Irrigation Management Transfer in the Murrumbidgee Region of New South Wales, Australia

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SUMMARY

IRRIGATION MANAGEMENT IN the Murrumbidgee Region of Australia is currently being transferred from the New South Wales Government to community-based management boards. An overview of the Murrumbidgee Region, the reasons for the government's decision to transfer the management of the region to community-based boards, the organizational structure which is facilitating the process of management transfer, and the management options preferred by the two irrigation areas within the region are presented in this paper.

INTRODUCTION

The Murrumbidgee Region of New South Wales (NSW) is the largest irrigation area in Australia. Hall et al. (1994) valued the gross margin of agricultural production in the region at approximately AUD 135 m (US$97.2 m).[4] Agricultural issues other than supply of irrigation water are generally addressed by commodity-based cooperative societies within the region. Irrigation management of the region has been the responsibility of the NSW Department of Water Resources and its predecessors. It is currently being transferred to community-based management boards. In this paper, we will present an overview of the Murrumbidgee Region, the reasons for the NSW Government's decision to transfer management to community-based boards, the organizational structure which is facilitating the process of management transfer, and the management options preferred by the two irrigation areas within the region.

OVERVIEW OF THE REGION

General

The Murrumbidgee Region is divided into two irrigation areas, namely, the Coleambally Irrigation Area (CIA) and the Murrumbidgee Irrigation Area (MIA). Settlement in the MIA occurred intermittently from 1912 to 1960, whilst the CIA, first settled in 1960, is the newest irrigation area in NSW.

The MIA is 483,882 hectares (ha) and the CIA is 79,161 ha in size. The MIA is subdivided into Yanco Irrigation Area, Mirrool Irrigation Area, Benerembah Irrigation District, Tabbita Irrigation District and Wah Wah Irrigation District (Figure 1). The Irrigation Areas are provided with adequate surface drainage infrastructure, and have access to relatively good quality (< 0.2 dS/m salinity) water for irrigation. Surface drainage structures are currently being constructed in some Irrigation Districts. Some drainage waters from Irrigation Areas are used for irrigation in the Irrigation Districts. Out of the total 563,000 ha within the Murrumbidgee Region, only 136,000 ha are irrigated (Table 1). Most of the irrigated lands are within the CIA, Yanco Irrigation Area, Mirrool Irrigation Area and Benerembah Irrigation District.

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[4]AUD = US$0.72.

Figure 1. Location of the irrigation areas within the Murrumbidgee Region.

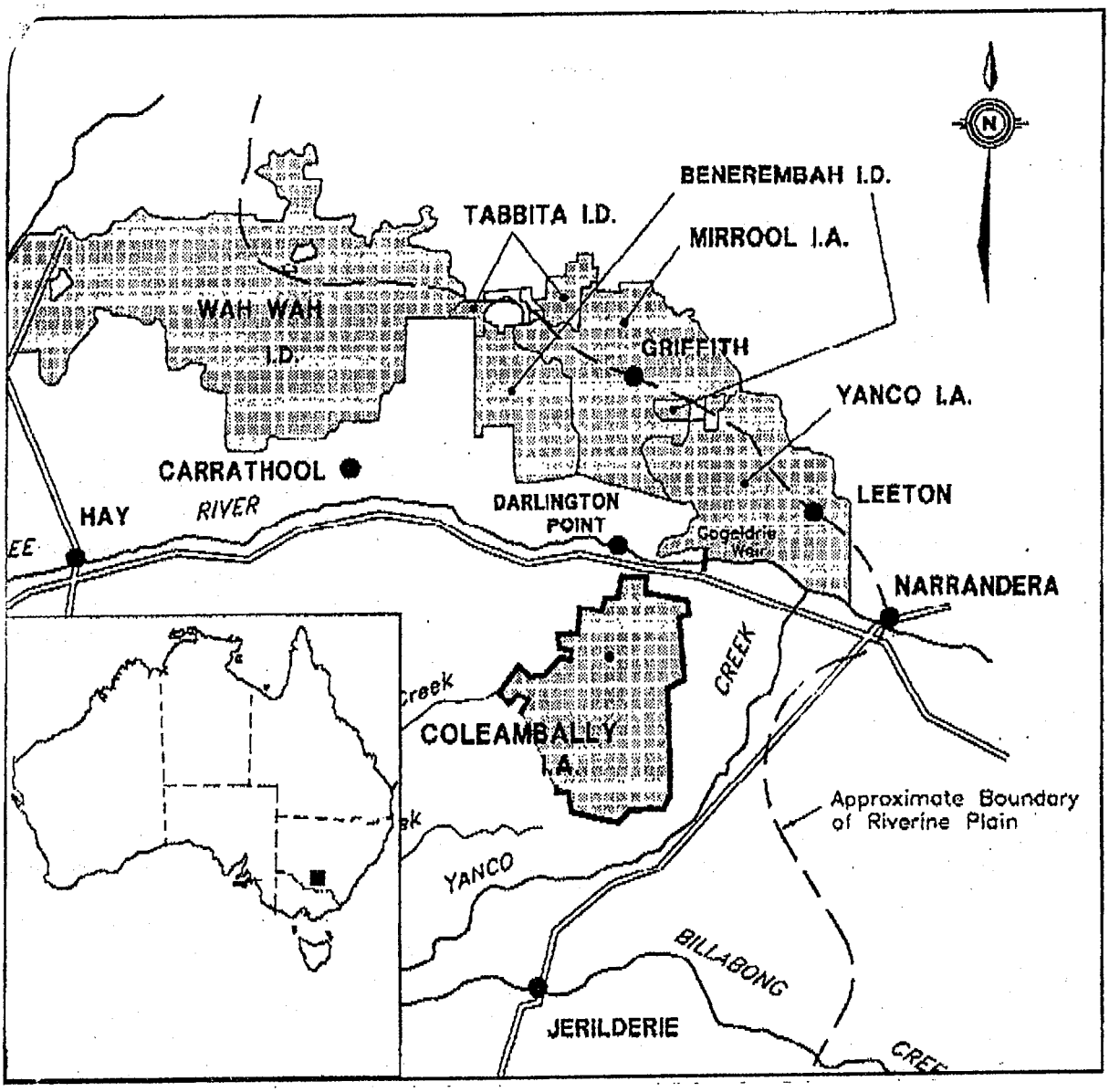


Table 1: Land use within the Murrumbidgee Region (Data after GHD 1999).

	No of farms	Total Area (ha)	Irrigated Area (ha)	Water Delivered (Ml)	Lucerne, Pasture & Fodder (ha)	Oil Seed (ha)	Rice (ha)	Other Grains (ha)	Vegetables (ha)	Vines (ha)	Citrus (ha)	Fallow & Misc. (ha)
Coleambally	332	79,161	41,901	492,313	16,506	1,309	19,077	3,264	224	41	6	1,474
Mirrool	1,881	74,849	27,900	351,452	7,295	249	8,920	2,180	1,765	3,064	3,957	461
Yanco	982	88,760	31,594	328,421	10,890	440	13,299	2,241	1,090	353	2,083	1,198
Benerembah	135	44,332	19,134	195,500	8,046	515	7,255	1,642	1,182	136		358
Tabbita	21	12,912	3,262	26,181	2,423	114	401	244	14			66
Wah Wah	143	261,640	11,511	99,029	7,484	278	1,890	1,053	170		1	635
Total	3,494	561,684	135,302	1,492,896	52,644	2,905	50,842	10,624	4,445	3,594	6,047	4,192

Climate

The climate in the Murrumbidgee Region is semi arid. Average annual rainfall and potential evaporation are 390 mm and 1,700 mm respectively. The annual rainfall has varied between 155 mm in 1902 and 693 mm in 1956. Although the rainfall distribution is generally considered to be uniform, it varies considerably (Figure 2). Please note that monthly median rainfall is lower than the monthly mean rainfall. This indicates that in general the rainfall is low, but in wet months the monthly rainfall is substantially high. The difference between the monthly mean and the median rainfall is less in winter months. Potential evaporative demand varies during the year reflecting the seasons (Figure 3).

Water Supply

Water for irrigation, domestic and stock purposes within the Murrumbidgee Region is supplied from storage dams at Burrinjuck (1,026 Gigalitres [Gl]) and Blowering (1,628 Gl). The dams are approximately 400 kilometers (km) from the region. Annual water use within the region has increased from 300 Gl to 1,500 Gl since 1968. This is due to a 370 percent increase in rice production and 21 percent increase in horticulture (citrus and vines). Out of the total diversion, one third is diverted into the CIA from Gogeldrie weir, and the remainder is diverted into the MIA from Gogeldrie and Berembed weirs (Table 1).

Water Distribution

Water is distributed to farms through a network of earthen or concrete lined channels by a team of channel attendants reporting to channel superintendents. The replacement value of irrigation infrastructure in 1993 was AUD 380 m (US$274 m). The main canal within the MIA is 155 km long, and there are 2,350 km of channels conveying water from the main canal to farm boundaries. The total length of drainage channels within the MIA is approximately 750 km. The CIA has 460 km of supply channels and 760 km of drainage channels. The manager of water supply coordinates the bulk supply needs of irrigators with the requirements of other river water users, and the operation of dams and weirs. The distribution network in the MIA is transmitting flows in excess of its design capacity. For example, the main canal has a design capacity of 4,500 megaliters (Ml) per day, but has peaked at 6,400 Ml per day. This level of operation leaves little free board or surge capacity to accommodate changes in supply or demand and substantially reduces the life of the channels. The capacity of channels is not an issue within the CIA.

Gutteridge Haskins and Davey (GHD 1989) reported that the maintenance of irrigation infrastructures has not been kept at the levels required for long-term efficient operation of the irrigation areas. The following have contributed to this situation:

1. Inadequate forward planning and funding.

2. Application of available funds to low priority areas.

3. Unsuitability of plant and equipment.

4. Inefficient work practices of maintenance staff.

With respect to water distribution, GHD (1989) reported that,

1. The level of service provided by the channel attendants is rated high by the irrigators.

2. A large percentage of the irrigators currently operate control structures with the permission of their channel attendants.

3. Most irrigators would consider an element of user maintenance and operation.

Farm Types and Size of Holdings

There are two types of farms within the Murrumbidgee Region, namely large-area farms and horticultural farms. The number of farms within the MIA and CIA are 3,278 and 333 respectively. The farms in the CIA include 311 large-area farms and 22 horticultural farms. The farms in the MIA include approximately 900 horticultural farms. Most of the horticultural farms within the MIA are found within the Yanco and Mirrool irrigation areas. Over 75 percent of the water

Figure 2. Monthly rainfall data (mm).

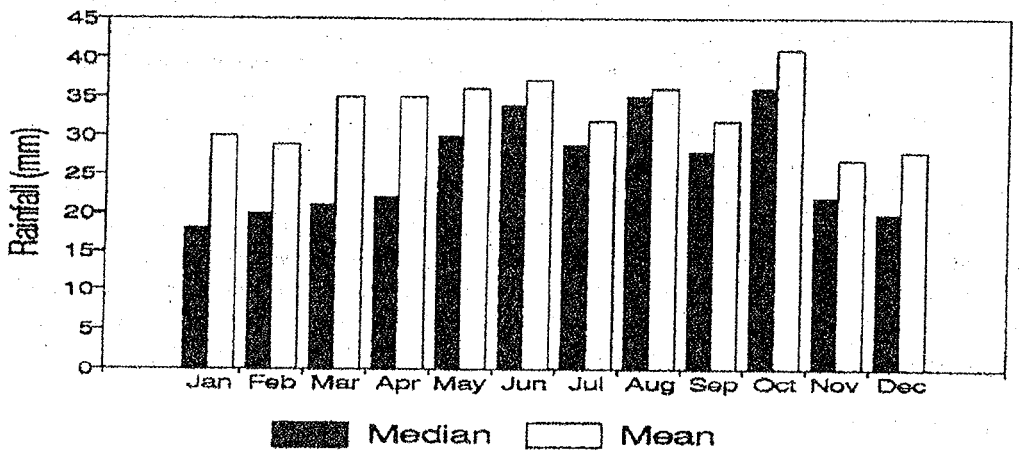
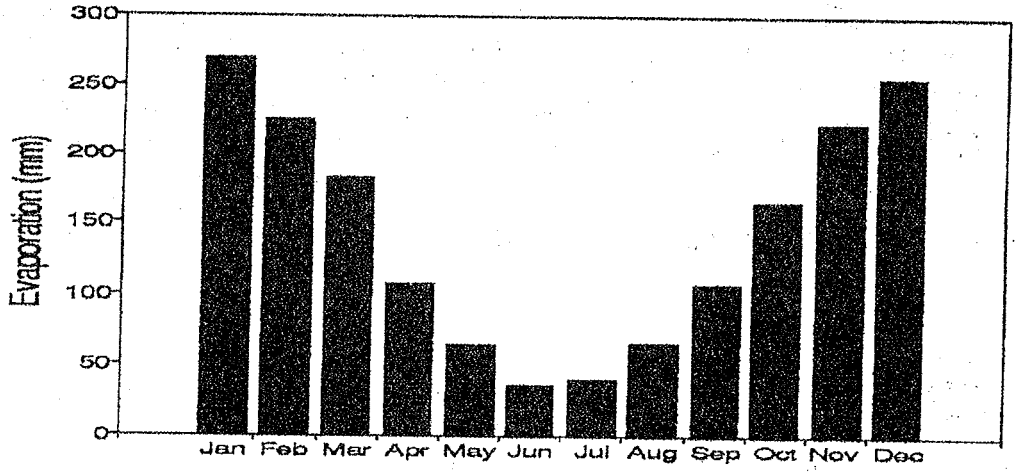


Figure 3. Monthly potential evaporation demand (mm).



diverted into the CIA is used for rice growing. In contrast, farming activities within the MIA are varied. Approximately 90 percent of the water diverted into the MIA is used by the large-area farms. Types of enterprise vary considerably between irrigation areas (see Table 1).

The horticultural farms are small in size (average size is 20 ha) and have "high security" water supply (water is delivered to the farms within 24 hours of ordering). In the MIA, this involves higher work loads for the channel attendants, higher costs and higher distribution inefficiencies via channel escapes and seepage from channels. Many of the horticultural farms are laser levelled and most are surface irrigated. Recently a number of these farms are adopting pressurized irrigation systems. Most of the horticultural farms are tile drained. Tile drainage from these farms is transferred into a regional drainage network.

The average size of a large-area farm is approximately 250 ha. However, the size of farms in the Wah Wah and Tabbita irrigation districts is much larger. Original on-farm development of large-area farms mainly employed contour irrigation taking advantage of natural topography. Although these farms do not have "high security" water supply, many properties can access water on demand. Rice and pasture are the major crops on these farms. Since the introduction of laser technology, most large-area farms are laser levelled, and the new layouts are suited for rice as well as alternative crops. Surface drainage from these farms is allowed to enter the regional drainage network.

Farm Water Allocation and Availability

Water allocation per farm within the region, is based on a volumetric scheme based on the size of the farm. Accordingly large-area farms less than 120 ha in size are allocated 6 Ml per ha. Farms greater than 120 ha, but less than 180 ha in size are allocated 720 Ml for the first 120 ha and 10 Ml per ha for additional ha. Farms greater than 180 ha, but less than 340 ha in size are allocated 1,320 Ml for the first 180 ha and 2 Ml per ha for additional ha. Additional allocation is not provided for farms greater than 340 ha in size. Greater allocations (12 Ml per ha) are provided to horticultural farms to meet specific needs of permanent horticultural planting and smaller intensively irrigated farms. In 75 percent of years, supplies in excess of allocation are normally available, while in 65 percent of years, irrigators can expect 120 percent of allocation for irrigation. "Off allocation" supplies resulting from excess water availability following rainfall are also expected to be available in some years.

Water Ordering

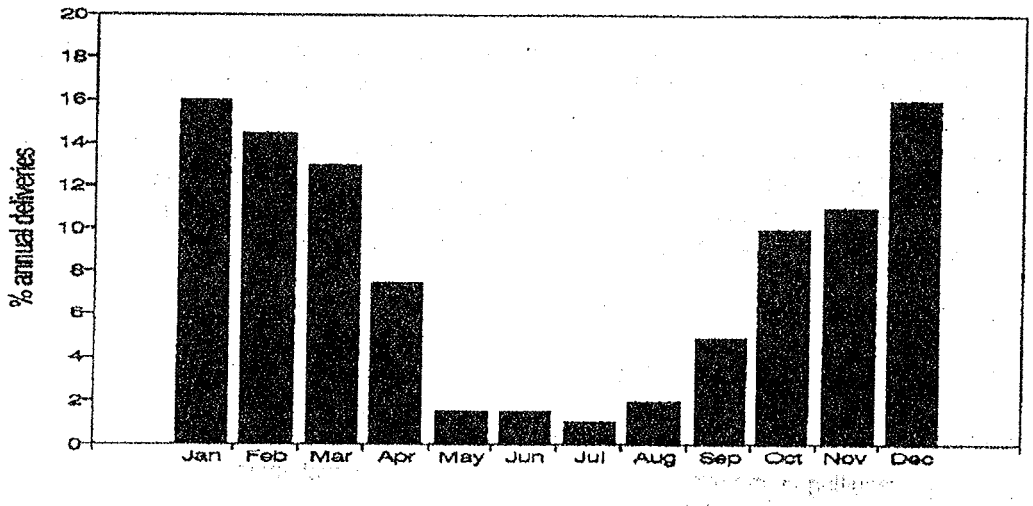
In the MIA, the current practice is to submit a *water order card* detailing the outlet number, crop to be watered, starting and finishing dates and the quantity of water required. In the CIA, this information is obtained through a telephone ordering system. Usually the irrigators order water only a day ahead of the required day. However, travel times for the water from the dams to the diversion weirs ranges between 6 and 9 days. This necessitates the NSW DWR to order water six-to-nine days ahead. This water may be *rejected* by the irrigators if it rains (Beck, pers. communication). Rain rejection is a major form of inefficiency within the Murrumbidgee Region. This could be avoided if better water ordering systems and minor on-farm storage ponds were adopted. Irrigation water deliveries in the Murrumbidgee Region by month are presented in Figure 4 (Data after GHD 1989).

Water Pricing

Historically irrigators paid low prices for irrigation water within the Murrumbidgee Region (Madden 1994). In 1989, the government introduced a new irrigation water pricing policy. Irrigators now pay up to 70 percent of the cost of delivering water from the weirs to the off-takes and 100 percent of water distribution and maintenance costs. Water delivery charges required to cover the running cost of the system and renewals of capital assets without making a return on the capital value of large-area farms and horticultural farms in the MIA are AUD 19.26 (US$13.87) and AUD 78.03 (US$56.18) per Ml. However, the current average charge for large-area farms and horticultural farms are AUD 12.57 (US$9.05) and AUD 25.36 (US$18.26), respectively (Hall et al. 1994).

The total cost of irrigation water for a farm in a season depends on fixed charges as well as variable charges. The fixed charges include an administration fee, a rice area monitoring fee (rice farms only), an entitlement fee, and an outlet fee. The fixed fee for large-area farms within the Murrumbidgee Region is approximately AUD 2,000 (US$1,440) per annum in 1994. The variable costs include water supply cost (depends on the total water supplied to the area), river delivery charge and an asset replacement levy. In wet years, the total water supplied is lower than a dry year. Therefore, the unit price of water per Ml is higher in a wet year than a dry year. For a large-area farm the variable cost per Ml is estimated to vary between AUD 9.38 (US$6.75) and AUD 12.75 (US$9.18) in the MIA, and AUD 9.90 (US$7.13) in the CIA in 1994 (NSW Agriculture 1994).

Figure 4. Monthly irrigation water deliveries.



The total water supplied affects the financial planning of the farm and the revenue of the irrigation area by affecting the price of water per Ml. Therefore, in 1990 a new pricing system was introduced. Accordingly, the total revenue required to maintain the infrastructure and deliver water to the farms is determined *a priori*. The actual price of water is determined at the end of the season, based on total water sales within the Irrigation Area and the total revenue required. Under this scheme, the total cost of water to the farmer will not usually vary from year to year, if usage moves in proportion to the water use of neighboring farmers. Separate pricing schemes have been devised for horticultural and large-area farms (Murrumbidgee Irrigation 1993).

IRRIGATION MANAGEMENT TRANSFER IN THE MURRUMBIDGEE REGION

The Murrumbidgee Region was established by the direct initiative and intervention of successive NSW governments and would not have proceeded in the current form without substantial underwriting by the government. The region reflects the past social policies of government seeking to decentralize and settle people after the two world wars and feed the major cities. Current government subsidies include matching of asset levy contributions (up to a cap), additional capital subsidies, and remission of contributions to the cost of head works.

In 1987, the government appointed an Advisory Board of irrigators to develop an understanding between the NSW DWR and the irrigators region. In 1988, the NSW Government made a commitment to "hand over after three years, reticulation systems within areas and districts to management boards, subject to agreement between the boards and the government, following vote of irrigators." In 1989, the Minister commissioned an inquiry into the NSW DWR management of all irrigation systems. Subsequently, the status of the Advisory Board was upgraded and now the board reports directly to the Minister. In 1993, the NSW Government made an in-principle decision to allow irrigators to take control of irrigation areas and districts.

Factors contributed to the government's decision were as follows:

1. The government was under pressure to maintain a responsible balance between expenditure and revenue. By transferring the management of irrigation areas and districts, the operating costs to the government would be moved to autonomous corporations.

2. Financial pressures and representation from irrigators for more commercial public sector management.

3. There are minor irrigation schemes in the northern and southern parts of the State of NSW, which are being operated successfully as private schemes.

It is anticipated that privatization and corporatization will result in the improved efficiency of government trading enterprises by providing opportunities for lowering the cost to the community while maintaining the present level of services, and/or, raising the level of services at the current cost.

Corporatization is defined as "to subject operations of government trading enterprises to market pressures (NSW DWR 1993), i.e., the establishment of clear objectives, strengthening managerial authority and responsibility, rigorous performance monitoring with appropriate rewards and sanctions and the creation of a position of competitive neutrality for government business."

Privatization relates to the transfer of government trading enterprises to the private sector irrigators who use the scheme (NSW DWR 1993). Thereafter it operates independently of direct government involvement. Therefore, under privatization not only does government control cease, but also does the government's annual contributions for works and subsidies. Specific advantages of privatization over corporatization include:

1. Release from the financial constraints which public ownership imposes.

2. Competition resulting in improved efficiency and lower prices to customers.

3. Greater incentive to ascertain the needs and performances of customers.

4. Ability to attract higher quality managers.

5. Greater access to private capital markets.

Facilitating Irrigation Management Transfer

Following the Cabinet's decision to proceed with the transfer, a steering committee was established. The committee oversees all issues associated with implementation of transfer. It is required to submit regular progress reports to the Government Trading Enterprises Reform Sub-Committee of the Cabinet. To assist the steering committee, six teams are established. They are as follows:

1. Irrigator Business Assessment Team.

2. Land and Water Management Assessment Team.

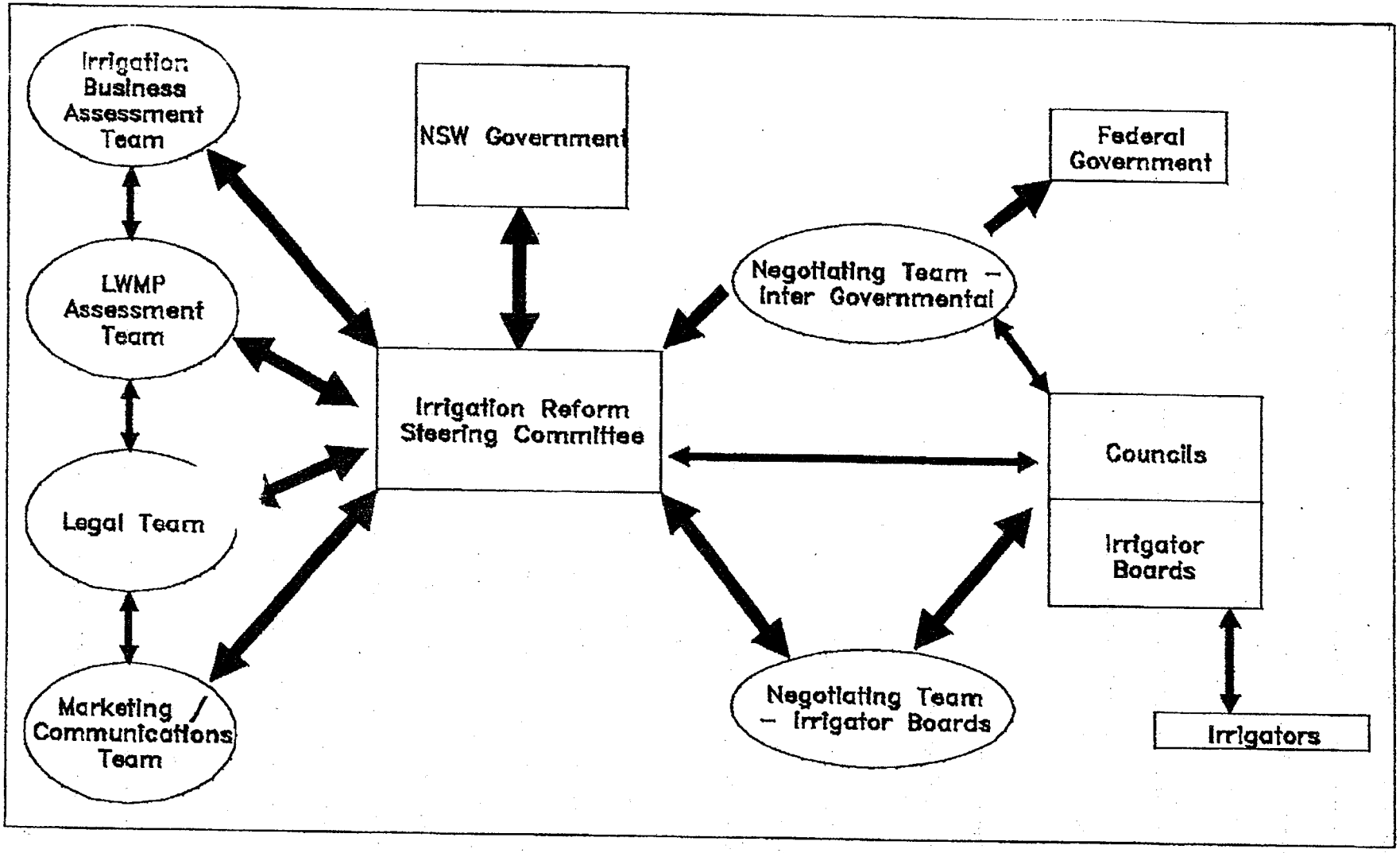
3. Legal Team.

4. Marketing and Communications Team.

5. Negotiating Team (Irrigator Boards).

6. Negotiating Team (Inter Governments--negotiations between the state and federal governments on tax and environmental issues).

The organizational flow chart of the above is presented in Figure 5. To take part in the process, the irrigator boards must submit a business plan to the government, which must indicate how the scheme will manage issues such as asset maintenance, environmental obligation, taxation, liabilities, protection of rights of individual irrigators and seasonal variations in water sales. Such plans are reviewed by the relevant teams. Schemes without sound prospects of viability will remain with the government and undergo further commercial reforms to prepare for later transition to irrigator ownership.


Irrigation Business Assessment Team
NSW Government
Federal Government
LWMP Assessment Team
Negotiating Team – Inter Governmental
Irrigation Reform Steering Committee
Councils
Legal Team
Irrigator Boards
Marketing / Communications Team
Negotiating Team – Irrigator Boards
Irrigators

Accountability and Performance Indicators

For the new autonomous boards, four corner stones of accountability are in place. They are:

1. A comprehensively specified operating licence, bulk water licence, and drainage licence.

2. A Land and Water Management Plan (L&WMP).

3. The memorandum of articles of association, which specify the relationship between the board and share holders.

4. Financial independence, contractual arrangements and published financial accounts.

The Irrigation boards will be adopting a number of financial, productivity and environmental performance indicators. Possible financial performance indicators for the boards are as follows:

1. Rate of return.

2. Local operating profit per Ml delivered and per customer.

3. Accumulated cash reserves.

4. Real distribution costs per Ml delivered and per customer.

5. Real maintenance costs per km of channel, per km of drain and per Ml delivered.

6. Real administration costs per customer.

7. Real operating costs per Ml delivered and per customer.

8. Ratio of contacting costs to total costs of maintenance and capital construction.

Possible productivity performance indicators for the boards are as follows:

1. Ml delivered per channel attendants and total staff.

2. Ml delivered per ha irrigated and per customer.

3. Number of orders per staff and per customer.

4. Percentage deliveries within 6 hours, 12 hours, 18 hours and 24 hours.

5. Percent deliveries delivered at specific flow rate.

6. Irrigation efficiency; ratio of water at off-take to water rates.

7. Outfalls as percentage of water purchased at off-take.

8. Outfalls as percentage of water sales to farms.

9. Days lost through accidents.

Possible environmental performance indicators for the boards are as follows:

1. Successful development and implementation of a L&WMP.

2. Irrigation efficiency.

3. Outfalls as percentage of water purchased at off-take.

4. Outfalls as percentage of water sales to farms.

5. Percentage of land with shallow water table below critical depth.

6. Percentage of land with soil salinity below critical depth.

7. Percentage of land with soil acidity.

8. Concentrations of pesticides and nutrients.

Corporatization of the MIA

The MIA is currently being "corporatized." This is due to greater complexity in terms of land uses, crop types, the differences in age and quality of the irrigation and drainage infrastructure and attitudinal differences between irrigators within the MIA. The gross value of production from Yanco and Mirrool irrigation areas in 1990/91 was AUD 221.6 m (US$159.55 m) (NSW Agriculture 1993). The corporatization process involves restructuring and re-orienting the MIA into a commercial business operating similarly to private sector organizations, but with the government as its sole share holder. A summary of the "Corporatization Project Plan" adopted by the MIA is presented below.

Program	Sub-program	Major Issues
Political consideration	Finances	
Business assets		
Business plan		
Management	Operations	
	Staff	
Licensing	Licensing	Bulk water
		Drainage
		Flood plains
		Land and Water Management Plan
		Wetlands
		Environmental Protection Agency
Consultation		
Implementation		

The final outcomes of finances, operational and licensing sub-programs will be included into the business plan.

Privatization of the CIA

The CIA is currently being "privatized." Primary reasons for privatization of the CIA are: the strength of business (in 1990/91 the gross value of production at farm-gate was AUD 57.9 m (US$41.69 m); small size; relatively new infrastructure; and "homogeneous" farming activities and farmer attitudes. The privatization of CIA has wide community support. Eighty-two percent of the irrigators preferred privatization over corporatization and 77 percent favored the creation of a Private Irrigation District. Eighty-five percent of them were aware that elections will be required for Management Board positions. The government would have normal regulatory functions. The work plan adopted by the NSW DWR for privatization in the CIA is presented below (Lewis 1992).

A. Assessment of existing situation:
Distribution system
Operational system
Financial situation
Economic review
Environmental report
DWR regulatory functions
DWR community service functions
Flood plain management
Preliminary licence conditions
Titles to land

B. Consultation with other interest groups:
Identify other interest groups
Arrangements for consultations
Carry out consultations

C. Assets and liabilities:
Outline boundary to consider
Listing of physical assets
Value of assets
Legal obligations
Bridges and culverts
Legal definition

D. DWR preferred arrangements:
Preferred organizational structure
Bulk supply licence conditions
Drainage licence conditions
Environmental controls
Hand over of financial arrangements
Arrangements for DWR staff
Economic assessment
Works on private property
Assets to be handed over
Operational arrangements
Use of infrastructure for other purposes

E. Government trading enterprises consultancy:
Liaise with government trading enterprises consultants
Review Government trading enterprises report

F. CIA Irrigation Management Board preferred arrangements:
Determine alternative options
Analysis and assessment
Prepare a business plan

G. Resolution:
Determine resolution process
Carry out resolution process
Minister's decision

H. Plebiscite:
Legal research
Arrangements for voting
Present case to land holders
Carry out plebiscite

I. Implement:
Implementation plans
DWR arrangements
Petition
Government arrangements
Advertise petition
Board of enquiry
Create provisional private irrigation district
Elect board of management
Advertise bulk licence application
Convene land board hearing
Land board hearing
Issue licence
Dissolve irrigation area
Arrange board of enquiry
Finalize arrangements for staff.

Success of Irrigation Management Transfer within the Murrumbidgee Region

The evolutionary process of management transfer within the region is presently in motion. The NSW DWR has a commitment to hand over the management of MIA and the CIA to Irrigation boards in 1995. The success of the boards will depend on a number of interrelated "competitive" and "process" factors (Anon 1993). The relationship between these factors are summarized in Table 2. It is too early to comment on how the irrigation boards will perform after irrigation management transfer.

Table 2. Relationship between "competitive" and "process" factors.

	"Competitive" factors			
		Customer service	Water prices	Water quality
"Process" factors	Efficiency of operation	X	X	X
	Infrastructure refurbishment and maintenance	X	X	X
	Staff performance	X	X	X
	Sustainable system operation	X	X	X
	Financial management	X	X	

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