



IRRIGATION IN CENTRAL OTAGO



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INTRODUCTION

In arid Central Otago the economic survival of many farmers, and much of the past prosperity and future development of the region is dependant upon irrigation. In many cases the irrigation races are the only source of water available to the irrigators. This contrasts markedly with most other areas of New Zealand where irrigation is provided to give only additional security to farmers.

There are 16 community irrigation schemes operating in Central Otago and the Alexandra Residency is responsible for the operation and upkeep of all of these schemes. (There are in addition to this, numerous small schemes operating either individually by farmers or small groups of farmers for which the Residency has no responsibility.) These schemes service approximately 950 irrigators through a network of races extending 1300 km which carry between 0.03 and 2.5 cumecs of flow. The area currently under irrigation is approximately 26,000 ha.

In addition to the 16 operating schemes the construction of the Maniototo Scheme is currently nearing completion, with water expected to be flowing by spring 1984, and the Earnscleugh and Manuherikia Schemes are currently under consideration for reconstruction.

Despite the real importance of irrigation to the social and economic structure of the whole region it would appear that for many years the management of irrigation in Central Otago has not been forthright or forward looking in the broad sense, and several conflicting factors have now grown to a stage where it is likely that a political dilemma in relation to irrigation will soon emerge.

It is the purpose of this brief report to attempt to outline these various factors and to recommend a course of action.

The appendices have been included to provide some background detail to the schemes, and to identify the reports prepared in recent years on the subject.

A BRIEF HISTORY OF IRRIGATION

The practice of irrigation in Central Otago commenced in the early goldmining days when miners found that they could grow good gardens using water from mining races. A Frenchman named Feraud is believed to be the first to use this water for farm irrigation about 1865 on his farm the 'Monte Cristo' near Clyde.

As the mining areas progressively became worked out many farmers purchased the mining rights and converted them to irrigation use, so that by the turn of the century all readily obtainable water was in use for irrigation.

Because considerable race construction had been done for mining these early mining races played a very important part in the prosperity of Central Otago, as they represented a capital development that could not have been faced by the farmers alone (for example, the Hawkdun Scheme is founded on the Mt Ida race which is 100 km long and was built by the Mines Department in the 1870's to carry water to the rich alluvial workings at Naseby.)

By the turn of the century it became obvious that there were many possibilities for irrigation that were beyond the capacity of individual farmers, or even small groups and so the Government commenced investigations and surveys for larger schemes within the region. In 1906 a survey was initiated in the Maniototo Valley followed by the Ida Valley and then the Manuherikia Valley, and this survey alone revealed that over a quarter of a million acres of land could be irrigated.

As a result of this study the first Government scheme was undertaken in Ida Valley in 1912 and was based on the provision of storage to hold the whole of the run-off from the Manorburn watershed. This scheme and the associated system serving the Galloway Flat required the construction of three new dams and to this day still remains one of the larger schemes in Otago. It was completed in 1917.

During the 1920's and 30's other communal schemes followed, many of which were also based on the purchase or acquisition of mining rights and races. The early schemes to be introduced by the Government comprise:

Scheme	Completion Date	Area Irrigated	Current No. of Irrigators
Ida Valley	1917	5,500 ha	52
Galloway	1920	1,100 ha	27
Manuherikia	1922	2,000 ha	200
Earnscleugh	1922	1,100 ha	87
Last Chance	1923	1,000 ha	42
Ardgour	1923	500 ha	10
Teviot	1924	1,400 ha	81
Tarras	1925	1,100 ha	19
Hawkdun	1929	3,600 ha	89
Arrow	1930	1,300 ha	76
Omakau	1936	5,800 ha	85

Only three schemes have been constructed since 1936, all in the Upper Clutha Valley, and they are more modern schemes and generally in much less difficult terrain than the earlier schemes. The three schemes are:

Pisa	1955	1,000 ha	14
Ripponvale	1956	500 ha	34
Hawea	1966	1,000 ha	20

FUNDING OF IRRIGATION

The early water agreements were based on irrigable area for each property and a charge levied per acre on this. The agreements were for varying periods up to 50 years and generally there was no provision for variation of these charges within the period of the agreement. It was the intention that these schemes should pay full operating expenses plus capital charges but this was achieved for only a brief period.

With the onset of the depression the Government scaled down the water charges in 1928 but made no provision for the return of normal charging at some later date, and by the mid 1940's most schemes were running at a loss. During the 1950's when many of the original agreements were renewed (generally for a period of 20 years) significant increases to water charges were introduced but again no provision was made to vary these charges within the period. The power was subsequently given to the Minister to vary water charges on an annual basis, but despite this facility it appears that only a token attempt has been made to effect true financial viability. From the early 1970's until recently the water charges had been subjected to annual increases of between 10 and 20%, and while for a time the overall financial position of the schemes improved slightly it has continued to be one of heavy government subsidy.

For example, Last Chance currently recovers only 14% of the operating costs, Hawkdun and Ardgour each recover only 15% of operating costs, and Ida Valley and Galloway recover 17% of costs. The total recovery for all Central Otago schemes for 1983/84 was only 22% of the full operating costs. See Appendix 2 for a summary of the financial status of all schemes.

A second area of concern is the level of funding for operations and maintenance. For many years the low level of funding has permitted only routine maintenance to be carried out on many of the schemes, and this has meant that major repairs to races, and the replacement of significant structures at the end of their economic life have not been carried out at the appropriate time. This has resulted in a situation where there is an accumulated backlog of deferred maintenance for significant items of work which will now involve the expenditure of large sums of money to rectify. However, despite the low funding level large sections of race in a number of schemes have been rebuilt over the last 10 years as part of a local policy to reduce operational costs.

As an example of the insufficient funding, for the 1983/84 year I submitted a detailed case for a maintenance allocation of \$2.45 m but was issued only \$1.77m, and for the 1984/85 year I requested \$2.37m and at the time of writing the indication has been that I may receive only \$1.4m.

From an inspection of our files it also appears that for many years no request has been made for this office to submit a considered case for the level of funds needed for maintenance, nor has one been submitted. In the past it was usual to expect the previous year's expenditure plus (say) 20% as the level of funding, although within the last few years there has been a significant cut-back in this trend, especially with the price freeze.

SHORTCOMINGS IN THE IRRIGATION SYSTEM

There are many deficiencies and irregularities in the Central Otago irrigation system and the following is a summary of the more important ones.

1. Lack of Storage

Most schemes suffer from a lack of storage for the excess winter and spring water which is needed to supplement the hot dry summers. As river flows reduce during the summer so does the supply of irrigation water to many schemes.

2. Long Head Races in Rugged Terrain

The arable pastures for most schemes are some distance from the reliable source of water, and this creates the situation of long and sometimes vulnerable life lines. The geology in Central has resulted in many of these headraces being constructed in rugged terrain where construction was difficult and access for adequate maintenance is now a significant constraint.

3. Many Races are Very Old

Many of the early schemes were based on converting mining races for use as irrigation, and they were built by manual labour to low engineering standards in comparison to current techniques. Constructed mostly of local materials these old races frequently incur excessive losses through leakage. (Only Pisa, (1955), Ripponvale (1956) and Hawea (1966) schemes have been built since 1935.)

4. Inadequate Design Standards

Many races were constructed to a standard appropriate for the time, but the demands by modern irrigators considerably exceed the ability of the existing systems to provide, both in terms of reliability and volume.

5. Major Structures in Poor State of Repair

Major structures are generally in a poor state of repair (eg intakes, pumps, pipelines, syphons) and they now constitute points of likely scheme failures in an unpredictable manner. Very large levels of expenditure would be required to overcome this problem. Through inadequate funding over a long period of time there has been a

progressive build-up of deferred maintenance on minor structures and some races and these also constitute possible failure points.

6. Efficiency of Water Use

Despite the fact that water is generally scarce in Central Otago the irrigators have failed to maximise the efficiency of its use.

Efficiency here is defined as the ratio of water retained in the plant root zone, to the total water supplied to the farmer's gate.

The efficiency of different application techniques differ considerably, and depend on such factors as soil type and porosity, design of the irrigation layout, reliability of structures or equipment, adequate or consistent water supply, and the conscientiousness of the irrigator. Typical efficiencies which may be obtained are: borderdyking 60-70%, spray systems 60-75%, corrugation 50-60%, contouring 40-60%, and wild flooding 10-50%.

Accurate areas under the different types of irrigation are not currently known, but are roughly assessed as: borderdyking 10%, spray systems 10%, and wild flooding 80%, and the overall water use efficiency probably less than 40%.

To improve the overall situation many farmers need to be weaned from wild flooding to more efficient techniques, a move which is likely to be widely resisted because of the high capital cost involved, but also many farmers are not convinced they are inefficient. The historically low price of water has also provided a disincentive for them to become more efficient.

7. Water Charges

There would appear to be no rationale in the way water charges are currently levied between schemes, with some schemes having programmed increase in charges over a number of years while other schemes have their charges reconsidered each year. Many schemes have numerous different water charges within the one scheme, and while these different rates may have been logical when they were introduced decades ago they have no relevance today, and they currently stand out as anomalies. (For example, Manuherikia has eight different rates.) This situation was the subject of the Engelbrecht Report (1980), and while this was an in-depth study involving many of the

irrigators nothing visible came of the report's recommendations, and no feedback has been given to the irrigators on the report's outcome.

Another aspect of the water charges that is most unsatisfactory is the notification to the irrigators of the levy for the irrigation season. The date that irrigators are notified of the current seasons water charges varies from year to year, and for 1980/81 it was November, but for 1981/82 it was not until July 1982 that Residency was advised of the schedule, nearly three months after the finish of the irrigation season. For the Hawea irrigators the situation is even more unsatisfactory. Following an instruction in July 1982 the charges for Hawea have been withheld, and accordingly the farmers have not been advised or levied for water received since September 1982.

This is most unbusinesslike, and has evoked consistent criticism from the irrigators. I believe irrigators should be advised of their water charge before the commencement of the irrigation season.

8. Financial Position of Schemes

This is probably the single most important factor effecting all Central Otago Schemes. The current water charges result in a recovery of only 22% of the cost of operating and maintaining the schemes, and there is generally considerable resistance by the irrigators to paying significantly more for the current level of service.

The current situation results in the dilemma of Government being reluctant to promote irrigation at the existing economic levels, and the irrigators being reluctant to pay more for the present schemes in their unsatisfactory state.

PRESENT SITUATION

Quite apart from the above shortcomings certain significant events relating to irrigation have occurred during the last two years which have brought about pronounced changes in attitude by the irrigators in Central Otago.

1. The long expected failure of the main race in the Manuherikia Scheme and the delay by the Minister in issuing the necessary maintenance funds.
2. The estimating and construction difficulties with the new Maniototo Scheme, and its subsequent truncation.
3. The recent Government policy for the funding of new irrigation schemes, and the implications of this for Central Otago.
4. The failure by the Department in the estimating of proposed Scheme upgradings (Manuherikia whole-of-the-valley, Earnscliffe, Waireiki/Kakanui.)
5. The proposed closure of the Arrow Scheme.
6. Commitments given by the MWD in recent years which, for a variety of reasons, have not been fulfilled. Also, many reports have been prepared by the Department on various aspects of irrigation and there has been active resistance within the Department to release these reports to the irrigators involved. Many of the recommendations from these reports have never been formally actioned, being neither implemented nor declined.

All these factors have contributed to the present situation whereby the subject of irrigation is a sensitive and volatile issue for the entire region.

Many irrigators are now questioning the time-honoured belief that irrigation water will always be provided by their gate, and at an advantageous price. Also most farmers have always looked to the Department for guidance and support on irrigation matters, but the recent disclosures and upheavals have, for many, shattered their confidence in the Ministry. For a few this has even turned to anger. For example, the Chairman of the Maniototo County Council has stated that the sooner the Ministry of Works and Development is removed from the Maniototo Scheme the better. For the Bannockburn area

the irrigators are becoming increasingly frustrated by the apparent hurdles that the Department finds which delay honouring the commitment given to them by the Minister for funds to improve their scheme. The Chairman of the Vincent County Council has also angrily criticised the Department on several occasions for not releasing to the irrigators information which vitally affects them, and he has likened us to the CIA.

It is clear that with these issues reverberating in the public arena the Department must have a clear and defined approach towards the older schemes so that we can give a positive and credible lead to the irrigators in the difficult times to come.

THE CURRENT DILEMMA

All of the factors so far outlined contribute to the emerging dilemma facing the future of irrigation in Central Otago. With many of the old schemes now having large structures in need of replacement, large sums of money will be required within this decade if supply is to be retained. Current water charges paid by the irrigators represent only a small fraction of the cost of operating and maintaining the schemes, which means that the Central Otago schemes are heavily subsidised by the Government. This is a situation which many of the irrigators have come to expect, but it is in conflict with the Government's stated intention that such schemes must largely pay for themselves, although successive Governments have failed to increase the level of water charges so that this objective could be realised.

There is much debate about the ability of pastoral farmers to pay for the cost of providing water, with typical figures of between \$30 and \$60 per hectare being advanced, but even the figure of \$60/ha may be less than the cost levied if the renewal of the Manuherikia headworks is to proceed. And the Manuherikia situation is not an isolated one. A major slip threatens the headrace of the Ardgour Scheme, and the possible cost in the order of \$300,000 to retain the scheme will have to be borne by only a handful of irrigators. In the case of the Arrow Scheme earth movements imperil the already critical state of the headworks and the level of expenditure likely to be required to secure long term supply may be in excess of \$4m, and it is difficult to see how the irrigators alone could support such expenditure.

Quite apart from the cost of providing water to farmers, there is also the question of the economic viability of the Central Otago pastoral farming, with the produce from these serviced farms not being in high demand in world trade. But the failure to maintain these existing pastoral irrigation schemes in Central Otago will have a profound affect on the social structure and economic development of the entire region.

Unlike other parts of New Zealand irrigation is a vital ingredient to many Central Otago farmers, and in numerous cases irrigation races are the only source of water available to the farmers. Over a period of many decades the whole social fabric of Central Otago has been woven around these Government funded irrigation schemes, and the withdrawal of this service would inevitably result in a dramatic decline in the profitability and type of

farming, aggregation of farms, loss of jobs and the migration of population from the areas affected.

Such a traumatic upheaval to the region is clearly most undesirable, and should not be permitted to happen unless there is no other viable alternative. While considerations such as these are purely the matters of Government, it is my concern that as advisors to Government we have all the relevant information relating to irrigation available so that the best possible advice can be given to Government. We are a long way from that position at the present time.

RECOMMENDATIONS

1. That the Otago Officials Committee be reconvened, and give urgent consideration to the question of irrigation.
2. That the MWD take immediate steps to assess the engineering integrity of all the Central Otago Schemes, and the costs of remedial works.
3. That a defined strategy for maintenance for these schemes be then promulgated.
4. That copies of all recent reports on irrigation be released to irrigators, and the outcome of the recommendations for each be clearly stated.
5. That major steps be taken to improve the way in which the Department liaises with local irrigators.
6. That measures be considered by which the MWD can regain its credibility in Otago.
7. That a rationalisation of water charges be undertaken, along the lines suggested (in part) by the Engelbrecht report.

Rod Carstens

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