farming systems for reclamation and rehabilitation of saline and waterlogged lands to improve community livelihoods in the Punjab Province. The primary focus of the project is on developing productive and profitable farming systems for these lands. A central aspect is the development of community organisations to promote demonstration and adoption of appropriate and sustainable biologically-based technologies. These technologies include planting salt-tolerant trees, shrubs, grasses and crops and other biological interventions to reduce the effects of salinity and waterlogging.

India: Himachal Pradesh Sustainable Rural Livelihoods

Commenced June 1999; estimated completion July 2002

Large areas of the states of Madhya Pradesh, Rajasthan and Himachal Pradesh need environmental protection. Tree cover has been depleted, soil erosion has increased and water tables have fallen. A Feasibility Design Team has carried out a study in Himachal Pradesh to design a feasible and sustainable rural livelihoods project which will focus on community and organisational needs and their impact on the environment.

Nepal: Community Resource Management Conservation

(Current Phase) Commenced May 1997; estimated completion April 2002

This project is implementing activities aimed at income generation for the poor, increasing subsistence production, improving community self-reliance and conservation of the environment. The project will build upon the literacy, water supply and community forest management activities of the Nepal Australia Community Forest Project Phase 4 that was completed in April 1997.

Plans are being finalised to implement a bridging phase between the current project and a new stage for community forestry in Nepal. The design for this stage will be completed by the end of February 2002.

South Africa: Institutional Strengthening for the Department of Agriculture

Commenced March 2001; estimated completion June 2004

The objective of the project is to strengthen the capacity of the National Department of Agriculture (NDA), Northern Province Department of Agriculture and other relevant South African Government agencies and community groups to effectively implement the South African Landcare program.

Planned Outputs include the development and implementation of a strategic plan for the Landcare Program, eight model Landcare projects, training, awareness raising among key politicians, and the development of effective and efficient project management and monitoring systems.

Zimbabwe: IFAD-Smallholder Dry Areas Resource Management

Commenced March 1995; estimated completion October 2004

Australia is co-financing this project with the International Fund for Agricultural Development (IFAD). The project is administered through the United Nations Operations Program (UNOPS) and aims to provide poorer people living in selected Communal Areas with enhanced food security and incomes, based on sustainable and drought-tolerant resource management by local communities. Specific activities include the provision of improved seeds, draft animal power, micro-irrigation development and funds for credit. A second phase of the project commenced in May 2000 to serve communal areas in the provinces of Midlands and Matabeleland South.

Multilateral Partnerships

The Australian Government, through AusAID, provides annual contributions to a range of multilateral agencies, which either directly or indirectly combat desertification. These agencies include development banks, international environment organisations, United Nations agencies and United Nations specialised agencies.

For example, Australia provides support to the World Bank, whose assistance in controlling land degradation totalled $US 1.8 billion for the period 1990-1999. Additionally, Australia provides support to the Global Environment Facility, which has allocated since 1991 more than $US 350 million to combat desertification and deforestation.

Other specific multilateral agencies that deal with desertification and receive AusAID funding include the United Nations Environment Program ($650,000 in 2001/02) and the International Fund for Agricultural Development ($1.5 million in 2001/02).

NGO Partnerships

In 2000/01 the Australian Government, through AusAID, provided $128 million for aid activities implemented through Australian NGOs. The estimated NGO figure for the 2001/02 financial year is $115.6 million. Many NGO activities target southern Africa and address land degradation.

Desertification related activities currently supported by the Australian Government through ACIAR

TITLE	COUNTRY	DURATION	TOTAL BUDGET ($ Aust)
Lucerne adapted to adverse environments in China and Australia	China	Jan 2001 – Dec 2004	$938,899
High yielding anthracnose-resistant Stylosanthes for agricultural systems in India and China	Brazil, China, Colombia, India	July 1998 – June 2004	$897,222
Traits for yield improvement of chickpea in drought-prone environments of India and Australia	India	July 1998 – June 2004	$735,679
More efficient breeding of drought resistant peanuts in India and Australia	India	July 1998 – March 2002	$551,423
Salinity management in southeastern Australia, northeastern Thailand and Lao PDR	Laos, Thailand	Jan 2001 – Dec 2003	$743,496
Integrative technologies for assessing the extent and cause of degradation in arid community rangelands	India	July 2000 – Dec 2003	$372,807
Development of technologies to alleviate soil acidification in legume-based production systems in the tropics of Asia and Australia	China, Thailand	July 2000 – June 2004	$712,810
Water resources and salinity management in agricultural areas of inland Northern China and Northern Australia	China	Jan 2001 – Dec 2004	$993,358
Sustainable mechanised dryland grain production	China	July 1997 - Dec 2002	$795,566
Enhanced resource-use planning for tropical woodland agro-ecosystems	Zimbabwe	Jan 1999 - Dec 2002	$819,558
Capturing the benefits of seasonal climate forecasts in agricultural management	Indonesia, Zimbabwe, India	Jan 1999 - Dec 2002	$982,927
Improving the productivity and sustainability of rainfed farming systems for the western Loess Plateau of Gansu Province	China	Jan 2001 – Dec 2004	$1,372,554
Conjunctive water management for sustainable irrigated agriculture in South Asia	Pakistan	July 1998 – June 2002	$625,818
Integrated nutrient management in tropical cropping systems: improved capabilities in modelling and recommendations	Kenya Zimbabwe	July 1999 – June 2002	$434,130
Training program on the principles and practice of sustainable cropping systems	India, South Africa, Zimbabwe	Jan 1999 - Dec 2001	$180,000
Drill modification for rice-wheat with straw retention	India	June 2001 – May 2002	$37,200
TOTAL			**$11,193,447**

Unrestricted core funding to international agricultural research centres	
ICARDA - International Centre for Agricultural Research in Dry Areas	$250,000
ICRAF - International Centre for Research on Agroforestry	$200,000
ICRISAT - International Crops Research Institute for the Semi-Arid Tropics	$600,000
IWMI - International Water Management Institute (incorporating IBSRAM - International Board for Soil Research and Management)	$500,000
TOTAL	**$1,550,000**

China and Australia: Lucerne adapted to adverse environments in China and Australia

Commenced Jan 2001; estimated completion Dec 2004

Forage production is one of the key limiting factors to increased animal production across vast areas of China. Fertile areas are almost exclusively cropped, with pasture production restricted to marginal areas. Factors such as overgrazing, salinity and waterlogging or acid soils are prevalent, and result in poor pasture production. A well-adapted, deep-rooted perennial is urgently required to maintain productivity and arrest soil problems in these areas. Lucerne has great potential to alleviate these problems in both China and Australia and research is currently under way for expanded areas in Australia, including the cereal zone. However, there is a specific need to develop varieties with high levels of tolerance to factors such as salt, acid/aluminium soils, waterlogging or drought.

China and India: High yielding anthracnose-resistant Stylosanthes for agricultural systems

Commenced July 1998; estimated completion June 2004

The pasture legume, *Stylosanthes* plays a vital role in mitigating fodder shortages, improving soil fertility under agropastoral systems, and in the restoration of degraded lands. However, the economic utilisation of *Stylosanthes* is threatened by Anthracnose disease. The objective of this project is to select germplasm with improved anthracnose resistance and herbage and seed yield for adaptation in contrasting agro-ecological regions, and also to develop a genetic map for *Stylosanthes* as a basis for the development of cultivars with high yield, persistence and multiple sources of resistance. Anthracnose epidemiology will also be studied to better respond to changes in *Stylosanthes.*

India: Traits for yield improvement of chickpea in drought-prone environments

Commenced July 1998; estimated completion June 2004

Chickpea is an important protein-rich crop in India, West Asia and North Africa. In Australia it is useful as a high-value export crop, and a source of nitrogen and a disease break when planted prior to cereal or oilseed crops. But when grown in drought-prone areas, its yields are only 0.5-0.8 tonnes per ha, and this project aims to lift those yields. Scientists will define the limitations to yield under dryland conditions then breed lines with physiological characteristics most able to withstand drought. They will develop breeding populations to test the best methods for screening superior characteristics and determine whether they can use molecular technologies for improving the efficiency of breeding for drought resistance.

India: More efficient breeding of drought resistant peanuts

Commenced July 1998; estimated completion March 2002

Peanut is widely sown in many of the world's semi-arid cropping regions, including areas of India and Australia. However, even though it is a fairly drought-tolerant plant, production can fluctuate considerably as a result of rainfall variability. Much work has been carried out in both countries to improve the performance of peanut under drought conditions. A previous ACIAR project identified a number of traits of the plant that were closely correlated with the yield of nuts. Some lines showing these attributes were selected for. The present project aims to select from these populations for lines that are drought-tolerant and high-yielding. The scientists will apply a new breeding approach in an attempt to improve the efficiency of selection in large-scale breeding programs.

Southeastern Australia, northeastern Thailand and Lao: Salinity management

Commenced Jan 2001; estimated completion Dec 2003

Dryland salinity causes major land degradation and economic loss in Thailand and Australia. Lao PDR currently has only a small area of land affected but there is potential for much larger areas to be affected if they are poorly managed. This project will refine and apply groundwater mapping and modelling technologies to describe recharge and discharge processes in selected catchments of northeast Thailand, central Laos and southeast Australia. Scientists will estimate the relative effect of trees in plantations and other configurations in comparison with alternative land uses on groundwater recharge and discharge. They will also predict the local and regional impact of current and proposed reforestation projects on groundwater hydrology of the selected catchments. In addition, an economic study will highlight the social and economic consequences of the hydrological impacts associated with various reforestation scenarios, and of the increased use of saline groundwater resources within the cultural context of each country.

India: Integrative technologies for assessing the extent and cause of degradation in arid community rangelands

Commenced July 2000; estimated completion Dec 2003

Grazing lands in semi-arid and arid regions throughout the world are suffering degradation or desertification, with serious consequences for subsistence farmers. Better land management is needed if productivity is to be maintained. However, it is difficult to distinguish between the effects of land use and natural variation in productivity. This project aims to determine the extent of land degradation in communal rangelands in India in order to develop strategies for more sustainable land management. By applying new remote sensing methods developed in central Australia, scientists will be able to discriminate between rainfall variation and degradation in extensive areas of the communal rangelands. The findings will be shared with villagers, who will be involved in deciding how to prevent further land degradation, thus encouraging commitment to improved land use.

China, Thailand: Development of technologies to alleviate soil acidification in legume-based production systems in the tropics of Asia and Australia

Commenced July 2000; estimated completion June 2004

Because of their capacity to fix atmospheric nitrogen and break down into organic matter in the soil legumes are commonly used in farming systems to improve soil fertility. Yet increasing use of legumes with inappropriate management practices can lead to the problems of soil acidity, and soils with a high degree of acidification show poor fertility and low pH buffering capacity that result in low productivity. The overall objective of this project is to reverse the negative impacts of accelerated acidification and nutrient depletion through the development of new ways to prevent or limit these processes.

China: Water resources and salinity management in agricultural areas

Commenced Jan 2001; estimated completion Dec 2004

This large project will collect and analyse hydrological, agronomic and soil quality data in the heavily irrigated Songnen and Yinchuan Plains of China and the Ord River Irrigation Area of Western Australia. The aim is to produce management options to avoid the long-term damaging consequences of heavy irrigation and groundwater use. The scientists will also assess new irrigation techniques and will compare crop production under different scenarios so as to develop detailed management options to ensure long-term viability of all resources. Work will take place on determining the mechanisms of water-logging, and quantifying groundwater discharges of salt and nutrients, so as to prepare detailed maps for planning and management.

China: Sustainable mechanised dryland grain production

Commenced July 1997; estimated completion Dec 2002

The agricultural system in Northwest China is rapidly becoming mechanised but conservation tillage is rare and soil compaction is a problem. In Australia, conservation cropping systems are common for grain production, but there are still problems. This project will assess models of mechanised conservation tillage by using data from China and Australia. In China, it will assess the effects of crop residue, soil tillage and wheel traffic on soil properties and the growth of wheat and maize. It will also evaluate the cost of conservation tillage and controlled traffic systems and compare precision-controlled traffic systems with conventional crop production systems.

Zimbabwe: Enhanced resource-use planning for tropical woodland agroecosystems

Commenced Jan 1999; estimated completion March 2002

Rural communities are constantly faced with decisions about how they develop or conserve the resources they manage. The consequences of these decisions will have an impact beyond the immediate area and may be felt far into the future. Poor decisions have contributed to many current degradation problems, and so this project has been initiated to help improve the decision-making process used in southern Africa and northern Australia. The project will focus on the management of tropical woodlands. The aim is to develop and trial a framework of processes and tools for decision-making which will result in effective community-based planning for sustainable resource management.

India, Indonesia and Zimbabwe: Capturing the benefits of seasonal climate forecasts in agricultural management

Commenced Jan 1999; estimated completion Dec 2002

Climate variability affects agricultural production, human health and the well being of communities throughout the world. Seasonal climate forecast tools are under development, but need testing. This project will evaluate alternative seasonal climate forecast signals and statistical methods in Australia, Zimbabwe, Indonesia and India. The project will determine relationships between climate indicators and impacts on agriculture and assess the value of forecasts at key decision points in the agricultural system. The scientists will also develop and apply a range of decision support systems including workshops and learning packages, agricultural models and an international version of the Australian Rainman software package.

China: Improving the productivity and sustainability of rainfed farming systems for the western Loess Plateau of Gansu Province

Commenced Jan 2001; estimated completion Dec 2004

This project will undertake research on tillage and cropping systems to reduce erosion, improve fertility and increase economic return for wheat-based cropping. Project sites are a loess plateau region in eastern Gansu Province and areas in southern Australia. The project targets two regions in Gansu - Dingxi with 400 mm annual rainfall and colder winters, permitting only spring wheat growing, and further east Xifeng, with 560 mm rainfall and warmer winters allowing growth of winter wheat. There are four objectives: to develop conservation tillage systems based on crop residue retention; to integrate legumes including lucerne and fallow replacement legumes such as soybean and mung bean into the wheat rotations; to adapt the existing simulation model (APSIM) to Gansu conditions and cropping systems to permit extrapolation of results in time and space; and to build up Gansu (Gansu Agricultural University, Gansu Grassland Ecological Research Institute) research capacity. The project also plans to promote the improved cropping methods amongst extension workers and farmers.

Pakistan: Conjunctive water management for sustainable irrigated agriculture in South Asia

Commenced July 1998; estimated completion June 2002

Conjunctive water management refers to the management of waters from all sources within a water basin and leads to an increase in the amount of available water. At the present time, South Asia does not have the capacity to carry out effective conjunctive management. This project aims to identify and test combinations of technologies, institutions and management tools to conjunctively manage surface and subsurface water. The project's objectives are to maximise short, medium and long term agricultural productivity of water, facilitate water savings and ensure environmental sustainability of irrigated areas in South Asia.

Colombia, Indonesia, Kenya, Philippines, Vietnam, Zimbabwe: Integrated nutrient management in tropical cropping systems - Improved capabilities in modelling and recommendations

Commenced July 1999; estimated completion June 2002

Farmers in the tropics rely to a large extent on organic inputs and biological processes for managing soil fertility yet organics are not part of fertiliser recommendations. Because of the variable, but predictable, effect of organics on nutrient availability, links with models are essential. Another major gap in soil fertility recommendations for the tropics is that of phosphorus management. Soil phosphorus dynamics and indicators of phosphorus availability are complex yet no crop or ecosystems model has adequately captured phosphorus dynamics for estimating crop (or ecosystem) production. The objective of this project is to use data from a range of sites in the tropics to test and improve the capability of the Agricultural Production

Systems Simulator (APSIM) to predict the decomposition of various organic inputs, the dynamics of N and P in soil and crop yields (including P deficient situations). The project will be implemented through the Combating Nutrient Depletion Theme of the Soil, Water and Nutrient Management Consortium (SWNM) of the CGIAR.

India: Drill modification for rice-wheat with straw retention

Commenced June 2001; estimated completion May 2002

The objective of this small project is to develop and test in India conventional modifications to the Pantnagar drill and to the bed former cum drill which permit zero till seeding of rice into wheat residue and of wheat into rice residue, the former implement for flat seedbeds and the latter for raised bed conditions. It is proposed to develop within 12 months a locally-produced systems that works satisfactorily, so that at the least field plot work testing of the effect of residue retention can commence and innovative farmers can be attracted to begin trials. This implies drill operation in up to 6 t/ha of evenly distributed crop residue, whether anchored, or loose and chopped. The outputs will comprise design plans for the machinery modifications, and at least two prototype drills, one for the flat and one for raised beds.

Glossary

ACIAR	Australian Centre for International Agricultural Research
AFFA	Department of Agriculture Fisheries and Forestry - Australia
ANZLIC	Australian & New Zealand Land Information Council
AusAID	Australian Agency for International Development
COAG	Council of Australian Governments
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Landcare	Landcare is a Federal Government initiative, first introduced in 1990 as a community-based grants scheme to assist landholders to improve land management activities. In 1997, the Program model was adopted to develop a diverse range of programs, utilising funding available from the Natural Heritage Trust.
NGO	Non Government Organisation
NHT or the Trust	The Natural Heritage Trust
NRMMC	Natural Resource Management Ministerial Council

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Related Agency Websites

Australian Centre for International Agricultural Research
http://www.aciar.gov.au/

Department of Agriculture, Fisheries and Forestry (AFFA)
http://www.affa.gov.au/

The Australian Agency for International Development (AusAID)
http://www.ausaid.gov.au/

Commonwealth Scientific and Industrial Research Organisation (CSIRO)
http://www.csiro.au/

Department of Foreign Affairs and Trade (DFAT)
http://www.dfat.gov.au/

Department of the Environment and Heritage (Environment Australia)
http://www.ea.gov.au/

Environmental Resources Information Network (ERIN)
http://www.ea.gov.au/sdd/erin/index.html

Land and Water Australia (LWA) - formally Land and Water Resources Research and Development Corporation LWRRDC
http://www.lwa.gov.au/

National Action Plan for Salinity and Water Quality
http://www.affa.gov.au/content/output.cfm?ObjectID=6B1EDE3C-999C-4BC2-85851652470241EB

National Land and Water Resources Audit
http://www.nlwra.gov.au

Natural Heritage Trust (NHT)
http://www.nht.gov.au