



GOULBURN-MURRAY
WATER



**THE WINSTON CHURCHILL MEMORIAL TRUST OF
AUSTRALIA**

**STUDY OF INSTITUTIONAL AND MANAGEMENT
APPROACHES TO IRRIGATION LAND USE CHANGE**

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CHURCHILL FELLOW 2002

**THE WINSTON CHURCHILL MEMORIAL TRUST OF
AUSTRALIA**

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EXECUTIVE SUMMARY

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During 2003 I travelled to California, Washington DC and the Netherlands as a Churchill Fellow. My aim was to gain an improved understanding of issues affecting landscape change and initiatives, and programs supporting the change process.

Many busy people made time to meet with me and share experiences. Mr Mike Wade, Californian Farm Water Coalition, Sacramento and Ms Sharon Nance, Natural Resource Conservation Service, Fresno were very helpful in providing fellowship contacts and a sound understanding of Californian irrigation systems and rural communities. The staff at the UDSA and BOR, in particular Jack Frost and Robert Hickox enabled me to learn about their organisations and programs. Richard Davis at the World Bank and Willem Oosterberg, at the Ministry of Transport, Public Works and Water Management at Lelystad in the Netherlands assisted me greatly with information and contacts.

The Australian experience of setting a catchment context in which to manage landscape change, is robust and sound. In fact, our catchment approach is admired by many people I visited. Most areas visited are facing similar land use change pressures to those in the Murray Darling Basin.

There is no simple solution for communities managing landscape change. Each affected catchment community must develop its own approach to get the best long-term balance between social economic and environmental values.

Understanding demographic and social issues for future landscape change programs in Australia is a fundamental requirement for any change. In Australia, perhaps we rely too much on government agencies to lead capacity building and change. In contrast, US demographic information is actively managed and communicated at State and Local levels with meaningful input from Non Government Organisations (NGO).

We must also understand the functions of floodplains and necessary management changes required as is evident in the Netherlands. The Dutch agencies have undertaken programs to reinstate farmlands into floodplain areas and integrate these additions with existing wetlands to further enhance social and environmental (or nature) outcomes.

A critical pressure is the move towards free trade arrangements throughout the globe. In the Netherlands, water quality is heavily regulated. Only low impact operations will be part of the future Dutch agricultural economy. In the US, agricultural enterprises are aligning themselves with niche product needs and quality requirements demanded by large urban populations and importing countries.

These findings will be incorporated into current and future land use change planning programs throughout the MDBC. Presentations will be given to the MDBC, G-MW, Catchment Management Authorities and the Kerang Swan Hill Land Use Change Project Team.

ACKNOWLEDGMENTS

I have received significant support to prepare for and undertake this fellowship opportunity.

Firstly let me thank those people who acted as referees for me in the initial application process.

For the opportunity to be selected and the financial support received for my fellowship and to the many people who contribute to the management and operation of the Trust I extend my appreciation and thanks.

I am also most grateful to the Goulburn Murray Water Staff who encouraged and assisted with my application preparation and with the many organisational aspects before my departure in June 2003.

To all those who assisted me in the US and the Netherlands, I am extremely appreciative and I will extend to them every support should they choose to visit Australia. I acknowledge the exceptional support offered by Mike Wade, Californian Farm Water Coalition, Sharon Nance, Natural Resource Conservation Service, Richard Davis, World Bank, Willem Oosterberg, Ministry of Transport, Public Works and Water Management and Robert Hickox, Bureau of Reclamation, Washington DC.

Finally and most importantly I have to thank my wife and family for their support and management of all issues on the home front for the fifteen weeks I was away.

BACKGROUND

Australian irrigation landscapes are most productive in terms of food and fibre production. These landscapes also contain significant infrastructure that stores and distributes irrigation water allocations. Water storages also support many important environmental and recreational values.

Increasingly the decline of river flows, drainage impacts on river water quality and ageing irrigation and floodplain infrastructure has focussed attention on how future irrigation areas could be redesigned or reconfigured as an alternative to a 'business as usual' case.

Other pressures for change include; a declining terms of trade for irrigation businesses, the increasing number of people seeking lifestyle options in those rural areas with valuable amenity features, the increasing age profile of irrigation farmers and the lesser importance of irrigated agriculture being a future career choice for young people.

In Northern Victoria, the Kerang Swan Hill Pilot Future Land Use Project commenced the planning phase in 2000 to address change pressures in a sub regional context. The development stage of the project has raised a number of complex environmental, floodplain and irrigation management issues.

1 INTRODUCTION

The Churchill fellowship provided an opportunity to see first hand and better understand irrigation land use change experiences in other countries. In addition the fellowship provided a once in a lifetime opportunity to exchange water and catchment management related experiences with community and agency staff in California (Central Valley Area), Washington DC and the Netherlands. This report outlines the findings of my fellowship study for the period June to August 2003.

I have structured the report around issues arising from the places and organisations visited. Many are relevant to irrigation areas in the Murray Darling Basin.

The experience of meeting many people from such a broad cross section of land and water management means that this report does not reflect everything I gained from the Churchill experience. Perhaps the key issue is that upon my return to Australia I am now much wiser than before I left.

Clearly the experience and contacts made has provided me broad base on which to consider and support future irrigation land use change initiatives in Australia.

The places and organisations visited are listed below. Some visits were extremely brief; others involved significant interactions and/or field trips with a range of contacts.

California Farm Water Coalition
Northern California Water Association
Agricultural Water Management Council
Central Valley Irrigation Districts
Yuba County Water Agency
Natomas Mutual Water Company
Western Canal Water District
Central California Irrigation District
Friant Water Users Authority
Westlands Water
Stamoules Produce Company
John Deiner (Farmer at Five Points)
Congressional Hearing, Tulare
Natural Resource Conservation Service, Fresno
Senoma, Water Quality Control Board
The Bay-Delta Project, Antioch
University of California, Fresno
USDA Agricultural Research Centre, Beltsville
World Bank, Washington DC
United States Department of Agriculture (USDA), Washington DC
Bureau of Reclamation, Washington DC
Ministry of Transport, Public Works and Water Management, Lelystad, Netherlands
Wetlands International, Wageningen
Rotterdam
Nutrient Management Institute, Wageningen
Dutch Dairy Commodity Board, Zoetermeer
Kiwa Water Research, Nieuwegein
De Werribeen Park, Kalenberg

2 CALIFORNIA FARM WATER COALITION (CFWC)

The organisation's welcoming and hospitable executive officer, Mr Mike Wade provided me with a good overview of water industry related matters in California. I was invited to give a presentation to a CFWC meeting on 18th June 2003 with respect to water management in Australia and the Pilot Kerang Swan Hill Future Land Use Project.

The Central Valley area in California is a large 9.1 million acre irrigation region that produces an array of irrigation produce including pasture, horticultural products and rice. Some 20% of agricultural production is exported. Annual water deliveries (11.1 million acre feet, average) are supplied via some 40 Federal and State managed storages and dams. Total water usage is divided as follows; agriculture 43%, urban 11% and environmental 46%. Some 4.0 million acre feet is delivered annually to Metropolitan and urban communities

Based in Sacramento the Californian Farm Water Coalition was formed in 1989 in the midst of a seven year drought. The initial organisational focus was on urban hardship as many communities were directly impacted upon with significantly reduced water supplies. As a non profit group, with membership from most Californian water contractors (or districts), the organisational role is to increase public awareness of the irrigation industry's efficient irrigation practices, promote the industry's environmental management function and publicise how agricultural water use benefits all Californians.

The CFWC has produced a variety of publications, roadside signs on major highways and buses and multi media tools to educate and inform the public about agricultural water issues. The CFWC had developed a web site specifically targeted at engaging primary school children about the industry. The organisation's key slogan was 'food grows where water flows'.

The organisation's staff strongly supported the value of water to rural communities where irrigation underpins 40% of jobs in the valley. Another key issue was that the irrigation industry has been maintaining its stance to have more water storages built, as contracted or agreed deliveries to irrigators have been reduced in recent times in response to environmental flow requirements in key wetlands and estuaries.

3 NORTHERN CALIFORNIA WATER ASSOCIATION

The Northern California Water Association (NCWA) was formed to promote the economic, social and environmental viability of Northern California by enhancing and preserving the water -rights and supplies of its members ie irrigation districts. They maintain that they have embarked on an integrated water management program with stakeholders. A key element of the integrated program is the long term commitment to enhance fish passage and other ecosystem improvements throughout the Sacramento Valley. The group has facilitated the development of successful funding submissions to attract investigation and construction funds to enable water contractors to implement more 'fish friendly' enhancements in irrigation areas including flow variations to address

temperature criteria , fish screens on diversion off takes, placement of gravel into streams to affect improved salmon spawning, removal of regulating weirs on streams to allow unimpeded fish passage are elements of their program. The organisations work has also included the amalgamation of individual irrigation diversion pumps into a single unit with fish screens.

The organisation appears to be very effective and successful. It has formed a sound technical base with respect to fish management and has established important working partnerships between irrigation contractors, government agencies and key environmental groups.

4 AGRICULTURAL WATER MANAGEMENT COUNCIL

The agricultural water Management Council is a voluntary non-profit organisation attempting to bring together all interests in agricultural water management. The organisation was established as a requirement of a State law for the Department of Water Resources to establish a committee to review and study potential efficient water management practices and to determine which practices were feasible for achieving water conservation or savings.

The council members have been sourced from State, Federal and local agencies, agricultural communities, the academic community, environmental and public interest groups. One key outcome sought from the council is to develop efficient water management plans (EWMPs) and to comment on plans completed by member organisations. It is expected that EWMPs will address the social economic and environmental impacts of all actions in a EWMP.

5 CENTRAL VALLEY IRRIGATION DISTRICTS

5.1 Yuba County Water Agency

The Yuba County Water Agency operates a number of key water storages north of Sacramento. The agency has both flood management and hydro electricity generation responsibilities. The flood management responsibility is a key management issue as devastating floods in 1950 and again in 1955 inflicted considerable damage to local communities. Flood levee banks surrounding the town of Marysville stand some 35feet above urban street levels.

In average years, flows passing down the Yuba River are about 2.4 million acre feet. Of the harvested water 28% is diverted for irrigation and electricity generation purposes and the remaining 72% is utilised for in-stream environmental purposes. Agreements with local, state and federal agencies determine what volumes are to be released for beneficial irrigation and domestic consumption purposes and the volume to be retained in the rivers natural channel.

However released volumes are increasingly being diverted from the downstream San Francisco Bay Delta Area and to other State projects or to delta water users. These extraction levels are fundamental issues being addressed in the CALFED project (see later).

In times of irrigation water shortage, the Yuba County Water Agency facilitated the transferring of a district's surplus irrigation water to other districts with supply shortages.

Water releases are also managed to influence water temperatures. Multi height dam outlet configurations deliver cool water temperatures in the autumn season to enhance successful spawning of chinook salmon. In the spring period water is drawn from the outlets closer to the storage surface to increase water temperatures to optimise growth and rearing conditions for salmon.

It did not appear that renewals costs were being charged to the county irrigators and that infrastructure replacement will be dependent on a reallocation of Federal, State and County funds.

The agency is finding it difficult to meet expectations of all customers. Irrigation water use extraction demands are competing with alternative storage and release patterns required to influence the in-stream conditions required by salmon.

5.2 Natomas Mutual Water Company

This district/contractor is located on the immediate outskirts of Sacramento. The district supplies irrigation water supplies to large flood irrigated areas of rice and lucence.

A key issue with this water district was its close proximity to the City of Sacramento. Expansion of urban housing development is occurring at an exceptional pace as many people are now choosing to live in the city areas close to available health, and other community support services. It is expected that a significant conversion of the district lands will result into urban expansion.

A key finding at this time of the fellowship was that rights to water are held by the district; not the landholders as is the case in Australia.

In the short term, as urban expansion occurs, the water volumes used on individual holdings prior to housing redevelopment will be made available to the district to increase security and supply to the remaining irrigators. In the longer term this process is likely to increase water supply costs to remaining district irrigators.

The district does not appear to be developing a land use strategy or infrastructure investment contingency plans even as the urban development is rapidly encroaching onto irrigation holdings.

5.3 Western Canal Water District

In this water district some 40 miles north of Sacramento, rice is the predominant irrigated enterprise. The district has long term contractual water supply arrangements with the Bureau of Reclamation. The district has management arrangements established to trade water to other contracting districts including municipal water authorities in times of system water shortage. The sale price reflects the income foregone by irrigators plus a handling charge and is undertaken on a year by year basis.

Two irrigation farmers I met highlighted the increasing pressures on irrigation water supplies and felt that their economic returns from rice and alfalfa enterprises combined with their associated water usage costs would increasingly reduce farm viability as crop production subsidies were gradually removed.

It was interesting to note that on some irrigation farms, labour is sourced from regional towns to undertake irrigation tasks and other farm work. However the price paid for labour appears to be very low and many farm labourers live at or below the recognised poverty line. It was also apparent that a significant source of farm labour was supplied by illegal immigrants from Mexico.

The Western Canal District had recently undertaken a large infrastructure replacement project where district and external funding was utilised to remove a large instream diversion weir and replace it with a siphon to facilitate the migration of salmon from the Bay Delta Area to upstream spawning grounds.

5.4 Friant Water Users Authority

Largely developed in the 1940's at a cost of \$180 Million, the Friant Division delivers Central Valley Project Water to more than 1 million acres of irrigable farmlands on the east side of the southern San Joaquin Valley. To make the Friant system possible the US Bureau of Reclamation purchased historic water rights from holders below the Friant Dam and reached agreement to deliver a base flow of 5 cubic feet per second to maintain riparian rights to downstream users. Some 28 irrigation districts, water districts and cities are now provided water from the Friant Division.

In years of surplus water supply transfer of water supply has continued between districts so that aquifers in some districts can be recharged. In periods of drought the receiving districts reduce their demand on the Friant Division's surface supplies and pump from the recharged aquifer systems.

The first 800,000 acre feet of available supply from the San Joaquin River and the Millerton Dam, referred to as Class 1 supply, is accessible by districts that don't have groundwater supply options. Class 2 water supplies only become available when it becomes clear that Class 1 supplies can be met. Districts with Class 2 contracts incur supply deficiencies more frequently and often revert to groundwater supplies to meet their irrigation supply needs.

The federal government ie US Bureau of Reclamation originally funded the capital costs of the Friant Dam. Capital costs are returned to the US Bureau of Reclamation ie Government. These costs are collected via County property ratings as are system operating and maintenance costs. No recuperation applies to interest on the original capital provided; an issue constantly defended by locals that indicate that the entire system has a return to the broader economy and to the national treasury by generating an annual agricultural production of more than \$1.3 billion.

The long and protracted debate about lessening water availability and the changed importance of environment has pushed water management to the top of important issues in this region.

A congressional hearing attended at Tulare, included many public demands for more dams and increased water supply security. At the formal part of the hearing witnesses spoke on key water issues and how their group or organisation would expect government to solve the water crises. Some three hundred farmers (and strangely not many other stakeholders) attended the hearing.

US Congress members at the event, mostly representatives from California, were strongly in favour of strengthening irrigation based communities. The key point in their deliberations not understood by many attendees, was that strengthening did not mean building more dams but rather reconfiguring landscapes, improved water use efficiency and greater awareness of what improved environments could do for regional economies and communities. Unfortunately many farmers went home believing that their Congress Members would 'win the day' for an expanded irrigation system.

5.5 Westlands Water

The Westlands water district includes an area of more than 564,000 irrigated acres. The district farmers produced some \$900M worth of food and fibre commodities generating some \$2.7 billion of farm related economic activity for the Fresno and Kings counties with a combined population of 50,000 people.

Large parts of the west side of the district are affected by salinity and inadequate drainage problems which were recognised prior to water supplies being allocated to the district. At the time of signing up irrigation supply agreements with the US Bureau of Reclamation, the provision of drainage services was clearly to be included as an integral component of the irrigation supply agreement.

Construction of drainage systems commenced in 1968. By 1975, concerns with construction costs and possible environmental concerns led to a suspension of the drainage construction program. Further environmental concerns, ie selenium toxicity impacts on birdlife at the mid drain disposal facility ie Kesterton Reservoir, led to the closure of the drainage system in 1986. Drainage services have been non existent since that time.

Options to manage the 250,000 acre area with and without drainage have been investigated and include an option to retire the affected area from irrigation.

Lack of drainage is not the only resource management pressure on Westlands farmers. Reduced water deliveries have resulted in the district receiving only 50% of their contract volume in recent times. In addition the shortage of surface supplies has resulted in incremental groundwater extractions such that aquifers have become over exploited and farmers face an increasing reliance on any available and expensive transfer water from other irrigation contractors or districts.

Westlands now considers that over the long run, less reliable and more expensive water will reduce farm incomes, limit cropping choices and erode land values. In addition to impacts on district farmers the retirement proposal would affect several urban communities that depend on the district's agricultural economy.

Recognising that land retirement could have far reaching implications, detailed economic analyses have been undertaken of future management options including the land retirement option. Key aspects of the draft reconstruction proposal include:

- The US government purchasing 200,000 acres and thus removing them from the irrigation system
- The purchased lands would be managed by Westlands as nature reserves or for some other beneficial use.
- The district would receive a new and more secure water supply contract ie 805,000 acre feet (compared to the current 1.15M acre feet contract, which is being eroded through increased water being held for environmental purposes)
- The US government would be relieved of its original contract obligation to provide drainage services to the affected land.

Some 15,000 acres of land had already been retired under a demonstration project funded by the Bureau of Reclamation. The retirement programs has given rise to Westlands engaging a community outreach coordinator to work with affected communities to improve the way of life for many residents whose livelihoods is based on the viability of farming in the Westlands district.

Irrigation farm water costs vary between \$38.69 to \$116.27 (US) per acre foot, depending on the volumes of higher cost water transferred into the region. Water transfers into the Westlands district from other upstream districts is primarily sourced from rice farmers who had chosen to fallow land due to poor market conditions.

Land fallowing is a commonly adopted strategy that reflects the availability of water supplies in any given season. In the Westlands district over the past ten years, declining supply availability has resulted in an average area of 150,000 acres being laid fallow. In an extreme drought in 1991/92 the area of fallow land peaked at 350,000 acres.

The trend of lessening water resource availability (some say regulatory droughts) coupled with increasing salinity of landscapes has driven the need to improve water use efficiency and to manage farm drainage tailwater on-farm.

6 STAMOULES PRODUCE COMPANY

This large (9500 acre) commercial farm was primarily dedicated to vegetable production. The farm is located in the Westlands Water Irrigation District. Low water supply availability and a shallow saline watertables (20 inches below natural surface) has driven a major development into sub-surface irrigation.

The operation engages some 430 staff full time and many casual staff for peak workloads. Salary costs alone were estimated to be \$1.6M per week for the peak workload periods.

A key feature of the enterprise was the installation (total area 9500 acres) of a fully automatic sub-surface irrigation system that was fully managed via the internet. The installation cost of \$1100 per acre was fully recouped in one years operation as significant water savings were achieved against the furrow irrigation methods previously employed, an introduced double cropping regime and expansion of areas cropped with the water saved. In addition significantly improved product quality was achieved via the improved irrigation management. The irrigation system is also used to apply crop fertiliser requirements.

Each 'paddock' (150 acres) is irrigated with a 1.5 acre feet irrigation application. Previous furrow irrigation applications used some 2.5 acre feet per application. Crops are planted on 80 inch wide beds, two dripper lines are buried 13 inches deep on each bed and are located 15 inches from the sides of the bed.

Crops grown include 600 acres of bell peppers, 3500 acres of cantaloupes, 3500 acres of sweet corn and broccoli and 1000 acres of honeydews. In total with double cropping about 12,500 acres are irrigated each year. Produce is packed, iced and loaded on to road transports at the farm and then distributed to domestic and export terminals.

Pump stations, designed and constructed to irrigate between 300 and 700 acres, have been carefully planned such that the components at each pump station are interchangeable to enhance the efficient management of replacement parts and maintenance programs.

Following two consecutive years of operation groundwater levels had fallen to 5 feet below natural surface.

7 JOHN DEINER

The lack of surface drainage in the Westlands District has encouraged farmers to investigate alternative methods to improve water application efficiency. At Five Points landowner John Deiner had developed a 'serial concentration' approach for drainage water. The method involves firstly improving flood irrigation efficiency on established cotton and alfalfa crops, collecting all surface drainage and reapplying the drainage water to more salt tolerant crops serviced with tile drains. The tile drainage water is collected and again applied to more highly salt tolerant crops. Collected tile drainage water from this third application is delivered to evaporative disposal facilities constructed on the farm.

As the drainage water contains selenium the operations of the disposal basins have been part of a research and development program to investigate disposal methodologies. A key issue to be assessed is how to enhance evaporation rates in a manner that does not attract bird life that would be otherwise affected by the selenium.

The research program, at the early stages of development, has incorporated fine mist sprays and disposal ponds filled with rock. The rocks absorb heat from the sun, enhance evaporation rates and limit the attraction of the site to local fauna. The more concentrated saline product is bled off and stored as dry matter. The research is also evaluating the refinement of final products and marketing opportunities.

8 NATURAL RESOURCE CONSERVATION SERVICE, FRESNO

Nationally US farming employment levels have dropped from 8 million to 3 million in the past four decades and the number of farms has declined by more than 50%. Today less than 10% of the US rural population live on farms. Many farm operations are supported by off farm income from employment at regional metro areas where the largest share of rural jobs and employment growth comes from the services sector that offers employment to over half of all rural workers.

The loss of US farm employment is attributed to successful improvements in technology, crop science and farm management. It was common to hear of the exit of young people leaving rural communities to seek improved education and employment prospects in metropolitan areas.

Rural economies in California have changed with respect to their dependence on family farming activities as the primary generator of rural income. It appears that the future well being of affected rural communities will now depend heavily upon the availability and quality of jobs in the rural services and manufacturing industries and the entrepreneurial opportunities in those sectors.

It was interesting to note how information on rural communities in the US is openly available on the internet including age profiles, government services, local industries, distances to education services, recreation opportunities etc. In addition USDA publications are readily available on national demographic trends including 'Understanding Rural America'.

Use of information on enterprise type coupled with age profiles etc appears to have enabled some specific targeting of NRCS programs. In some areas the development of wetland and environmental development grants were specifically targeted landholders who had chosen to remain on their properties more as a result of lifestyle reasons. These people were receptive to establishing lease agreements to protect the long-term environmental values represented on their farm. The US grants program funded the works and made payments to the landholders for income foregone as a consequence of not using the protected land for agricultural purposes. The grants were an important income source for these farmers, many of which operated enterprises where income returned was below production cost.

There appears however no silver bullet to turn around overall rural prosperity however land use change is inevitable in California. Agency programs are concentrating on building community capacity in those areas that provide business services. This approach allows the potential for off farm income support to manage enterprise change from solely dependent on agriculture based incomes. Programs are also providing less emphasis for those support programs attempting to build agricultural productivity on every farm enterprise. This appears to offer a sensible first step management approaches to land use change.

9 SAN FRANCISCO BAY DELTA AREA

The Sacramento-San Joaquin floodplain delta is a large area (approx. 1000 sq miles) where the two rivers meet prior to discharging to the San Francisco Bay. Approximately 50% of the State's annual surface run-off flows through the Delta that is characterised by a large number of islands and marshes. Large volumes of water are pumped from the upstream part of the Delta to supply farms and cities in the central and southern parts of California and the San Francisco area.

The delta soils are highly productive and irrigated agriculture is well established and supported with the flat landscape, mild climate and abundant water supplies. The bay's environment also supports key fish populations and is the entry point where salmon and steelhead trout commence their migrations upstream to spawn.

Conflict of interests between many stakeholders has led to the establishment of a Bay Delta Management Authority. Large funding programs (\$8.7 billion) designed to address the needs of the environment, urban water and agriculture has offered ideas on how to increase water storage and conservation, improve water quality and restore ecosystem functions. Some 20 million Californians rely to some extent on delta supplies. Drinking

water quality is a major issue and there are now also serious concerns that delta's rich organic soils are releasing suspected human carcinogens into the water system.

The program supports water conservation, water transfers, recycling and habitat restoration projects and improvements to the 1100 miles of unstable delta levee systems that are susceptible to erosion, seepage, earthquakes and land subsidence.

Strangely the organisational arrangements for this project view the delta area as a single entity and insufficient regard has been given to a catchment or watershed management approach.

Perhaps the most significant development has been the withholding of some 400,000 acre feet in average rainfall years to improve water quality standards. In low rainfall years the volume of stored water to be withheld, increases to 1.1 million acre feet. The volumes withheld affect downstream water users including irrigators who see their contracted supply arrangements being eroded and the subsequent economic burdens being placed on rural communities. If additional water is required to achieve Bay-Delta outcomes then presumably the Federal Government will buy supplies from willing sellers albeit a system not well developed and surrounded in suspicion that has developed previously where water trade adversely impacted on rural communities.

10 USDA, WASHINGTON, DC

Is the Federal Government Agency that sets national policy agendas for food and agriculture and provides funding support to State Governments to implement programs with respect to regional development and natural resource management in counties across the US. A key program of the USDA is the Natural Resource Conservation Service. This program is the vehicle through which program outputs are delivered across States and Counties.

Staff at the USDA outlined a number of development issues from a national perspective impacting on the future direction of agriculture and agricultural land across the US. These included:

- Plant technology has given rise to increased yields of corn and wheat
- The highest yields were found on commercial farms
- Production levels of ten major commodities now dramatically exceed internal consumption needs
- Better understanding required of key emerging markets of 'Middle Classes' in China, India and Indonesia
- Trade agreements seen as fundamental to increase agricultural exports
- High value agricultural products now represent more than 50% of total agricultural exports
- Paddock to plate contracts now 65% of total internal pork trade...open markets are on a rapid decline as companies seek improved food safety outcomes.

- Away from home food spending doubled since 1970
- Food as a share of disposable income has halved in the past five decades
- Commercial farms are small in number (6% of total farm numbers), own less than 29% of the land, but produce 68% of the agricultural output.
- Rural resident and intermediate farms occupy 71% of the land. Many intermediate farm businesses do not cover agricultural production costs and disposal income is above the national average as a consequence of off farm income.

With respect to rural communities, the USDA acknowledges that over the past thirty years the contribution of farm earnings in non metro counties has substantially declined. The development challenges are wide ranging and require specific approaches to be implemented recognising, that good paying jobs, access to critical services and a sustainable natural environment are key to a prosperous future. Emerging environmental challenges included water management, energy consumption, climate change, soil management, landscapes for wildlife and urban/rural interface management.

As matching the needs of a consumer driven food system with program support is extremely complex with a vast diversity of farm type, farm production capacities, scores of different commodities and countless varieties of products and services, support USDA programs are developing specific support mechanisms for each type of farm.

- Commercial Farm programs were investigating market expansion, risk management and improved conservation options.
- Intermediate Farm programs were investigating concepts to strengthen competitiveness, risk management and land stewardship.
- Rural Residence farm programs were investigating conservation and environmental programs

The USDA also supports community development as a fundamental step to improve community well being. Programs are established in each county with community involvement in developing their own specific regional development strategy or investment plan. The program recognises that development priorities in each county will be different and plans could include capacity building, health, housing, infrastructure, natural resource management programs and education programs. A range of investors, including government agencies (State and Federal), Universities, private industry groups and private individuals may choose to invest in development strategies.

Frequently included elements in regional development programs are wetland management programs. Resources (grant funds) are allocated to landholders to protect wetland areas on private land. The grant funds are used to implement initial rehabilitation works and establish lease agreements with individual landholders. The USDA and State Governments provide the landholder with lease payments or income foregone as a result of not cropping the wetland area. A significant component of allocated funds are directed to smaller non-viable agricultural farms and thus provide an income stream for the participating landholders.

1 1 WORLD BANK, WASHINGTON DC

This institute is primarily focussed on the development and delivery of poverty reduction projects for undeveloped third world countries.

With respect to water management the bank has recently reviewed its approach to support and investment protocols and has subsequently adopted a far greater requirement for client countries to address institutional requirements as a condition of water management investments. To a large extent their approach follows many of the catchment based institutional arrangements already established in Australia.

The banks professional staff (some 10,000 in Washington DC) have strong capacity with respect to many areas of catchment and water management. They have produced an array of technical and institutional reports that would be of value to Australian professionals and institutes involved in water management activities.

It is interesting to contemplate, that on the basis that this organisation is dealing with partner countries with less developed or established institution arrangements than those established in Australia, they are well positioned to offer some new principled approaches to redesigning rural landscapes and irrigation development.

The key message here was that with respect to water investment programs, the integration of environmental management issues has to be part of any investment package and that water systems need to be supported with strong institutional systems that encouraged and deliver meaningful agency and community input.

The development work undertaken by the Bank with respect to developing and managing environmental services would greatly assist with land use change developments in Australia.

1 2 BUREAU OF RECLAMATION, WASHINGTON DC

The Bureau of Reclamation (BOR) is a department of the larger Department of the Interior and has the leading role to address water management issues across the US.

BOR staff were extremely interested in land and water developments in Australia and were quick to point out that the standard of water management in Australia is very high on world standards. A key initiative with staff and discussed with me at the time of my visit was associated with the Water 2025 initiative.

Water 2025 is intended to focus attention on the issues of water management resulting from the explosive population growth in western states including California. Security of supplies for urban areas and the need to better manage water for the environment, recreational purposes, and irrigation for the production of food and fibre from farms for domestic and export production.

There is a reality that water allocations will in the near future be inadequate to meet these demands and that major conflict between these demands will erupt if nothing is done. The potential for conflict over water supplies is no longer defined by drought events; shortages will be presented in normal rainfall years. The BOR works with the States and Local Governments and expects these groups to undertake a leading role in meeting water challenges.

The 2025 strategy is built around a framework with six principles to guide resolution of the water problems. The strategy introduction highlights five realities that will drive the current water crisis and it proposes four key tools to assist future management of water supplies. Whilst the strategy addresses the water management issues for the entire US its application is specifically targeted at water management on the Colorado River where diversions to the southern part of the State of California are currently being stretched to the limit.

13 NETHERLANDS

The Netherlands is a small densely populated country (16 million people, 47,000 km²) located on the delta of three major European Rivers- Rhine, Meuse and the Scheldt. Its delta location has brought economic success to both the agricultural and secondary industry sectors. The delta location does however present significant flood plain management issues as regional development has continued.

The country is heavily reliant on dikes, levees and coastal dunes to prevent flooding from the sea and the river systems. Over 30% of the land area is below sea level.

The previous management action to continually strengthen flood plain protection works is being now questioned. Climate change is resulting in sea levels higher sea levels and alternative floodplain management options are being developed where land previously protected from flood events is now shared as an integral component of floodplain landuse.

In the past rivers were channelled between levee banks, reclaimed land was drained and large areas urbanised. These actions have led to land subsidence as the impacts of ponded water and rainfall are no longer sufficiently maintained to avoid soil shrinkage.

The Government is seeking to develop more integrated management of all water management functions including water for: drinking, irrigation, heating and cooling, fisheries, recreation, transport and ecology needs.

The land area consists of 17% water, 58% agriculture, 14% urban development and 11% nature reserves and woodlands.

13.1 Ministry of Transport, Public Works and Water Management

This organisation is a large multi functional group that coordinates all aspects of water and transport management for the Dutch Government. The organisation has well respected water and land management professions who participate on a range of projects. It was noted that staff knowledge and capability (engineering, wetland management and resource economics) are used across the globe with water management projects.

The organisation led the development of a total catchment planning framework for the Rhine River Basin in 2000. Staff were therefore most interested in catchment management developments in Australia and were supportive of continuing communications and possible staff exchanges to develop industry skills.

Mr Willem Oostenberg was a key contact in this organisation and his support was invaluable in securing contacts for me with respect to water quality, floodplains and the environment.

The key elements of the integrated catchment approach and relevant to Australia revolve around flood protection, river management and water quality.

13.2 Flood Protection

In 1995 thousands of people had to be evacuated when the Rhine River almost burst it's flood levees. The impacts of such an event would have incurred significant economic and social damage. With climate change impacts and faster runoff occurring in the upper basin it has become clear that more flood plain room has to be found. Urban developments will no longer be permitted on the floodplain and river systems will be allowed to respond to season conditions. A key action to enable this outcome has been the development of strategic flood pondage areas and the purchasing of rural land for the purpose of widening flood plains for flood storage and increased capacity to pass flood flows.

13.3 River Management

The overriding element of this catchment approach is the development and of an international agreement to implement measures to protect water quality in the North Sea. The European Union has now issued several directives designed to reduce industrial emissions and urban waste water impacts, set water quality standards and establish an operational framework for the management of waters in all member states.

13.4 Water Quality

The Rhine River provides drinking water for a large population base. Quantities sourced from the Rhine have not been seen as a concern in the past. However the integrated

catchment strategy is confronting this issue as new substances produced and consumed will eventually find their way into the river basin environment. Particular attention is now focussed on nutrient management from animal intensive enterprises.

13.5 Nutrient Management Institute, Wageningen

The Nutrient Management Institute NMI is an independent institute for research in the field of nutrient flows in rural areas. The research projects undertaken are primarily aimed at development of new knowledge and methods concerning the improvement of nutrient management in agriculture. Application of new knowledge in the agricultural practice is an important part of many of their research projects. The organisation has a research experience of almost sixty years and special expertise lies in academic research, applied research, extension and consultancy services.

The Dutch government is undertaking a proactive stance to minimise the impacts of animal effluent and nutrients (minerals) on surface and groundwater supplies. The intensive animal industry operators are now required by law be registered and keep detailed records of all nitrogen and phosphate inputs to their farm. The difference between inputs and outputs reflects the farms the mineral surplus. Fines or penalties are imposed where mineral losses exceed established targets for both phosphate and nitrogen.

The management approach has resulted in effluent being transported and applied to less intensive agricultural farms so that nutrient balances are achieved. The nutrient targets and policy development has been underpinned and influenced by a European Nitrate Directive and is now applicable in all EU member States.

13.6 De Werribeen Park, Kalenberg

The importance of nature or the environment to the Dutch people is very significant. Wherever and whenever possible they actively seek to support and enjoy non-urban environments with frequent visits for education and recreation purposes.

NGO organisations are known to have in excess of 250,000 members in the Netherlands and they invest significant efforts to maintain high environmental management standards. An interesting point to note was industry investments supporting ongoing operation and maintenance programs in key nature reserves.

My visit to De Werribeen Park at Kalenberg was a beneficial experience. The facility attracts some 1.4 million visitors every year to participate in passive recreation activities, all forms of boating and sailing and educational programs. The park is operated with 17 staff and it receives financial support from Banrock Station (South Australia) for many environmental enhancement projects. A fully established information centre and tea rooms are a key part of the infrastructure establish on the complex.

The park is an integral component of catchment planning. River floodplain areas have been purchased from farmers to add to the environmental value of the existing wetlands and to provide additional pondage areas to minimise overtopping of flood levee banks in periods of high river flows.

A long term plan has identified the additional land to be connected to the floodplain area. Future land purchases will complete the connecting of two large parks with important wetland environments.

A noticeable issue with the De Werribeen Park is that the park is managed in a manner that encourages visitors to attend and participate in one or more activities. In addition the park engages many semi retired people to undertake education and tour guide roles for tourists and school groups.

14 CONCLUSIONS

Sustainable catchment management is the desired outcome of landscape change projects both in Australia, the USA and the Netherlands. However catchment management planning frameworks is not well developed in the Netherlands and is practically not existent in California. Water management impacts resulting from new demands in reconfigured irrigation areas will impact on both upstream and down stream river environments and as such will require a holistic planning approach at the catchment scale.

Developing a catchment vision is an absolute necessity as a precursor to beneficial change. Securing stakeholder commitment to the vision and an integrated implementation program are also critical development elements. The Dutch Government had developed an excellent vision for the Rhine River Basin.

The process to change landscapes is a journey. It is of paramount importance to involve all stakeholders in the process to avoid surprises and insurmountable obstructions to communities impacted upon by the change. Increasingly local governments need to be involved early in the visioning development stages and it must undertake a leading role from the outset as many supporting programs to assist change are undertaken by local government organisations. Local government is well positioned to facilitate economic development and planning controls for land use and development. Unfortunately I did not experience any situations where local government undertook this leadership role.

Plan preparation outlining the 'journey for change' and the tasks to be undertaken are of critical importance. Too often the planning work is rushed, ill conceived and not understood by stakeholders. In worst case scenarios plans are not developed. Another critical planning process is the engagement of affected stakeholders and appreciating that it can take considerable time depending on the capacity of affected communities to be engaged with key issues and management options.

At all places visited there is growing recognition of the importance of the environment. However single issue environmental support groups have created significant frustration with agencies attempting to lead planning processes. There is now increased environmental awareness within larger urban populations. This group is becoming exceptionally strong in a political sense and their influence will increase in future.

Clearly efforts to engage these people are essential. Whist confronted with a difficult task, the process has now commenced in the USA and increasingly the awareness of critical linkages between urban and rural community resource usage is being developed and better understood. An encouraging aspect of this development is the sharing of 'change' program investigations with environmental NGOs.

Clearly all areas visited were impacted upon with water shortages. Irrigators as major consumers of water were frequently targeted as those who needed to be 'towed in'. In some areas polluters were targeted for improved management practices.

However more importantly there is growing recognition that future irrigators and dryland farmers will be adjusting to higher environmental standards to maintain enterprise viability.

The future for irrigators and farm productivity generally is promising. There were many examples of highly productive, low environmental impact, agricultural enterprises that would ably compete in the global export arena. In addition many enterprises were rapidly moving into efficient water application systems and seeking increased labour and professional staff to manage farm operations.

Floodplain requirements will increasingly mount a case to adjust intensive farming out of those areas with low flood protection security. There are good economic and social reasons to progress this concept in Australia. The environmental benefits could deliver promising outcomes, as improvement to floodplain health would support the further development of healthier river systems and reduce levee bank operation and maintenance costs.

Landscape change planning is fundamentally about stakeholders agreeing on a future position for land use at a sub region or basin scale. The most important issue to manage in the process are the affected communities ie the people and their businesses. In the US demographic data is well managed and is a most useful planning tool. It provides a very useful insight to the capacity of landholders to undertake change within specific farming landscapes. The targeting of grants to different scale farm operations has delivered some outstanding results especially with respect to wetland and riparian enhancement programs.

The fellowship opportunity highlighted the sound performance of catchment and water management in Australia. However increased opportunities to exchange professional expertise would assist in developing respective organisational capabilities.

The experience and lessons learnt from the fellowship will be integrated into future programs of the North Central Catchment Authority and into the current planning stage of the Kerang Swan Hill Future Land Use Project. In addition my findings will be presented to agency based natural resource management staff and farming communities in Northern Victoria.

15 RECOMMENDATIONS

The Kerang-Swan Hill Pilot Future Land Use Project is being undertaken to assist with the development of planning and development approaches to land use change in the Murray Darling Basin Catchment. The pilot study area contains large irrigation areas and associated ageing irrigation supply infrastructure, recreation lakes, floodplains of both the Murray and Loddon Rivers, internationally recognised Ramsar wetlands, and salt disposal facilities that protect water quality in the River Murray.

The project planning phase is currently well under way with a stakeholder based community working group currently considering the 'do nothing' or 'business as usual' case. The project development is expected to support the development future land use change programs in other irrigation and dryland farming areas of the basin.

The optimal way for me to support the development of land use change programs in Australia will be to continue to work directly with stakeholders on the pilot project in developing and implementing a reconfigured irrigation landscape for the study area. In addition fellowship contacts made overseas now have access to the planning documentation supporting the pilot project.

Additional benefits to the planning of future land use change programs would be the development of a study to compile demographic information on rural communities. The development of a common business and natural resource based information system which is shared between agency groups to enhance land use planning decisions would also be a most beneficial investment. A key output of these systems would be an ability to overlay different information in a spacial format that is more readily understood by community members and agency staff.