IRRIGATION AND ITS EFFECT ON LAND USE CHANGE

A study into the impact of irrigation on changes in land use in the Tasman District.

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EXECUTIVE SUMMARY

Severe drought in the recent summer of 2000/01 highlighted the significant impact that water plays in the productive land based industries of the Tasman district. Rationing of irrigation water reached an unprecedented level. This, coupled with the Tasman District Councils proposed resource management plan for water, questioned the efficient and equitable allocation of water for irrigation.

The aims of this report are to gain an understanding of the resource and associated issues, to determine future land uses changes, and to identify barriers to change.

Irrigation is not the only significant determinant of land use as it is in other less well developed regions. Primary production has been forced to become more intensive, especially on the plains within the district. This is due to the climate and high land values. These factors are often inflated well beyond their productive value for other reasons, namely "lifestyle values". This in turn commands greater returns in order to satisfy an adequate return on investment.

Due to the significant investment in high value crops, irrigators expect surety of supply to cover risk. This is not necessarily possible under the current policy which insists on equal suffering by all land users. Horticultural production, which is considered to be the highest value use, simply would not be considered without irrigation.

Diversity of land use is important to assist in spreading water demand. Areas with only limited diversity use almost the full allocation limit, thereby reducing the ability to spread risk.

Maximising both the value and efficiency of water use is seen by the community as very important. The easiest way of achieving this is by creating a market for water. Transferability of water rights both within and between zones should therefore be possible. The true value of water would then become clear.

Council planning suggests that the most productive rural land, namely Rural 1, should be maintained for the purposes of primary production. Subdivision is therefore discouraged. Ultimately the council should only be in a position to provide guidance, not to determine land use. The market should be free to decide on appropriate land use for the resources available. If this means land is lost from primary production, then so be it.

Should the council remain focused on maintaining productive land, then there is a real need to assist in water harvesting, storage and augmentation.

IRRIGATION AND ITS EFFECT ON LAND USE CHANGE

1. INTRODUCTION

The purpose of this report is to gain an understanding into current water management in the Tasman District and specifically the Waimea basin. Of particular importance in this region are the issues of irrigation water and its most efficient use.

The area consists of many and varied land uses and could be described as relatively intensively farmed.

On a national level, renewed profitability from primary production has enabled producers to enhance production and limit climatic variability through irrigation development. This has been coupled with some significant land use changes brought about by more profitable alternatives. The most significant developments have occurred through conversion of dry land to irrigation.

Such large-scale irrigation development has not occurred in the Tasman District as most of the irrigable area has already been developed. More efficient methods of application and use have been explored instead.

The water resource within this area is one of the best understood in the country, largely as a result of its small geographic area and the high demand for water. This has necessitated thorough investigation.

As the resource is all but fully allocated through water permits, there are many competing users of water. From an agronomic point of view these range from Intensive market gardening and Hydroponics, to less intensive pastoral and lifestyle properties. Competition for water also comes from urban demand and heavy industry.

Water is widely accepted as a natural resource, which must be made freely available to all. It is expected as a "god given right". Consequently, conflict arises particularly under adverse climatic conditions. Commercial returns are jeopardised and restrictions imposed on all areas of the community.

The objectives of this report therefore are:

- To gain a comprehensive understanding of the resource and the associated issues.
- To look at the various land uses within the district and to determine whether irrigation has a significant influence.
- Identify the economic impact of potential changes to land use.
- Identify the importance of water and other significant influences determining land use.
- Determine what barriers prevent land use change.
- Assess if a value can be assigned to water.

Essentially this report endeavours to look for options to derive the maximum value of water, and further more, to examine why land use changes have not occurred on a more regular basis i.e. what are the barriers to change.

While it is accepted that irrigation does have a significant influence on land use, it is not the only factor considered when determining land use changes. As land values appreciate, productive returns required from landowners also need to increase to maintain profitability. This often necessitates the need to change land uses.

2. SITUATION AND BACKGROUND

2.1 Project Scope

Irrigation in the Waimea basin has developed over approximately the past forty years to a point where most productive land has access to irrigation water. Changes in land use have occurred whereby traditional arable/pastoral production has increasingly been replaced by more intensive horticultural uses, in particular, where the most productive and versatile soils are prevalent.

Traditionally investment in irrigation development was considered as an insurance against climatic adversity. Subsequently, it is now regarded as essential in order to maximise production.

The climatic vagaries of the 2000/01 summer presented many challenges to primary producers in the northern part of the south island. The ensuing drought has since been widely accepted as being of a one in twenty five year magnitude. The effects of drought to irrigators were significant as rationing of water takes was implemented to a level that had not been experienced before. A number of issues were revealed which coincided with the Tasman District Council's proposed draft to the water component of their Resource Management Plan.

The Tasman District Council are obligated under the Resource Management Act (RMA) to maintain an integrated approach to water management in maintaining links between all water users i.e. Urban, Rural, Commercial, Recreational and Environmental needs.

The scope of this report is to look at the commercial aspects of water allocation and its efficient management in relation to present and future land uses. Specifically it looks at the various land use issues associated with irrigation, the barriers to changing land use and possible solutions.

2.2 The Climate

The Tasman District is blessed with a relatively kind climate. Adverse weather effects are tempered by the coastal location and shelter provided by surrounding hills. Rainfall is relatively evenly spread throughout the year, and extremes in temperatures are not common.

A feature of the local climate, however, is the high number of sunshine hours that often exceed 2,500 hours per annum. Such a climate provides some unique features suitable for growing specialist and horticultural crops. Associated with high sunshine hours are high evapotranspiration rates over the summer months and the need to replace lost moisture through irrigation.

2.3 The Local Region

These same climatic features also attract people to the region, both to holiday and reside. Consequently the Tasman District has experienced residential growth in the vicinity of 11% per annum. Such growth has created additional demand for residential and lifestyle property.

This has coincided with a period of depressed product prices, particularly for apples. A result of this has been a transformation toward non-productive, or low productivity lifestyle type units on former horticultural land. This is particularly evident in areas where profitability has been limited due to soil type, less favoured crop varieties, or adverse climatic conditions.

As capital values have appreciated productive returns need to be maximised. The underlying capital value is often distorted by non-productive values.

As horticultural output and land capital values have increased, the reliability of water has become more essential. This demonstrates an incremental change in land values and the comparative need to maximise the land value through effective production.

2.4 The Resource

The Waimea basin covers an area of 7,500 hectares. It has been formed as a flood plain from the Waimea River, whose tributaries include the Wairoa, Roding and Wai-iti Rivers. This area is the principle source of water for irrigation, domestic, industrial and urban supply.

Thirteen management zones represent the water resource under the proposed plan. These are comprised of the Delta, coastal Delta, Waimea Island, Reservoir, Wai-iti, Waimea West, Golden Hills, Redwood, Hope Aquifer and Eastern Hills, which can be loosely termed unconfined aquifers. These are recharged mostly from the rivers, rainfall and irrigation drainage.

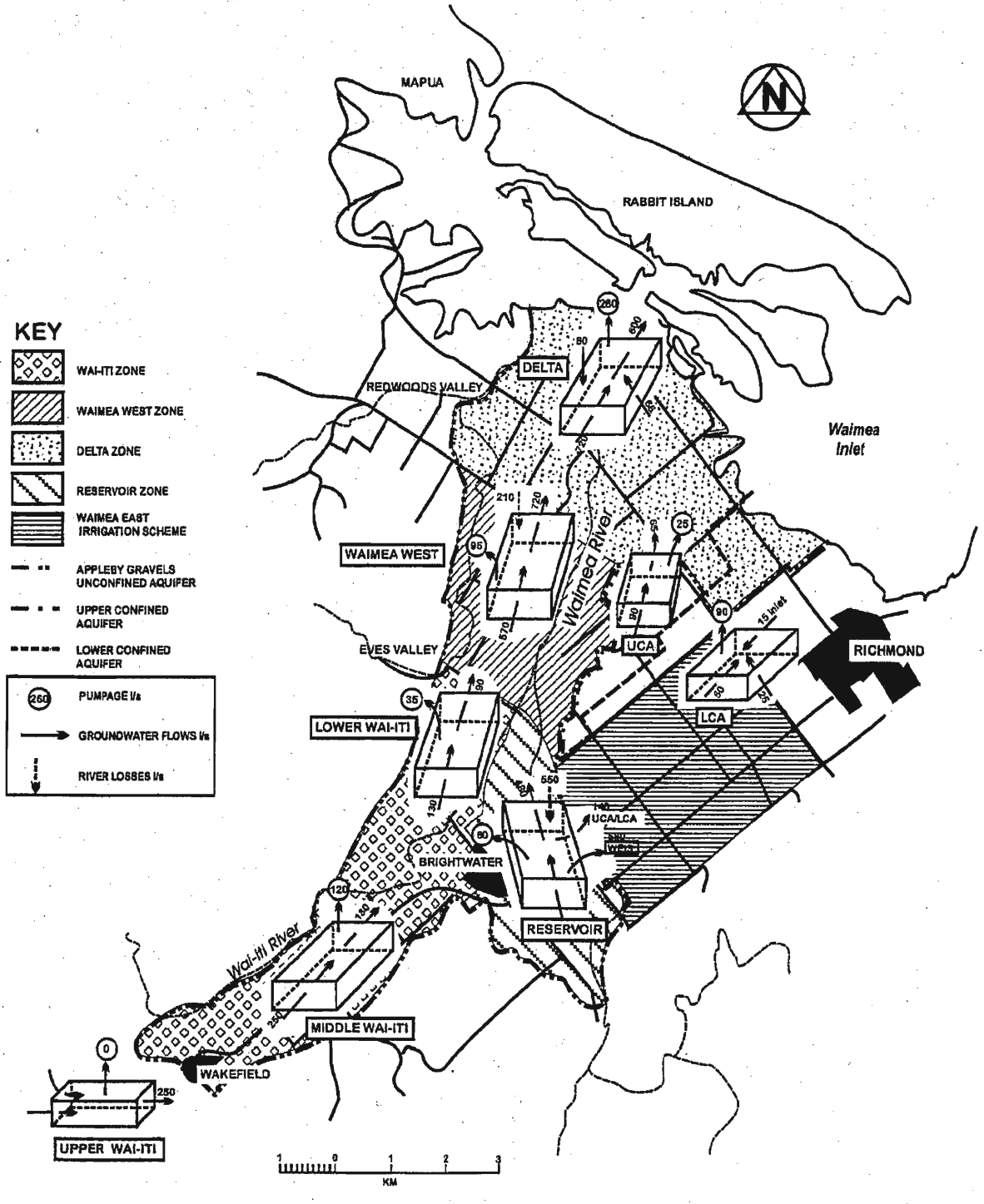
The other two significant zones are the Upper Confined Aquifer and the Lower Confined Aquifer. These are both deeper sources of water recharged from near the Wairoa Gorge with very little other influence, and are slow to permeate.

The final significant source of irrigation water is the Waimea East irrigation scheme, which draws water from near the Wairoa Gorge and distributes it to approximately 1200 hectares via a pumped system.

Council and previous water management bodies have undertaken significant exploratory and modelling work over the years and have developed a comprehensive database of information. Chart 1 was developed through groundwater modelling during the previous major drought of 1983 and shows predicted inflows and outflows. This water balance has been used to determine many of the allocation limits in the area.

Chart 1: Waimea Plains water budget, developed March 1983

Fenemor.A.D. 1998: A three-Dimensional Model for Management of the Waimea Plans Aquifers, Nelson. DSIR hydrology Centre Publication 18, Christchurch.



2.5 Water Allocation

The setting of an allocation limit is used as a tool to minimise adverse environmental effects such as over use, aquifer degredation and salt-water intrusion. Also, maintenance of aquatic life in the various water bodies.

Allocation limits are also set in order to maintain some surety of supply to users and accounting for approximately 90% of the cumulative evapotranspiration through summer.

Water allocation for irrigation is based on a maximum of 350 m3/ha per week (i.e. the equivalent of 35mm/ha per week). This is granted under a renewable water right for the water management zone and accorded to the resource available. There are approximately 346 water permits in the Waimea Basin for groundwater abstraction.

Within the Tasman District water allocation can be broken down to the following end users:

Irrigation	88%
Industrial	5%
Public supply	7%

2.6 Allocation versus usage

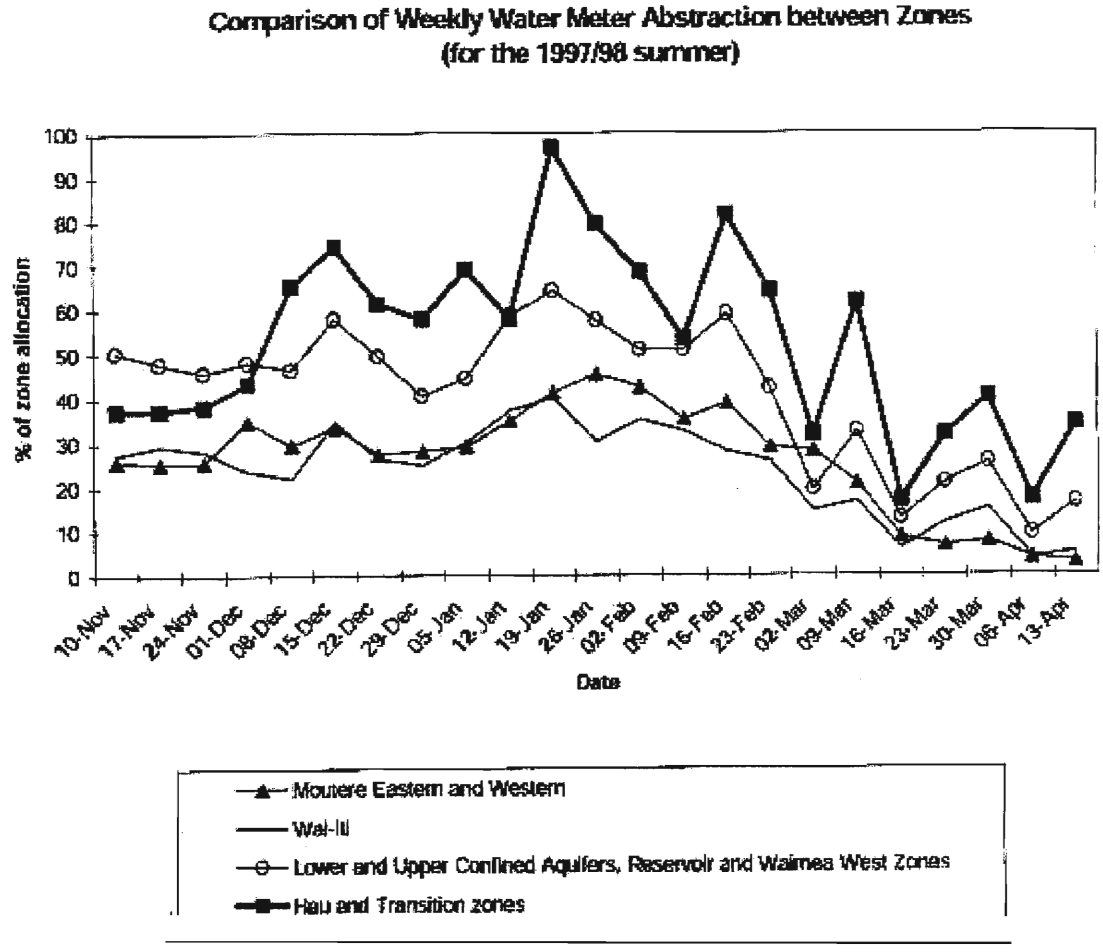
An integral part of the Tasman District Council's water management has been the compulsory installation of water meters in most zones, certainly those where the resource has been fully allocated. This has enabled better monitoring of compliance, improved resource knowledge, and has encouraged better water efficiency.

As a result of the above records it would appear that that only a portion of the allocation is actually used. (Refer to Figure 2).

Possible reasons for this shortfall include:

- A variety of crops watered within a zone and all having different peak water requirements.
- Diverse range of water users eg. urban versus industrial.
- Inefficient methods of application or inappropriate systems with long return intervals.
- Reservation of water for future use.
- Different soil moisture holding capability.
- Inefficient methods of abstraction and poor yielding bores.
- Allocated water being used for other purposes eg. amenity irrigation.
- Non compliance with meter returns.
- Only part of allocated area actually watered eg. many orchards only water the plant, not headlands and ally ways.
- Overestimation of requirements when applying for permits.
- Hoarding of water. "Existing use" abstractors sitting on water beyond the requirement of their land area.

Figure 2: Comparison of Weekly Water Meter Abstraction between Zones
Tasman District Council

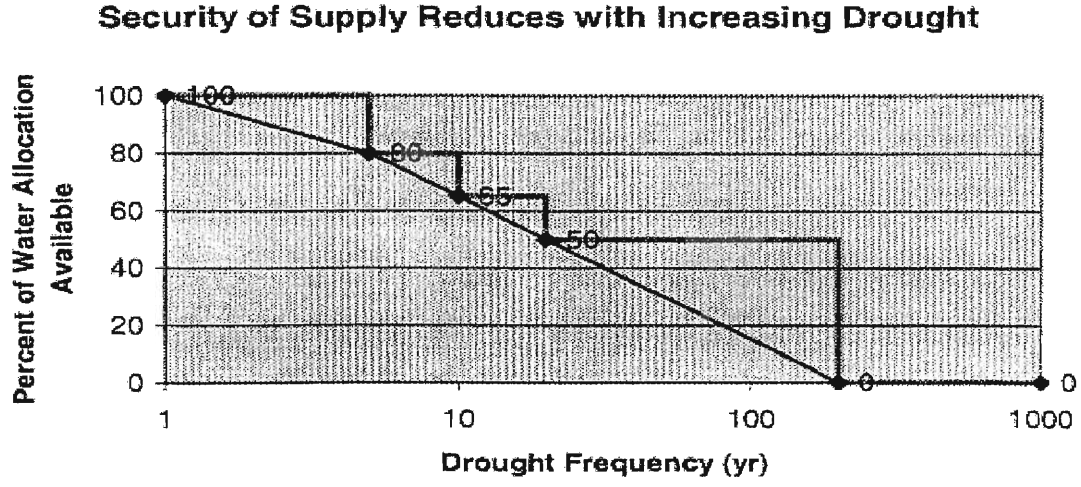


2.7 Water Rationing

A key component of the water management plan is that of stepped trigger related rationing whereby it is accepted users need to expect a 35% cut in pumping one year in ten.

This is derived from a graduated reduction in usage being a 20% cut from the previous step. This approach is applied to all users on the basis of "equal suffering" i.e. all abstractors suffer the same degree of hardship.

Figure 3:



Source: Fenemor & Robb (2001).

2.8 Current Land Uses

Recent estimates are based on the following land use covers on irrigated land within the district.

Table 1: Current Land Uses

	Irrigated hectares
Dairying	850
Other Pasture	225
Arable crops	375
Fruit	5000
Market gardens	350
Other Horticulture (hops)	450
Viticulture	250
Total	**7500**

Horticulture is by far the predominant land use. No allowance is made for non-productive lifestyle properties within the estimates. However, it is likely that these could well make up approximately 1500 hectares within the fruit sector. This is a result of abandoned orchards being turned over to non-productive use through economic adversity.

3. ECONOMIC COMPARISONS

3.1 Assessing the Economic Value of Irrigation

Table 2 gives a general estimate of the increased profit that could be derived from irrigation, determined on a marginal basis. This compares the net economic return after irrigation development with the original returns under dry land conditions.

Table 2: Estimate of the Value Irrigation Adds to Land Use

	Increase in annual profit due to irrigation
Dairy	$ 600 - $1700 / Ha
Sheep/Beef	$ 200 - $ 600 / Ha
Crop/Livestock	$ 200 - $ 700 / Ha
Horticultural	$1000 - $9000 / Ha

It is important to note that most horticultural development will not even be considered if reliable irrigation is not present.

Table 3 analyses the relative cost structure, water requirements and returns from various crops. The following points however should be noted:

- It is very difficult to assign a value to water and indeed dangerous to do so. However, for the purposes of this exercise it was deemed necessary to at least attempt to provide a basis for comparison due to the varied nature of production types.
- Care needs to be taken as in years of increased water usage the returns from each unit of water used will be diluted.
- The analysis is extremely sensitive to product prices.
- Climatic variability will have a large effect on both timing and total water usage eg. apple returns are very sensitive to fruit size, which is closely correlated to irrigation during fruit development.
- Timing of peak water demand differs between crops and can be significantly effected by seasonal variability.
- There is a wide variety in returns, capital structures and water requirements.
- Some crops are very sensitive to location and could not be grown throughout the whole district.
- All costs and returns are based on a reasonably high level of management expertise.
- The highest returning crops are also associated with significant capital development costs. Also, negative returns are expected in the early years as the crop reaches productive maturity. The notable exception from this list being potatoes which are associated with added high levels of market risk.

Table 3: Relative cost structure, water requirements and returns from various crops

	Irrigation and Development Costs / ha	Gross Margin $/ha	Estimated Water use m3/ha	Water Requirement mm/ha/week	Critical Demand Period	Estimated Value $/m3
Apples	$ 30,000	$ 15,000	4000	35	Dec-Feb	$ 3.82
Black Current	$ 5,000	$ 11,000	3000	30	Dec-Jan	$ 3.74
Potatoes	$ 4,000	$ 11,500	3260	35	Nov-Jan	$ 3.52
Hops	$ 35,000	$ 21,000	6800	55	Jan-Feb	$ 3.15
Grapes	$ 25,000	$ 8,000	2600	20	Establishment	$ 2.95
Boysenberry	$ 15,000	$ 13,500	4800	30	Nov-Dec Feb-Mar	$ 2.86
Kiwifruit	$ 35,000	$ 10,500	4700	35	Dec-Apr	$ 2.28
Dairy	$ 8,000	$ 4,900	5550	35	Oct-Mar	$ 1.18
Maize	$ 4,000	$ 1,000	4000	40	Feb-Mar	$ 0.75
Wheat	$ 3,500	$ 850	2250	35	Nov-Dec	$ 0.38
Beef	$ 3,000	$ 1,250	5000	35	Oct-Mar	$ 0.25

4. IRRIGATION AND LAND USE ISSUES

What issues relating to irrigation are likely to influence land use change?

4.1 Political

4.1.1 Water allocation

Virtually all of the water management zones are now fully allocated. No further water rights are likely to be granted. The possible exception, however, being the Lower Confined Aquifer, which after regular monitoring of the water flows during the recent drought would appear to have some spare capacity.

With no additional water rights available it is unlikely that land will be converted from dry to irrigated land and will be lost from production instead.

4.1.2 District planning

Council has a profound influence on land use. To what extend council should determine land use is debatable. There is an underlying desire to maintain productive land to the extent that subdivision is limited to a minimum of 12.5 hectares. This is despite the fact that many smaller blocks exist, a legacy of previous administrations.

The issue is that productive land will only be maintained if it has access to reliable water supply.

4.1.3 Usage versus allocation

As previously stated actual usage does not fully equate to the amount allocated for a variety of reasons. Therefore, it could be argued that further irrigation efficiency or allocation is required. Against this is the possibility that supply could become less reliable.

4.1.4 Limited faith in local government

There appears to be a genuine mistrust of local government to the extent that people expect the rules to change, or that water currently allocated could be taken off them.

4.1.5 Council policy and RMA

Council now has a greater obligation to satisfy environmental issues. This could be detrimental to irrigators where minimum river flows are required. These are now more likely to be rigorously defended for fear of falling foul of the Environment Court.

Additional costs associated with resource consents could influence the intensification of productive land, or alternatively, force that same land out of production.

4.1.6 Metering and monitoring

It is now compulsory to install water meters in all management zones. Many well-established existing users have met this with distain. They see it as the first step toward charging for water.

4.1.7 "Use it or lose it"

Council also has a policy of "use it or loose it" whereby a water right may be reallocated if the supply is not used. In some cases this has led to water being used wastefully. In reality the ruling has never been fully applied.

4.1.8 Allocation related to soil type

Under the proposed plan water allocation will be based on soil type. In theory soils with higher water holding capacity will be allocated a lesser amount. This takes no account of different land use's or crop water requirements. Variability in soils across properties is also open to debate.

It could be argued that soil water holding capacity determines start and end of irrigation season but that all irrigators suffer the same degree of evapotranspiration (ET). There will be numerous occasions when ET rates exceed the 5mm/day water allocation on an individual day.

Table 4: Comparison of Soil Types and Water Holding Capacities (Source: TDC Proposed Variation Nos15-18, 2001 and CRU, Dept. of Natural Resources Engineering)

Soil Type	Rate mm/week	Rate mm/day	ET/day Jan mm
Braeburn & Dovedale	25	3.5	4.5
Mapua &Roedale	19	2.7	4.5
Waimea	30	4.2	4.5
Richmond & Wakatu	27	3.8	4.5
Riwaka, Maori, Sherrry	30	4.3	4.5
Ranzau, Motupiko, Hau	35	5.0	4.5

From the above table it is apparent that most areas will not be able to match daily evapotranspiration losses during the peak demand month of January.

4.1.9 Redistribution of allocation to new users

Traditionally water users who require additional allocation to irrigate areas without a water right go onto a waiting list for supply, either from new allocation, or where water is reallocated due to the resource not being used.

Under the new proposal priority would be given to new users over existing users.

4.1.10 Rationing

Any further allocation or triggers that are tied to river flow are likely to incur more regular rationing. Users with high value crops are unlikely to make an investment if there is risk of uncertain supply.

4.1.11 Water reservation

Proposals under the plan allow for water to be reserved for future urban growth. This may not be the best or most efficient use of that water in the short term.

4.1.12 Efficient Use

Under the RMA council is obligated to ensure that the water resource is used in an efficient manner. Water use efficiency can be defined in many ways. The most common would be the uniform distribution of irrigation water to where it is required in an amount no greater than what can be stored within the crop root zone. Some methods of application could be described as inefficient or wasteful eg. using spray irrigation on windy days. There are a wide range of crops grown and irrigation systems in use within the district. It is difficult to develop regulations that apply to all on the same basis eg. spray versus drip irrigation.

4.1.13 Expanding urban demand

With population growth, increased demand is being placed on reliable supplies of high quality, potable water free from runoff contaminants.

4.2 Cultural

4.2.1 Maori land development and scarcity of water

Concerns by Maori are that land returned under treaty settlement may not be able to obtain water as it has already been fully allocated. This would prevent further and more profitable land development.

4.3 Social

4.3.1 Competition for water - social versus commercial needs

A conflict arises during times of water shortage when urban dwellers find it unacceptable for recreational water bodies to run low, yet primary producers face financial hardship.

4.3.2 Competition between users

During times of rationing some water users find it difficult to accept that all users are afforded the same right to water despite different economic returns and crop requirements.

4.3.3 Acceptability of irrigation practices

Some methods of irrigation are considered wasteful, particularly the most visible methods such as spray irrigation on windy days, yet other methods could be wasting a similar amount through over watering and losses occurring through drainage.

4.3.4 The value of water

Water is considered to be a free resource as of right, yet many urban dwellers assume that irrigators pay for water on a per unit basis.

4.4 Economic

4.4.1 Productive versus non-productive land use

In some areas the value of land bears no resemblance to its productive value as other values have been assigned, such as aspect and mountain views. The presence of irrigation water is irrelevant.

4.4.2 Economic impact on the community

Economic hardship in the pip fruit industry has seen less profitable orchards taken out of production or abandoned. The presence of irrigation water is irrelevant.

4.4.3 Transferability and Reliability of supply

The ability to transfer water rights is likely to influence land use especially into high value crops, thus ensuring consistent and reliable supply.

4.4.4 Tenure of supply

A water right is only for a defined period and whilst not tested, renewal is not necessarily guaranteed.

4.4.5 Fads and Trends

New crops come and go, some on the basis of their lower water requirements eg Olives. Long term they are unlikely to provide significant water savings.

4.4.6 Profitability and establishment costs

High costs of establishment and uncertain returns act as a barrier to change to new crops that may be more water efficient.

4.5 Management

4.5.1 Ability for producers to change

The desire or cost to change compared to returns may prevent change.

4.5.2 New technology

New and improved irrigation systems are likely to influence land use change through improved efficiencies i.e. uniform supply to the target area

4.6 Environment

4.6.1 Recharge protection

An area of no greater than 20% of the certificate of title area can be planted in indigenous forest under the Council's proposal. This is in order to ensure natural water recharge can occur for the benefit of down stream users. It has the effect of a barrier to land use change in areas where forestry may be the highest and best use for land.

4.6.2 Salt intrusion

Excessive draw downs in coastal areas pose a serious threat of salt water intrusion. The Maori translation for Waimea is "Brackish Water" which illustrates its proximity to the coast.

4.6.3 Minimum Flows

Associated run of river flows are often directly affected by irrigation takes. Where a duty of care is required to maintain minimum flows, irrigation takes will be restricted and can cause financial hardship through unreliable supply.

5. BARRIERS TO LAND USE CHANGE

5.1 Infrastructure

Where an established irrigation system is in place producers are reluctant to change or upgrade.

This could involve the upgrade of irrigation system to a more technologically advanced system eg. redevelop from spray to K-line or Long lateral system for pasture. The small gains achieved in efficiency are unlikely to compensate for the extra capital cost of redevelopment.

5.2 Capital Value versus Productive Value

Return on Capital is not necessarily seen as a key determinant in changing land use. Other factors such as lifestyle and proximity to amenities may be of greater importance.

5.3 Management Expertise

New enterprises may require further training or skills which management may not be prepared to invest in.

5.4 Resistance to Change

It is easier to stick to what is known and understood rather than incur financial and other risks.

5.5 Barriers to Entry

Many areas of primary production require investment in post harvest facilities or a shareholding in further processing facilities, often at significant capital cost. While it may be desirable to change the land use from say pastoral to horticultural, it may not be possible to do so in practice.

Other barriers to entry include the requirement to hold forward supply contracts, which are often reserved for preferred or select suppliers.

5.6 Availability of Water

As water is fully allocated this limits change, particularly from dry land to irrigation. Also, where a water right limits the amount of abstraction this will limit crop changes, particularly to crops which have higher needs at specific times eg. Hops and vegetables.

5.7 Extra Investment

Producers may not have the financial means to instigate land use change. Change to horticultural production carries significant capital outlay and deferred income streams.

5.8 Soils and Topography

Some locations may not be suited to alternative uses due to inappropriate soils, particularly for horticultural crops that are quite site specific.

5.9 Risk

Propensity to risk often determines the acceptance of alternative investments. If water is restricted to horticulturists there are few alternatives available, yet pastoral farmers can reduce stock numbers or purchase alternative feeds.

5.10 The Consent Process

The bureaucratic consent process often precludes land use change. The expense and frustration of satisfying RMA and other requirements can be seen as unworthy of the effort.

6. THE WAY FORWARD

It would appear that in the Tasman District, where water is all but fully allocated, new ways are required to ensure that water for irrigation is used in a way which best represents its commercial value, while ensuring that all water users are treated equitably and resources are used appropriately.

The following options have been identified as possible ways in which the value derived from irrigation can best be utilised.

6.1 Alternative Crops

Encourage the development of truly commercial, viable crop types that require less water. Grapes are an obvious example requiring only 50-80% of the water allocated.

Care needs to be taken to ensure that fads are avoided whereby water is allocated on the basis of crop type, then when economic cycles change that land is precluded from alternative crops on the basis of its limited water supply.

It should also be noted that even crops that can survive with limited water, would show a yield and/or quality response to additional water.

6.2 Maximise the Value Derived from Water

Look to crops, or land uses, which extract the maximum value from each unit of water. Ultimately the market should be free to decide and will determine this.

6.3 User Groups and Education

Consultation with all the key parties as was the case throughout the previous drought is seen to be paramount. This enables free discussion between all effected parties and council to ensure all are fully informed.

This could be extended to the point where council provides free information to interested parties such as river flows, evapotranspiration rates, data on alternative irrigation systems, water use analysis etc. This would be published on a regular basis or posted on the Council's Internet site.

6.4 Improve Irrigation Management and Water Budgeting

Systems that provide more accurate application of water should be encouraged. The use of soil moisture monitoring is currently used to varying degrees by land users.

6.5 Optimising Non Water Inputs

For irrigation to be effective all other production inputs need to be provided at the levels that will not inhibit production.

6.6 Alternative Sources

Additional sources of water could be explored. The use of treated sewerage water and industrial wash water has been explored in the past, however its application to land used for food production is prohibited in many cases.

6.7 Tiered Rationing

The use of different classes of water right may allow for fuller utilisation of available water. Users who require less reliable supply could use water for irrigation at times when river flows are ample, but would be the first to be restricted in times of shortage. Some users may be prepared to accept this level of risk if they have no other ability to access water.

6.8 Water Enhancement

A working party is currently investigating the possibility of augmenting supply to the upper Wai-iti River, an area that is significantly over allocated. If feasible this will help to maintain consistent supply to downstream users.

Harvesting of water in times of low demand for redistribution in times of low flow could be a real solution for the district.

Another strategy being considered is to build a series of weirs down the Waimea River. The effect being to raise the river level and assist in groundwater recharge.

6.9 Alternative Non-productive Land Use

Reassess current land classification on the basis of the lands likely economic productive value. Areas suited only to grazing because of poorer soils may be taken out of production and rezoned for other uses such as industrial.

6.10 New Technology

Uptake of more efficient irrigation technology should be encouraged.

6.11 Water Transfers

Transferability of water has been widely debated within this district. A previous attempt by Council to introduce transferable water permits was met with widespread contempt. Water users were concerned that it would lead to the permanent transfer of water from productive use and create dry land areas within the district. There was also the concern that water would be assigned a value and that water would end up in the hands of the highest bidder. This would at least promote efficient use by creating a market for water.

More recent survey work would suggest that many water users have become more resolved to the idea. Up to 10% of water users would be prepared to transfer water by way of a lease on a temporary basis. Permanent transfer is generally opposed.

The "use it or loose it" policy could be used in this area as a way of preventing stockpiling of water.

6.12 Reallocating Water Among Users

As Council have found, it is very difficult to re-allocate water after it has been issued. There is a reluctance to release over allocation due to its assumed effect on land value. The easiest way for water to be allocated to where it gains the maximum value is by assigning it a monetary value. Transferability allows this to happen. Economic reality would determine lands highest and best use.

6.13 Encourage Diversity

It would appear that the management zones that are most at risk from being rationed are the ones with a limited diversity of land uses or crop types. Generally the peak demand occurs at the same stage of crop maturity. The best illustration of this is the Hau zone near Motueka, which uses near maximum allocation from January to March, as the predominant land use is production of apples and kiwifruit.

6.14 The Role of Local Government

The most efficient way of allocating scarce resources such as water and land is by market forces. *"There do not appear to be any compelling reasons for district and regional councils to prescribe areas that must be retained in agriculture. However, the impacts of urban growth on agricultural production should be considered in planning decisions"* (Ministry of Agriculture and Fisheries, 2001, November). The role of local government therefore, must be limited to ensuring environmental and social requirements can be appeased and not to impose restrictive limitations on land users.

7. CONCLUSIONS

- Irrigation is not the only factor in determining land value.
- Problems only occur during periods of drought.
- Water and land are inextricably linked. Ability to irrigate is a key determinant in productive land use.
- Horticulture will not exist without water.
- As the cost of capital development and economic returns increase, reliability of supply also becomes more critical.
- Land value in some areas often bears little resemblance to its true productive value due to lifestyle effects.
- It is very difficult to assign a value to water and indeed dangerous to do so, as economic effects can change significantly over a short period of time. In times of increased demand per unit value of water is artificially devalued.
- The market is irrational and under true economic theory, land use would change more freely.
- As water becomes scarcer its efficient use becomes more important. There are many interpretations of what constitutes efficient irrigation.
- Methods of application have different visual impact eg. spray versus drip. It is much easier to confer an image of efficient use when the use is not obvious. Animosity and assumed wastage is avoided.
- Diversity of land use is important to spread water demand throughout the season within a particular management zone and between zones.
- What are we really protecting? The area in primary production appears to be getting smaller and supplies of produce can be easily imported into the district. It may be simply better to provide a better place for people to live.
- A mass change in land use is unlikely to occur until we have to pay for water.
- In order to maintain productive land use, producers must have adequate and reliable supply for irrigation. The alternative is to relax restrictions on minimum subdivisible areas.

8. RECOMMENDATIONS

8.1 Remove Political Barriers to Land Use Change

Council must not put itself in a position that would unduly influence future land use decisions, other than to provide general guidelines. Council needs to encourage freedom to change land use that favours more efficient water use. If insufficient water is available for productive use, then non-productive land uses will have to become accepted.

8.2 Encourage Consultation and User Groups

Free flow of information between key stakeholders and members of the public is critical to appreciation of the issues. There is widespread local knowledge and irrigation expertise within the community.

8.3 Vigorously Oppose Allocation of Water Right on the Basis of Soil Type

The idea is seriously flawed and would ultimately lead to widespread creation of non-productive land. Producers would not be prepared to accept the risk associated with limited water supply. The cyclical nature of primary production would inevitably see investment in alternative crops avoided due to unavailability of water.

8.4 Avoid Long Term Decisions on the Basis of Fads and Trends

Encouragement toward low water requirement crops such as grapes and olives is reckless. International trends would suggest that our competitive advantage in this area is likely to be short lived. All primary production is cyclical by its very nature.

8.5 Make Reliability of Supply a Priority

If high value primary outputs are to be encouraged then users, particularly horticultural, must have certainty of supply. As the resource is all but fully allocated then water harvesting and augmentation must be given extreme priority. Enhancement of the recharge areas through use of weirs should also be seriously considered as a low cost solution.

8.6 Encourage Transferability

The ability of producers to lease water rights from users who do not require it should be encouraged, both between and within zones. This would create some value for water and encourage efficient use.

8.7 Restrict Free Access to Water

Lifestyle water users are granted free access to water up to 5 m3/day. This is well in excess of that required by most households. These users should be encouraged to augment supply from rainwater storage.

8.8 Recognise Regional Importance of Primary Production

Economic benefits of primary production must be emphasised to the greater community. If politicians are not prepared to do this then ah hoc subdivision must be allowed.

8.9 Create Two Tier Water Rights

Water users who require new or additional water could be given a water right on the proviso that they are the first to go onto rationing in times of water shortage. This would at least go some way toward better utilising water which for most of the year simply runs out to sea.

8.10 Explore Alternatives

Look to becoming more creative in search of alternatives. Lateral ideas such as salt water extraction and rainmaking may become feasible with technological advances.

8.11 Allow Transfer to Alternative Users

Most heavy industry processors of primary products i.e. wood, meat and fruit, appear to have expanding requirements for water. The most profitable return to the region could well be in encouraging these types of water users, and allowing transfers from the Waimea basin where further expansion of primary production is limited. This applies particularly to processing of wood from the surrounding area.

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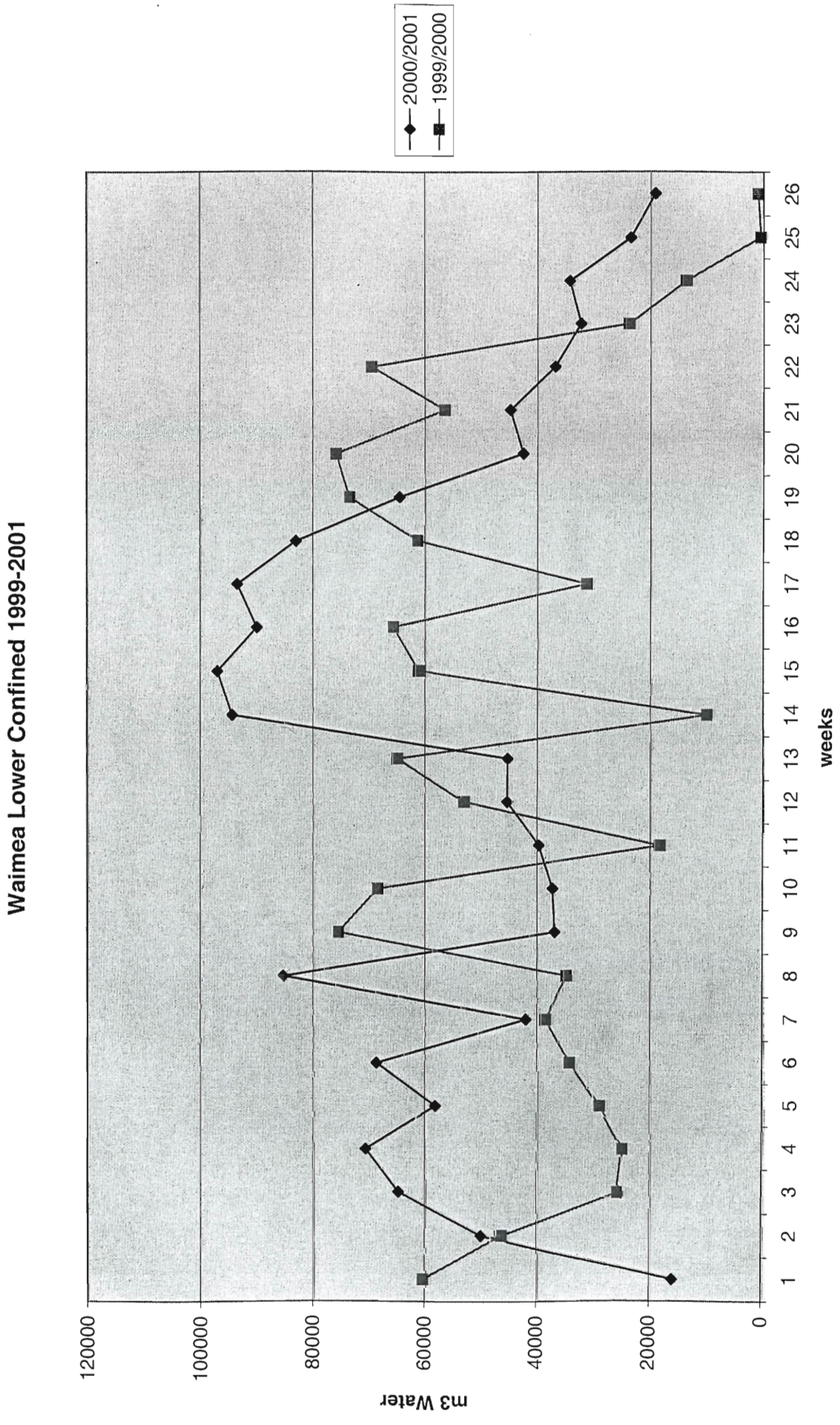
APPENDIX 1:

Usage versus allocation for the Lower Confined Aquifer



APPENDIX 2:

Usage versus allocation for the Hau zone