Social and Economic Impacts Associated

with

Irrigated Land Use Change

by

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Summary

Irrigation creates social change. It can transform the land, be a critical asset in the development of economies, re-vitalise people and stabilise communities. The evolution of radical diversification of land production, and the subsequent emergence of different rural economies and changed social patterns following irrigation, are described with a model of three waves of ownership change. There are impacts on land use, ownership, work and paid labour, demography and community social structures. Rural towns can be reluctant to appreciate the potential irrigation offers, the changing demands and opportunities. Positioning is needed to capitalise on their hinterland's changed production base while managing the social change that will eventuate.

Key words

Irrigation, social change, land use, farm ownership, community

INTRODUCTION

Throughout the European settlement of New Zealand, water has played a crucial role as both an obstacle and a hazard, (death by drowning was known as the 'New Zealand death') and as a critical asset in the development of the nation's economy. Latterly irrigation was promoted and developed by central government as a means of stimulating primary exports and off setting the nation's balance of payments problem. The last of the central government sponsored irrigation schemes were offered back to their host communities for purchase in the mid- 1980's when government financial support was withdrawn. More recently farmer advocacy, agitation and capital have been responsible for setting up schemes. The genesis of these contemporary schemes can be found in the regularity with which perverse climatic conditions - successive droughts - have been experienced by primary producers, particularly along the east coast of New Zealand and more especially in the South Island.

It has long been accepted that the power of water managed through irrigation can transform the land. But according to Morton (1978) it is not so widely appreciated that "water can transmute a society as definitely and profoundly as it transforms the landscape". Citing historical examples from ancient to modern times, Morton describes the ability of irrigation to colour formerly drab landscapes, replacing dessication with growth; and to increase production, creating wealth and concentrating populations where commerce and community flourish. He argues that the increased production stimulated by irrigation is associated not only with the action of the water on the plants but "with the psychological effect, the sense of security, which the flow of water produces in the farmer's mind".

Nevertheless, several generations of New Zealand farmers viewed irrigation primarily as an 'insurance' against a perverse climate rather than a production management tool. It was not until sophisticated irrigation technology developed allowing spray and sprinkler systems that the full potential of water application came to be realised.

As the potential of irrigated land was recognised, at times heralding a dramatic land use change, so began an almost inevitable change in land ownership as traditional or ageing farmers moved out (McCrostie Little *et al.* 1998a:5) their place being taken by generally younger farmers who were prepared to respond to irrigation with new, if not 'radical' land practices. It was the rural hinterland therefore that first experienced the social dysfunction of communities in a state of change as generational families moved out and newcomers moved in. Rural settlements and small towns soon found that they too were not exempt from structural disruption and if they were not able to meet the needs of the newcomers they were by-passed.

This paper[1] traces the development of community irrigation schemes including the role of central and local government. Attitudes and adaptations for farm families are examined, as well as ownership changes. Community level changes associated with new land uses include changes in demographics and work, and also changes to the dynamics of rural communities. Rural areas need to be active in maximising the social benefits of irrigation.

In addition to the economic and social changes created through land use changes associated with the establishment of irrigation, large scale schemes cause environmental impacts. These impacts have their own critical, social consequences, for example, conflict over the use of water resources, or water pollution and infrastructure changes such as transport and roading associated with dairy production. The seriousness of these consequences is acknowledged but the breadth of this paper is insufficient to allow their inclusion at this instance.

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[1] This paper is based on research including community case studies and key informant interviews, undertaken as part of the FRST funded project "Resource Community Formation and Change" (Contracts TBA801 and TBAX0001), and a review, "Study of Regional Benefits of Water Enhancement in Canterbury - Social Impact of Irrigation", undertaken for Butcher Partners in 2001.

IRRIGATION - HISTORICAL EXPERIENCE

Early schemes

The pioneers and early colonists who sought a living from the land quickly learnt that climatic conditions in the antipodes were regularly 'extreme' and that drought was an almost 'normal' summer, and sometimes winter, condition. These first farmers distributed water along valley floors and over plains by a network of open water races. The water was for stock and frequently also for domestic use to supplement rain water storage tanks. Those water races survive today and some were still in domestic use into this century. At least two Canterbury irrigation schemes, the Amuri and the Waimakariri, were built on the network of these century old water races. Such networks were often well in place by the mid-1890's with several notable exceptions, like the Cust drain which was in operation in 1862 draining the Rangiora swamp.

Records show that by the turn of the twentieth century small irrigation schemes were being commissioned by the then public service, Works Department. In 1906 the Stewards scheme, on the Waitaki river, was set-up with water use rights available to the Waitaki County Council. Few knew how to operate the scheme effectively. Nor, at that time, was efficient irrigation technology available to realise the potential of the water (McCrostie Little *et al.* 1998:2).

Works schemes initiated by government during the 1930's Depression included irrigation projects. Evans and Cant (1976:58-59) argued that the strong Canterbury interest in irrigation at that time resulted from national and local circumstances. The major phase of land subdivision and the bonanza wheat boom had passed, soil fertility had been depleted in many Canterbury areas and the rate of growth in the province lagged behind that of northern regions.

But it was not until the 1950's that County Rural Water Schemes were developed widely (McCrostie Little *et al.* 1998b). These schemes were a partnership between central and local government and the land owners who provided machinery and labour on a formal `quid pro quo' basis - no participation, no water on your property. The schemes had a great impact on their host communities and there are anecdotal stories of the agricultural economy of many communities being 'saved' during drought as a result of them. There was clean house water and there was recreational water for public amenities, like school swimming baths. However, there was still too little accessible water to protect a region from prolonged drought.

At the same time, new technology advances in border dyke and spray irrigation prompted some groups to run what became 'experimental schemes'. In the Waitaki valley it was the North Otago Progress League with water taken from the Stewards scheme, in North Canterbury it was the Waireka scheme out of the Waiau river. Farmers appeared impressed with the results but not to the extent of initiating a rash of similar schemes. The matter of irrigation rested for a decade. In the 1960's central government policies of national development lead to their sponsorship of a number of schemes throughout the country. Irrigation was given a higher profile, irrigation was on the move.

Role of Central and Local Government

The focus on irrigation escalated during the 1970's when central government took up the advocacy and financial support of irrigation schemes and the on-farm dispersal and management of water. Irrigation was just one plank in a policy platform of agricultural support measures with the wider economic potential to offset the nation's balance of payments deficit. The government was looking for greater financial returns from agricultural exports.

Government transferred control of water management to local government; the guiding principle was that encouragement be given to communal schemes for individual properties if recommended by local government. At the same time the National Water and Soil Conservation Authority assumed responsibility for national policy, general supervision of administration and advice to Cabinet Ministers. Scheme approval wound a complex path through a series of governmental and quasi-government institutions. Each level was

required to assess the scheme against individual institutional criteria and only when approval had been given could the proposal move onto the next assessment. From the first feasibility study to construction took at least 10 years. In North Canterbury, for example, irrigation was first mooted in the 1950's (Hunt, 1998:5) but the Waiau scheme was not begun until the late 1970's. The full scheme was completed ten years later with the commissioning of the Balmoral development.

By the early 1980's, in a `deregulated' economic climate government was confronting a situation where some 48 regional irrigation schemes, some with massive cost over-runs, were facing insolvency as farmers with agricultural subsidies removed, spiralling downwards market prices and spiralling upwards interest debt were unable to respond to the capital charges and running costs of the schemes. Negotiations were begun and the schemes were sold back to the community. Treasury agreed that purchase price criteria should be linked to pastoral production market value.

Local government, throughout this time, played a highly visible role alongside their communities, contributing technical advice, labour and machinery as well as acting as an advocate and mediator between the community and the sometimes intransigent bureaucracy.

With the decapitation of central government's controlling interest the role of local government has been refocused. It is still one of advocacy on behalf of rural communities, this time with the public at large, but it can also be an advisory role, as well as financial, one of interim banker as capital or mandatory legal arrangements are finalised.

When noting the leadership role of government in the establishment of irrigation schemes the critical role of local leaders should be acknowledged. In every community we studied there was a singular leader who carried his community into an acceptance of irrigation and then steered that community through the often frustrating and always demanding years of advocacy required before a scheme received planning and funding permission. His leadership would be underpinned by a community based group or committee nevertheless each community owes much to the endeavours and perseverance of one person.

These leaders can reflect today on how the irrigation schemes of the 1970's bought large areas of land into intensive or increased production with considerable national benefits. The Amuri Plains, once dry farm terrain of limited production value in the face of continual drought, today produce high returns, "*annual gross returns of $61 million*" according to one farming leader.

ATTITUDES AND ADAPTATION

Expectations of irrigation

When water reaches the first generation, pastoral farmers with irrigation have few expectations of radically changing their farming techniques - their overwhelming desire is to improve the quality of their stock. They want water to do the one thing for them that drought had not allowed - to grow the best ram they have ever bred. 'Exotic' use of water, like horticulture, would be left to *'the boy'* - the next generation. They just wanted, at least once in their careers, to acquit themselves well, demonstrating their skills and knowledge irrespective of the climate.

When irrigation was first discussed for the Amuri, for example, it was not envisaged that there would be land-use change, just more intensive sheep and beef farming systems. The New Zealand Planning Council and Centre for Agricultural Policy Studies, Massey University (1982:55) suggested tentatively that irrigation might make dairying more attractive. The report acknowledged that most farmers believed that irrigation would lead to more intensive sheep systems, with some possibility of land sub-divided for horticulture.

A limited view of land use change is, almost without exception, the natural pattern of response when on farm irrigation is first available. The exception was farmers in the Glenmark scheme at Waipara, where farmers,

in the late 1960's early 1970's, were reeling from both successive droughts and low market prices. Economic assessments of the time suggested that many of their farm businesses were close to insolvency. When their scheme came to fruition in the late 1970's and early 1980's they were prepared to listen to alternative land use enterprises, if only to save the family farm.

The first irrigation lesson to be learnt by farmers and rural communities is that this substantial investment and use of water resources should not be seen simply as an 'insurance' against perverse climate. The application of water is a new daily function with associated water technology, and its use is often linked to youth and enthusiasm - on-farm irrigation can be unremitting work (McCrostie Little *et al.*, 1998a:5).

In their study of off-farm employment Taylor and McCrostie Little (1995:211) recorded comments made by women working off the farm who also carried out farm work. One full-time nurse/farmer registered her dislike of irrigation work "*I keep saying I'm not going to shift the irrigation next year*". In terms of life style changes Blake and Taylor (1984:9) found that when considering the move into irrigation "most families did not, in fact, anticipate fully the changes that would eventuate".

Dairy farmers, however, always see irrigation as nothing more or nothing less than a management tool.

Agents of change

While central government was actively promoting irrigation the former Ministry of Agriculture and Fisheries (MAF) carried out a positive and practical education role. MAF encouraged farmer enterprise by planting experimental blocks to test the horticulture and pastoral potential of irrigated land. On the Waitaki Plains development, then with its full research and extension service, MAF was a major presence in the community during the 1960's and they supported experimental irrigation, monitoring grass growth and stocking rates. Later, in Waipara, as construction began on the dams in the late 1970's, MAF were hosting the first of a series of field days and farmers inspected crops that included citrus fruit, grapes, feijoas, capsicums, kiwifruit, blackcurrants and a range of nut trees. The following year similar field days demonstrated plantings of stone fruit and export suitable flowers. Horticulturalists, soil scientists, market experts and other technical advisers were on hand to answer questions or to talk about soil and plant requirements under an irrigation regime. MAF's on farm consultancy service advised farmers on water and stock management. With this expert, free and ready advice some of the risk was taken out of the radical land use change being contemplated by the Waipara farmers. They were able to proceed with the new developments supported by the most up to date knowledge.

Today, this arm of MAF no longer exists and any educational role falls, de facto, on to the shoulders of the irrigation company advancing the scheme. In the place of properly tested experimental plots and accessible information, irrigation farmers wanting to change or adjust their production base must seek out existing farmers and professional advisors. Or learn by the sometimes slow and tortuous path of their own mistakes, losing good production time and increasing the cost of capital development.

Farmer advocates of irrigation frequently support policies of government sponsorship so that farmer capital is freed to concentrate on new land use development. When government withdrew from irrigation development and the schemes were bought by the irrigation community, some farmers found themselves unable to invest in new developments as a result of the capital outlay required to buy into the scheme. The same is true for local, farmer-owned schemes. With a stake in the scheme but unable to carry out the planned diversification, and reap the rewards, the farmer may sell their farm at this stage. Lack of development money is one of the reasons that farm ownership changes as a direct result of the establishment of irrigation.

It should be noted that schemes like the Waitaki, the Amuri, Glenmark and the Waimakariri did not grow out of any ideals of full employment for rural people, or innovative land use change, or even prospects of a local economic bonanza. They evolved simply and directly out of the ravages of years of drought on the stock, the land and the people. The schemes grew out of the need to ameliorate the savagery of a drought climate.

Changes in ownership

On the Waitaki, many established dry land sheep farming families sold their farms and were replaced by younger families generally from the North Otago downlands. These farmers were eager to modify traditional farming systems supported by an accessible and regular water supply (Houghton, 1980:55). The younger families invested heavily in farm improvements, including irrigation units, setting about upgrading pasture for cropping and sheep and building bigger and better homes and farm buildings (McCrostie Little *et al.*, 1998a:5). The Amuri replicates the Waitaki experience with 60% of farms there changing ownership since the advent of irrigation.

Waitaki farmers identified the successive ownership and land use changes as coming in 'waves' (McCrostie Little *et al.* 1998a) after the introduction of irrigation. The pattern of successive ownership change is as follows.

First wave:
The existing pastoral farmers want no more than to improve their traditional base - stock breeding, wool growing. On-farm irrigation is labour intensive and initially capital expensive. These older farmers are reluctant to incur more or new debt and can find the work too physically demanding. Irrigation was a *"young person's game"* (1998a:5) . They will retire in favour of the next generation.

Second wave:
This wave will enter into major irrigation investment, often over-capitalising; they increase stock numbers but generally stay with the same production base. These farmers learns that pastoral farming and irrigation are not always compatible and at this stage, sometimes suffering from the results of over-capitalisation, will make the decision to sell, prompting the next 'wave' of irrigation farmers. Should these farmers stay they will radically change the production base into dairying or horticulture. The realisation has now been reached that the land potential lies in new land uses. The shift to dairying is often achieved via a series of interim changes, such as running a small herd alongside such alternatives as bull beef raising. It is, however, more likely that these farmers will not make the total change from pastoral to dairying but will elect to sell, retire or farm elsewhere. Dairying is not the only new land use for in Waipara this wave adopted horticulture; there is some anecdotal evidence to suggest that Waimakariri pastoral/irrigation farmers are also favouring horticulture through their new scheme.

Third wave:
This wave will buy the converted farm; they are dairy farmers by choice and experience and they frequently come into the district from a traditional dairying district often in the North Island. As the third 'wave' of irrigation farmers they will create the 'new' dairy economy in the host district.

The link between ownership and land use change is a fundamental dynamic of irrigation. It is frequently ignored in the irrigation debate yet it impacts not only on farm families but on the social structure of the host community, its settlements and small service towns.

COMMUNITY CHANGE

Changes in population

Social change is first represented by the altered patterns of farm ownership, sometimes within households, but more importantly incorporating outside families (McCrostie Little, *et al.* 1998a:14:5). In a generational pastoral farming community, farm continuity within the family ensured that change was mainly within the family. But as we have noted, irrigation offers risks and potential that challenge traditional farming and community stability. Different land uses demand different farming skills and frequently attract farmers with different skills and outlooks.

Changes in land use can spark a local perception that the population base has 'exploded' through diversified land use and the commercial and employment opportunities offered by irrigation - when in fact growth has been more modest. For the 10 years 1986 to 1996 the population of the Waitaki Plains area grew by 5%, below the overall New Zealand growth of 7.2%. The growth in population of irrigated areas does becomes significant, however, when compared with the fall in population of surrounding non-irrigated rural communities. In North Canterbury Hunt (1998:29) found that in the Amuri that there was an overall rise in the number of younger to mid-life males and that conversely in the same district there was a decline in the 60 years cohort.

Communities undergoing irrigation development undergo considerable social change as the 'old' families move out and their place is taken by 'new' families. If the community pattern is of generational farming the period of change, particularly at the beginning, can be structurally destructive and for a time the community can become dysfunctional. In the Waitaki social divisions grew between the old and the new families - these were most evident with the entrance of the first dairy families from outside (1998a:18). As well, within this social context dairying was not a '*highly rated occupation'* (1998a:18). Mostly the social dysfunction was caused by a lack of knowledge of the work patterns of the different groups of farmers. When it came to social organisation and district functions such knowledge was imperative if the differing groups were to come together as a community.

Nevertheless, if the former community had grown up knowing their neighbours, as their parents had before them, newcomers were always going to tilt the community's stable social structure. The philosophy of the sharemilker work contract and the continual movement in and out of dairy workers created feelings of dislocation amongst those of the old community who remained. Yet those who remained had an important function at this time as they create their own element of stability and continuation.

Dairy farming impacts on the age structure of the community. Dairy farming families are in their lower to middle life cycle and sharemilkers are frequently young families. As a consequence, the diminishing school roll now increases, especially in the junior classes. In the Amuri, the school roll has increased by 150%. Not seemingly important on its own, the roll increase again positions the school at the centre of the district's identity. Staff numbers will increase, bringing new young people into the district, centering the school again at the hub of educational, recreational and social activities. An increased school roll can re-vitalise a community.

While the average age of the community may be younger, however, the expectation of youth and enthusiasm taking greater involvement in the provision of community services and facilities may not be fulfilled. The transient nature of sharemilking may mean that some families take little part in the community - often a cause of criticism from more established community members.

Labour, skills and rural services

There are also flow-on effects from the new land use activity and changes in population. If dairying is the new land use contractors profit initially from the economic multiplier effect of the establishment of irrigation as they construct the systems, fence the paddocks and building the new houses and milking sheds. However it is not just new farm management skills that must be learnt, farm workers and local contractors must also change their skills base if they are to survive. Stable employment may no longer be an option if you are a shearer and there is not a sheep left to shear! As a sector, dairying employs more permanent workers than pastoral or arable farming and therefore brings more people into the community. Seasonally horticultural and orchardists employ more than pastoral farming. Anecdotal comments from Waimakariri note the increase in workers since irrigation and diversification there.

Not only must local villages and settlements change their skills base in response to the changes in land use in their hinterland, so must small towns. If like the local village they are not to be by passed in the hunt for workers, maintenance and technological service. When the need to upgrade the skills base to match the changed production base is not recognised, the local district will not be in a position to capitalise on the new

economy and development and maintenance business will go elsewhere. Rural service centres and towns need to change step responding to the district's changed land use if they are not to be left out of the new economy.

However the question must be asked where and how small contractors can gain new skills? It was during agricultural restructuring that farms eventually shed their on-farm workers who in turn moved into the nearest settlement and became skilled contract workers for independent hire. These workers developed a portfolio of skills based on the district's productive land use. It is on these small local businesses that the community economic survival will rest. If they are unable to provide the skills and services the new irrigation farmers require then those services will be sought elsewhere. So the question of where and how accessible training and technological expertise is available becomes a question of the economic survival of the small town if employment skills cannot be matched to the labour market demands.

With technological advances paramount throughout the agricultural sector labour skills become crucial. For instance communities are slow to appreciate that agricultural processing work can no longer be regarded as unskilled factory work. Local education does not always provide for the demands of the highly technically sophisticated industry that agricultural processing, such as diary processing, has become (1998b:13-15). Small town families whose hopes of finding employment for their early school leaver children often feel affronted to discover that there is no unskilled job waiting at the local processing plant and that low qualifications for first-time employees are no longer sufficient.

The building and irrigation contracting industries in particular are financially stimulated during the on-farm construction stages of dairy conversion, creating a series of economic effects that trickle down through the local and regional economies. Employment is created as well as increased expenditure.

However dairy farming is not the only land use option offered by irrigation. The Waipara Valley, host to the Glenmark scheme, is today a major grape growing

district, with vineyard cafes, a reputation for fine food and a tourist industry. The district and its small settlement of Waipara are economically alive and well.

To survive, a rural service town requires a role; it needs to be able to service its rural hinterland. There are many examples of depressed small towns bypassed by changed technology and the inability to respond to that technology. On the other hand there are examples of small towns that have responded to the new challenges offered and they flourish. Irrigation will be the clarion call or economic revival for some small town and for others it will be their death knell. What is certain is that irrigation information, technology and skills are not just required of the land users to optimise the economic potential of irrigation, they are critical for the network of small towns supporting the land use changes introduced by irrigation.

CONCLUSIONS

The introduction of irrigation into farming systems creates distinct social impacts through changed and new farming systems and wider demographic and community changes.

On-farm establishment costs, intensive labour requirements and profit margins for both old and new products will be the three deciding factors if irrigation is to be taken up by a farm family. Irrigation is still seen to be 'hard work' and therefore most effective in the hands of 'youth and enthusiasm'. Irrigation shifting routines were seen to be 'socially exclusive' - future new technology development should pursue simpler, less labour demanding and less time intensive systems. The relationship between youth, enthusiasm and irrigation results in a demographic change in the community with younger farm families replacing middle aged families.

When irrigation is introduced, new land uses such as dairying are attracted into the community. Waves of different people with different skills replace families holding 'traditional' skills, with the result that the

community can initially be destabilised. The leadership role of those families who remain, either changing their own skills base or upgrading their existing production to effectively utilise irrigation, is critical during this interim period. These local families act both to validate the new land use and maintain some sense of stability. Where established social constructs are under threat, they become 'social anchors' around whom the new emerging community will gather. Furthermore, there can be a resulting positive impact on local schools, sports and recreation facilities and other social services, strengthening rural communities.

While irrigation changes work patterns and roles of the farm family, demanding a wider skills base, its existence also demands similar changes to the skills base of farming service providers - contractors, skilled labour, rural service providers and small business people. When the production base of the land is changed the service provision must also change if it is to be relevant. Often local skills and resources are not congruent with the new production systems and local workers and small businesses are left outside the new, burgeoning economy. Rural towns which have not recognised the potential of the new irrigation based production system will loose service provision and other commercial activity to towns where these provisions will be sought and satisfied.

Irrigation provides an economic climate in which entrepreneurial innovation flourishes, not only on the land but also in the service towns. First, the potential of the new production base must be realised and second there must be a willingness by a range of farming service providers to extend personal skills and acumen. The research and advisory sectors must respond to the changed land use bought about by irrigation if the local and regional economy is to benefit fully. The rural service sector must continue to be relevant to the new farming systems in a new economy driven by irrigation.

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Three waves of change

Wave 1 ➥ ➥ ➥ ➥ ➥

- ❖ existing pastoral/arable farmers
- ❖ 'traditional' stock improvement
- ❖ debt adverse
- ❖ find irrigation work demanding
- ❖ retire in favour of next generation

Wave 2 ➥ ➥ ➥ ➥ ➥

- ❖ enter into major irrigation development
- ❖ increase stock no's and production (same base)
- ❖ find irrigation incompatible with traditional farming
- ❖ over capitalised - debt problems
- ❖ decide to sell out of family

Wave 3 ➥ ➥ ➥ ➥ ➥

- ❖ dairy farmers or horticulturalists move in
- ❖ bring new skills & experience
- ❖ create 'new' rural system
- ❖ new ways of raising capital & managing debt

Some families adapt to change

☛ **Traditional farm production base and skills**

- **adopt new skills**
- **adapt to new work patterns**
- **involve the next generation**

☛ **Mixed production base**

- **trying combinations of soil/water/production**
- **further develop skills/work patterns**
- **strengthen capital base/new markets**

☛ **Full new production system**

- **now driven by new generation**
- **family has adapted its way of life**