

Options to Improve Water Allocation Outcomes

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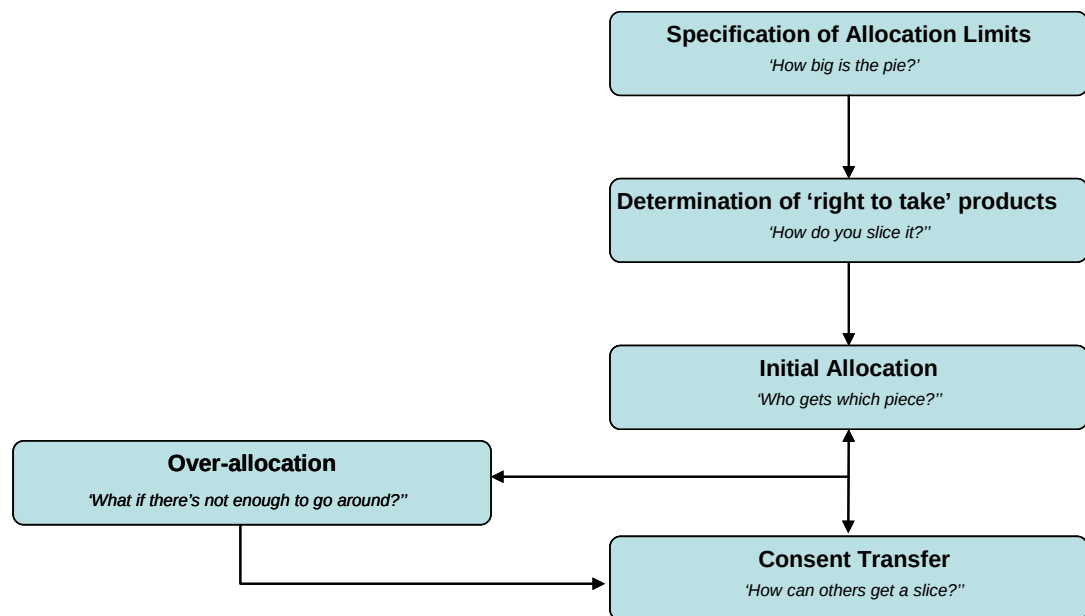
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Executive Summary

The broad objectives for an effective water allocation system are to develop a decision-making process that enables equitable provision to be made between existing and future uses in a way that optimises environmental, social, cultural and economic values for the community.

The various steps involved in the development of a water allocation framework and implementation through the resource consent process are illustrated in Figure 1 below:

■ **Figure 1: Overview of steps involved in the water allocation process**



The report identifies definition of 'right to take' products as an important step in the development of a policy framework for water allocation. This process follows specification of allocation limits and may involve definition of available allocation in terms of sectors of use, priority of access, reliability bands or resource share specification that provide support for the resource allocation decision-making process, particularly when levels of allocation approach sustainable limits. These options may be applied in various combinations to develop catchment-specific outcomes that include reservation of allocation for future use, prioritisation of allocation or restriction across various sectors of use and allocation of water with reliability characteristics that match intended use. Specification of allocation in terms of resource share may also provide a means to optimise allocation in response to inter-annual climatic variability or provide for the impacts of long-term climate change.

Once a policy framework for water allocation has been established, the process of water allocation can be implemented in terms of three major components. During the initial allocation phase sufficient resource is available to provide for all users within limits established to protect a combination of common resource pool and private good values. As the level of allocation approaches the sustainable limits focus is shifted

toward processes that facilitate transfer between new and existing users to achieve highest value use of the resource. The final component of the water allocation process involves mechanisms established to deal with situations where the total volume of allocation exceeds allocation limits either due to historical allocation processes or as a result of changes in allocation limits required to maintain common pool resource or public interest values.

Once the characteristics of available allocation have been defined a range of possible options may be utilised to facilitate the allocation process. These options range from queue-based systems such as the current First In, First Served through to market-based models. Each option has associated advantages and disadvantages, with the potential application for each dependant on factors specific to an individual water resource. Table 1 outlines potential application of the various allocation options identified in terms of the allocation status of an individual water resource.

For many water resources in New Zealand the current First In, First Served process is likely to provide an appropriate allocation mechanism. However, where a resource is close to or at sustainable allocation limits, market-based options including auction systems and secondary market transfer may assist the allocation process to ensure water is committed to the highest value use. Where allocation exceeds sustainable limits options exists for regulatory intervention or market-based options to be implemented with stakeholder engagement to reduce allocation to the desired level.

Development of alternative options for water allocation undoubtedly present a significant challenge for regional councils into the future. Depending on options adopted changes to the current methods of allocation may require enhancements to the structure and implementation of the resource consent process as well as increased technical and compliance monitoring requirements.

A framework that clearly articulates methods utilised to inform the decision-making process is considered crucial to underpin effective water resource management. This framework should aim to provide certainty for users in terms of future access and reliability while enabling regional councils to deal with many of the uncertainties inherent in the management of a natural system. Development of such a framework should be initiated before high levels of resource allocation are reached.

■ **Table 1: Application of available options for water allocation**

Water Allocation Models	Rights Allocated as Proportion of Total Allocation				
	Low	Medium	High	Full	Over
	<25%	25%-75%	>75%	100%	>100%
Initial Allocation					
First In, First Served ¹					
Primary Market Auction					
Ballot					
Transfer					
Property Transfer ^{2,3}					
Regulatory Approval of Transfer ^{2,3}					
Secondary Market Transfer ³					



Water Allocation Models	Rights Allocated as Proportion of Total Allocation				
	Low	Medium	High	Full	Over
	<25%	25%-75%	>75%	100%	>100%
Over-Allocation					
Increased Frequency of Restrictions					↔
Last In, First Off					↔
Regulatory Reduction of Consents					↔
Regulatory Redistribution of Consents					↔
Consumptive Based Charges ⁴	←				→
Storage ⁵	←				→
Buyback Auction					↔

- Notes:
- 1) First In, First Served currently applies through to applications that are submitted that if approved, would result in over-allocation.
 - 2) It would be expected that a regional council would not approve transfer if the resource was known to be over-allocated, and the transfer would be expected to increase actual utilisation of water consents. Once a secondary market is operational, a regional council may require special transfer rules to be able to suspend certain types of transfer if over-allocation is suspected to exist, but these must be specified in advance to provide clear and transparent signals to the market.
 - 3) It is possible for transfer mechanisms to be considered at low levels of overall resource utilisation where the costs to access the resource for economic application (drilling and source development, storage construction) are considerable.
 - 4) Consumptive based charges relating to resource rental could be employed at all stages of the allocation process.
 - 5) Provision of storage is not necessarily an allocation option per se but may be an outcome of the application of other policy options and requires at least some remaining allocation to be available.

1. Introduction

1.1 Background

Sinclair Knight Merz (SKM) was engaged by the Ministry for the Environment to determine a range of possible approaches for the initial allocation and subsequent reallocation of water in New Zealand, including situations of over-allocation. This work is intended to contribute to implementation of the Sustainable Water Programme of Action.

The Sustainable Water Programme of Action (SWPoA) was initiated in 2003 as one of the four priority work areas under the Sustainable Programme of Action. From the consultation process undertaken in early 2005, the six broad goals established for the project were to:

- Achieve greater strategic planning for water at national and regional levels;
- Provide clearer direction and guidance from central government;
- Ensure greater consistency in the way increasing demands on water are managed across the country;
- Develop a better framework for deciding between conflicting demands for water;
- Enable increased effectiveness of Maori participation in water management; and,
- Provide for more effective management of the potential impacts of diffuse or unintended discharges on water quality.

A key outcome for the Sustainable Water Programme of Action is to ensure water is allocated and used in a sustainable manner that optimises environmental, social, cultural and economic outcomes for the wider community. In recent times the allocation of water has become an increasingly complex issue in many parts of the country as competition between the various uses and values associated with water has intensified. Management of the tension between these competing uses and values requires a robust framework to ensure allocation decisions are transparent, equitable and achieve the desired objectives.

In developing options for future management of water allocation, the Sustainable Water Programme of Action has established several key principles:

- Water will continue to be managed as a public resource;
- Regional councils will continue to have primary responsibility for managing freshwater;
- Freshwater management will be improved under the Resource Management Act 1991;
- Clear environmental limits will be set for water quality and the quantity available for allocation;
- Enhancements to existing mechanisms and the provision of incentives will improve efficiency of water use;
- Nationally outstanding water bodies will be identified and better protected;
- The best information will be used for the decision-making processes; and,
- Resource users will be encouraged to take responsibility for their actions and will be given the flexibility to develop appropriate solutions.

These principles are intended to guide development of initiatives to improve management of freshwater in New Zealand.



1.2 Objectives

The objective of this project is to document potential options for the allocation of freshwater in New Zealand that may address some of the constraints of the current first-in, first-served system, particularly in situations where there is significant tension between competing uses and values for water. The report documents potential advantages and disadvantages of options for water allocation and identifies settings where application of options may be most suited.

1.3 Methodology

This report draws on experience from the development and implementation of frameworks for water allocation both in New Zealand and internationally. In particular, the report draws on SKM experience in Australia where reform of the water sector has been ongoing for some time. While acknowledging the differences in resource management issues, the Australian experience provides a valuable insight into the development of alternative mechanisms for water management.

The structure of the report is intended to provide an overview of the current system for water allocation in New Zealand followed by a discussion of various options available to develop future water allocation process. The report covers aspects from initial allocation of the resource to transfer of existing allocation and management of situations where allocation exceeds sustainable limits. The advantages and disadvantages of the various options identified are discussed, along with potential applications to improve allocation outcomes.

2. Objectives of Water Allocation

2.1 Overview

Water is an integral component of the natural environment. Freshwater resources in their natural form (lakes, rivers, streams, wetlands and aquifers) have significant environmental, social and cultural value for New Zealanders. However, consumptive and non-consumptive uses of water also provide essential services for the economic and social wellbeing of the country. Managing the tension between the competing uses and values ascribed to water is central to development of an effective framework for water allocation.

While New Zealand has comparatively abundant water resources, conflict between competing uses and values for water has increased significantly in recent times as a result of increasing utilisation of water resources, coupled with a shift in community values toward increased protection of the natural environment, maintenance of biodiversity and recognition of the recreational and cultural values associated with water.

The basic objective of a water allocation process is to enable equitable provision to be made for existing and future water users in a way that optimises environmental, social, cultural and economic outcomes for the community. In achieving these aims, an allocation system must also be able to account for:

- Changes in water availability over time either through modification of environmental baselines in line with changing environmental, social, cultural or economic values, or physical variations resulting from climate change/variability;
- The need for integrated management of both water quality and water quantity at a catchment scale;
- Uncertainty over future water requirements given changing technical, economic and social conditions;
- Sufficient flexibility to allow adaptive management in light of incomplete knowledge of the dynamic response of the resource to abstraction of water;
- The “rights” of existing users to access and utilise the resource; and,
- Mechanisms that provide a fair, transparent decision-making process that maximises overall benefit to the wider community.

The following section of the report aims to develop some of the basic concepts related to the management of water allocation as a basis for development of policy model options for water allocation in subsequent sections.

2.2 Understanding Common Pool Resources, Private Goods and Public Interest

There is often confusion associated with terminology used to explain the broad economic and policy principles that influence the water allocation process. It is important to note that the existing consent process and supporting allocation models are the outcome and summary of these principles rather than direct application of the concepts. The following section provides a brief overview of the economic and policy concepts used to assist the water allocation framework, with basic examples of how each principle might be observed in practice.

The rights associated with water resource can be broadly categorised into two major economic categories, based on characteristics that reflect:



- Whether there is competition involved in obtaining rights to access (termed rivalrous vs non-rivalrous); and,
- The ability to exclude others from utilising rights to access (excludable vs non-excludable).¹

Using an example of allocations that support in-stream and surrounding area environmental attributes including biodiversity, cultural, aesthetic, and passive recreational values these attributes are in 'competition' with other consumptive rights. On this basis the resource is considered *rivalrous*. However, as an individual's ability to access the benefits resulting from a sustainable freshwater resource cannot be restricted, it is also characterised as a *non-excludable* good.

A good that has the properties of being *rivalrous* and *non-excludable* is categorised as a 'Common Pool Resource'.² Unless legislative and consent controls are imposed on consumptive and non-consumptive uses, the common pool resource attributes are at risk of being diminished over time due to overuse.

Consumptive users of freshwater are therefore in 'competition' with environmental allocations that represent common pool resources and are therefore considered *rivalrous*. Consumptive uses seek to hold consents on the basis that persons without consents (or as permitted through legislation) will be excluded from accessing the resource. By applying legislative and consent related controls the consumptive uses represent a characteristics of being *excludable*. A good that has the properties of being *rivalrous* and *excludable* is categorised as a 'Private Good'

'Private Goods' represent both permitted and consented activities that reflect most consumptive activities, ranging from emergency access for fire fighting, abstraction for stock and domestic supply, urban supplies, irrigation as well as commercial and industrial applications. It is important to note that the definition of private good relates to the characteristics of the diversion taking place, not the ultimate beneficiary of the diversion.

Most in-stream non-consumptive applications of water would also be considered private goods on the basis that consumptive users located upstream cannot access water that is intended for a downstream non-consumptive user. It is also observed that many 'non-consumptive' hydro-electric uses actually reflect a diversion from the stream or reflect storage under the control of the consent holder which tends to reflect excludable nature of the resource.

The descriptions above underline the role of government agencies in determining the nature and magnitude of the common pool resource that is considered sustainable, and the necessary protections from unlimited resource access required to ensure private goods are secure and do not have detrimental impact upon common pool resources.

¹ Wills, 1997 Chapters 6-7

² While this is sometimes referred to as a Common Good it should also be noted that it is often misrepresented as a Public Good. A public good has the characteristics of being non-rivalrous (individual consumption does not impact the consumption of others) and non-excludable (cannot exclude individuals benefiting)

2.3 Developing an Effective Allocation Process

Decisions regarding the 'public interest' are equally applicable to both common pool resources and private goods. Application of a 'public interest' test in the allocation process reflects the relative importance placed upon specific allocations from the water resource to achieve particular outcomes. Examples of the outcomes of this process could be:

- Providing basic water availability to meet emergency applications, household and stockwater requirements before other consumptive demands;
- Providing priority water allocations to maximise benefits from social, economic or environmental outcomes desired by the community; and,
- Providing priority water allocations to maximise benefits within particular geographical areas at the national, regional or local levels to reflect outcomes desired of the community;

Under the Resource Management Act 1991 (RMA), the public interest aspects associated with water are recognised via Section 14, which provides for the use of freshwater for an individuals reasonable domestic or stock water requirements. In broader terms, the RMA also recognises the public interest aspects of water use in Part 2 of the Act which outlines the purpose and principles for management of natural resources. This establishes the basis for sustainable management of the natural environment to provide for the social, economic and cultural wellbeing of the community.

There have been examples where provisions for particular economic sectors to maximise and secure the potential economic growth of New Zealand have also been applied. A recent example of priorities and allocations to support particular economic outcomes in the future was reflected in the outcomes of the Waitaki River Catchment Allocation Board process completed in 2005.

2.3.1 Achieving Allocation Objectives

The stages involved in the water allocation process can be grouped within five broad categories. These categories, as defined for this report are: the setting of allocation limits, specification of 'right to take' products, initial allocation, transfer of allocation, and methods for addressing over-allocation.

Allocation Limits - Determination of the resource available for allocation to consumptive and non-consumptive uses from an individual water resource. Determination of allocation limits is a two stage process that involves firstly identifying an appropriate threshold of protection for common pool resource and public interest values being protected, then determination of the environmental flows required to sustain those values at the required level.

Specification of 'right to take products' - Once the total volume of allocation from a water resource is determined the next step in the allocation process is the division of the available allocation into various 'blocks' that reflect overall water allocation objectives determined by the regional council. This process may include identification of potential consumptive and non-consumptive uses, determination of appropriate supply reliability for each use followed by definition of appropriate priority for access, restrictions and efficiency of use criteria to maximise utilisation of the available resource

Initial allocation - Progressive allocation of water to additional users until a maximum allocation threshold is reached. Processes for the initial allocation of a water resource need to ensure water is utilised in a technically efficient manner to achieve an optimum balance between the competing uses and values for water. The allocation process also has to account for the uncertainty inherent in the management of a



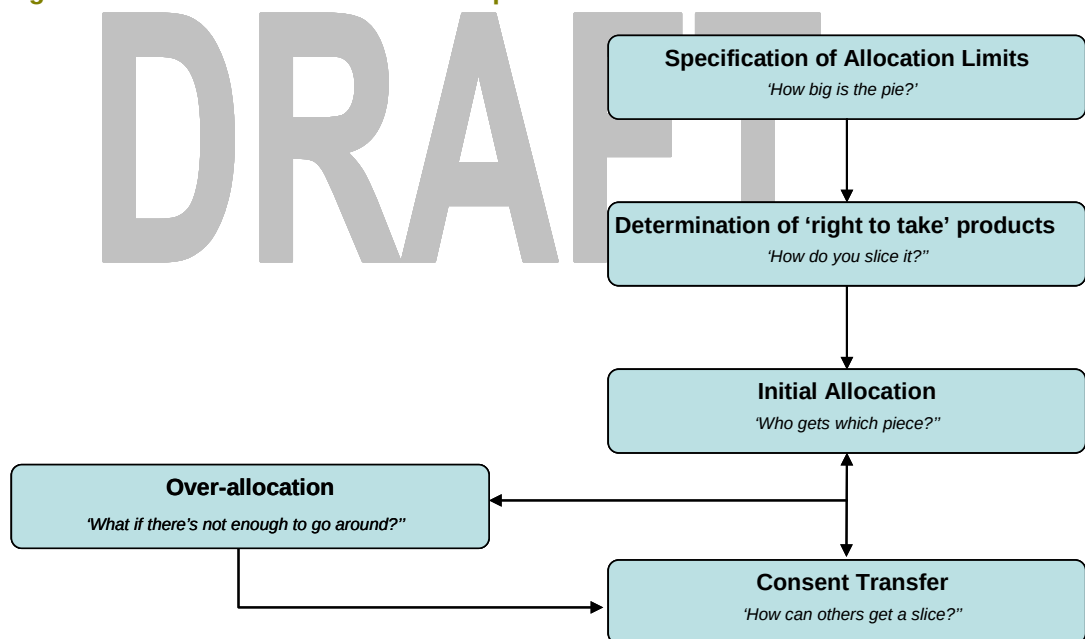
natural system while providing adequate certainty and consistency for resource users in terms of conditions associated with the right to access the resource.

Transfer or Reallocation - The reassignment of existing allocation between new and existing resource users. Processes controlling the transfer of available allocation between users need to operate in a manner that facilitates optimum utilisation of the available resource. Transfer processes need to be simple and proceed in a timely manner to enable transfer to occur on a temporary or permanent basis with low overall transaction costs.

Over-allocation - The surrender or cancellation of a portion of existing allocation to ensure total resource allocation does not exceed resource sustainability criteria. Processes that aim to remedy over-allocation need to be able to reduce or restructure existing water allocations while ensuring equitable outcomes for consent holders more generally.

A schematic overview of the water allocation process is illustrated in Figure 2 below.

■ **Figure 2: Overview of water allocation process**



The focus of this report is a review of options available for determining 'right to take' products as well as the initial and subsequent reallocation of water resources including management of situations where the resource is over-allocated. The processes involved in the determination of allocation limits are not considered in this report and form a separate work stream under the SWPoA.

2.4 Defining 'Rights to Take'

2.4.1 Categories of Use

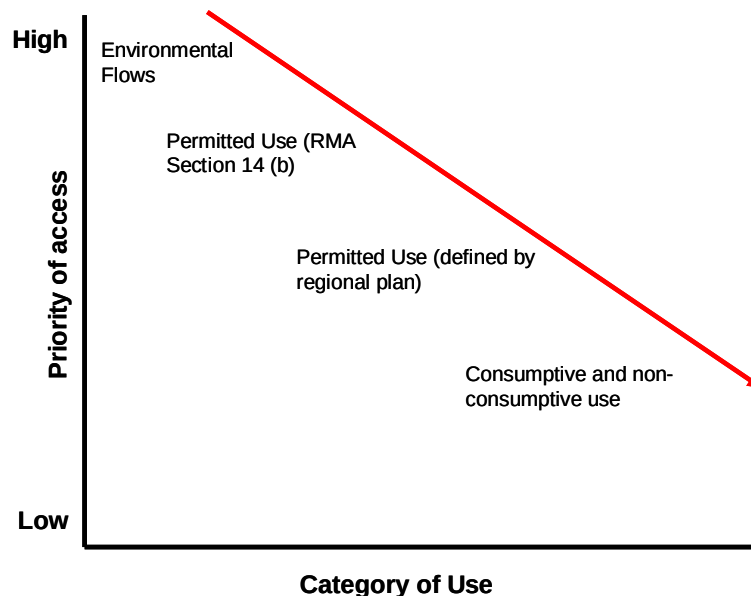
The varying uses of freshwater can be divided into three basic categories that describe the nature and ultimate application for which water is utilised. At a basic level these categories include:

- Maintaining values attributed to common pool resources;
- Private Goods that reflect basic public interest elements represented in legislation or supporting instruments e.g. fire-fighting, domestic and stock water supply; and,
- Other Private Goods:
 - i) Consumptive* - uses of water that involve abstraction or diversion of water from an individual waterbody. This definition also includes uses that involve temporal delay in the return of water to the original source (e.g. hydro storage, irrigation net-use); and,
 - ii) Non-Consumptive* uses of water that do not physically remove water from an individual waterbody, but may impact on water quality objectives (e.g. cooling water, commercial jet-boating, fish hatchery supply or maintenance of a trout fishery).

2.4.2 Broad Priorities Assigned to Categories of Use

Figure 3 provides a schematic illustration of the priority assigned to various categories of water use under the current First In, First Served allocation system. Environmental flows are assigned highest priority to reflect their common pool resource nature. Reasonable stock and domestic uses defined under Section 14 (3) (b) of the RMA are then accorded priority (provided they do not result in adverse environmental impacts) over permitted uses allowed by regional plans. Existing consumptive and non-consumptive users then have priority access (within the given duration of existing resource consents) to the remaining resource over new or future users.

- **Figure 3: Priority of access to water resources under the current allocation framework**



2.4.3 Sectors of Use

The basic categories of water use can be further subdivided into various “sectors” to reflect the ultimate use of the water. These sectors represent groupings of individual users with resulting economic, social and environmental considerations as determined appropriate by the regulatory authority. The sectors



present will vary between catchments reflecting the combination of land use, urban and industrial development present. Various sector examples with their associated categories of use include:

- Environmental, recreational and cultural sector (common pool resource , non-consumptive);
- Power sector (private good with national or regional public interest, consumptive or non-consumptive);
- Municipal supply sector (private good with local public interest, consumptive);
- Industrial sector (private good with regional/national interest, consumptive); and,
- Agricultural and horticultural sector (private good with regional/national interest, consumptive).

The assignment of various sectors of water use allows consideration of a range of factors involved in the water allocation decision-making process including:

- **National/regional/local benefits** - the contribution of an individual water use (consumptive or non-consumptive) to the overall economic, social, cultural and economic wellbeing of the community;
- **Current utilisation** - the level of current allocation (peak rates or volumetric allocation) to a particular water use sector;
- **Technical or physical efficiency of use criteria** - a measure of the relative benefit to the community derived from a given volumetric allocation of water;
- **Likely future demand** - future growth or expansion of a particular water use sector
- **Potential economic benefits** - potential local/regional/national economic benefits derived from a particular water use;
- **Potential environmental considerations** - beneficial or adverse effects of a particular water use occurring both in-stream and out-of-stream;
- **Appropriate restriction** - measures to reduce consumption by a particular water use sector during periods of limited availability; and,
- **Supply reliability criteria** - the reliability of supply required for a particular water use sector.

By considering allocation on a sector basis, future approaches to water allocation, while protecting the interests of existing users, may provide for prioritisation of access based on assessment of the relative merits and likely future demands of individual water use sectors. This is further discussed in Section 4.2.

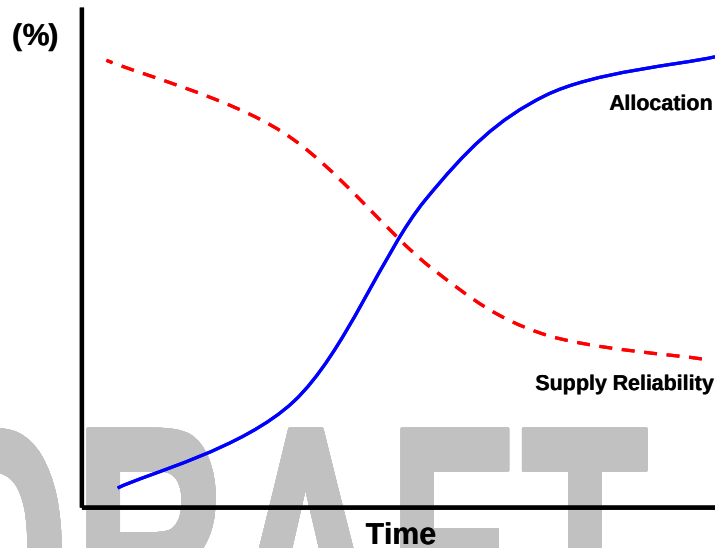
2.4.4 Reliability of Supply

In terms of water use, reliability of supply describes the ability of an individual water user (or sector) to access the resource to the extent permitted within their resource consent. Reliability can be characterised by the frequency of restriction and extent of restrictions imposed. For example, if reliability of access is high a user may be able to exercise their entitlement on a virtually uninterrupted basis, whereas if reliability of access is low a user may face frequent or severe restriction on their ability to fully exercise their resource consent.

Reliability of supply is a function of the minimum flow (streamflow) or level restrictions (groundwater) applicable to an individual water take as well as the total volume of water allocation. The reliability of access for existing users generally decreases as a greater volume of water is allocated over time. If no allocation limit is specified, reliability of supply may reduce to a point where a particular water use application is no longer viable. If a total allocation limit is specified this will ultimately determine the

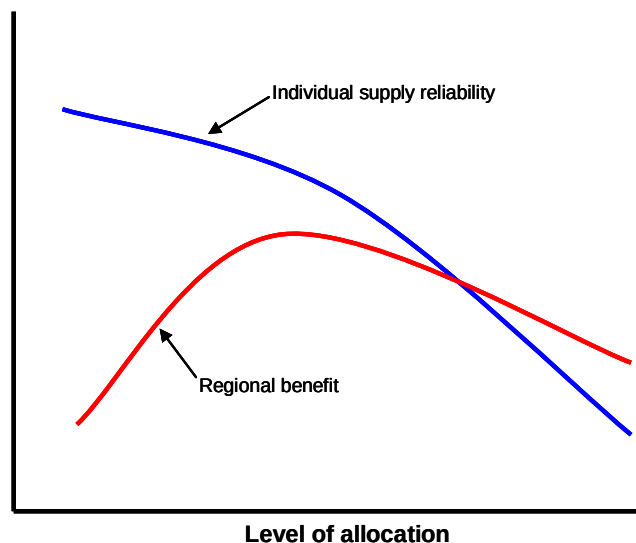
reliability of access for users when the resource is fully allocated. The reduction in reliability of supply accompanying resource allocation is illustrated in Figure 4 below.

■ **Figure 4: Variation in supply reliability with increasing allocation**



In terms of overall economic outcome, a trade-off exists between the economic benefit able to be derived from a given water resource and the reliability of access available to individual resource users. This relationship, illustrated in Figure 5, shows individual users maintain a high reliability of supply when the level of allocation is low. As more users access the resource, the overall economic benefits increase but the reliability of supply for individual users declines. The potential economic benefit continues to increase up to a threshold beyond which the reduced reliability of supply no longer provides positive economic outcomes overall.

■ **Figure 5: Impact of allocation on supply reliability and regional economics**





For individual resource users, the reliability of supply may either be determined on an implicit basis by the total volume of allocation from a particular water resource, it or may be explicitly stated in the conditions of a permit to access a water resource.

2.5 Impediments to Achieving Allocation Objectives

The current water allocation policy framework in New Zealand does not universally provide for optimum outcomes in all situations. This is particularly the case for water resources where there are currently high levels of demand between competing uses or where situations of full or over-allocation exist as a result of historical allocation processes. Although issues vary between individual water resources, several common themes emerge from assessment of current water allocation practice in New Zealand³. Issues identified relate to constraints of the current regional planning and resource consent process as well as the availability of appropriate tools or methods for a range of technical and planning issues related to water allocation.

In terms of the regional planning and resource consent process, constraints identified include:

- The limited scope for consideration of preferential or prioritised water allocation to achieve optimum environmental, social, cultural and economic outcomes;
- The ability to incorporate elements of uncertainty inherent in natural resource management into the water allocation decision making process (e.g. where the actual effects of abstraction cannot be reliably predicted before some level of abstraction occurs);
- Adequate review provisions to enable effective management of over-allocation or in situations where available allocation may change over time;
- The use of provisions related to technical water use efficiency and the ability to transfer consents between uses; and,
- Elements of current resource consent structure.

Gaps identified in tools currently available to assist the resource allocation decision-making process include:

- Application of methods for assessing the relative merits of competing water uses;
- Methods for determining nationally and regionally significant values associated with a particular water resource;
- Methods for establishing technical or physical efficiency of use; and,
- Methods for the establishment of minimum flows/levels and allocation limits.

³ Hill Young Cooper, 2005; Ministry for the Environment, 2004

3. Current Regulatory Process

3.1 Overview

Under the RMA the main responsibility for the management and allocation of freshwater resources is exercised by regional councils and unitary authorities. The RMA provides for councils to prepare policy statements and regional plans to manage the overall allocation and use of water resources. Regional plans provide a framework for managing the taking of water for consumptive and non-consumptive use from rivers, lakes and aquifers. Regional plans may provide policy guidance and rules establishing volumetric allocations as well as minimum flows and/or levels set to maintain environmental baselines during periods of limited availability. Water is allocated for consumptive and non-consumptive use above the baseline environmental thresholds through the resource consent process.

Water allocation may also be controlled by Water Conservation Orders. The RMA provides for the use of Water Conservation Orders as an instrument to protect the outstanding amenity or intrinsic values of a water resource. Once a water resource is covered by a Water Conservation Order further allocation for consumptive use (other than as a permitted use) can only occur via the resource consent process in a manner compatible with provisions of the Order.

Under Section 14 of the RMA, consumptive use of water is permitted for reasonable domestic and stock water requirements provided the taking of the water does not result in an adverse effect on the environment. All other taking and use of water requires resource consent except where permitted by a regional plan. A majority of regional councils have established a threshold for permitted takes which varies between individual regions but provides for small-scale utilisation of water for consumptive supply. As a result there are effectively two 'types' of permitted take; those established reasonable stock and domestic use under the RMA and those operating under permitted use criteria established by regional plans.

The process for obtaining resource consent is set out in Part 6 of the RMA. The consent process currently operates on a First-In, First-Served basis where applications are processed sequentially in the order they are received. Applications for resource consent are typically assessed in terms of policies and rules contained in regional policy statements and plans with consideration given to avoiding remedying or mitigating potential adverse environmental effects.

The only exception to this process to date occurred in the Waitaki River catchment where, due to significant competing demands on the available water resource and the absence of a relevant regional plan, the Government enacted special legislation (*Resource Management (Waitaki Catchment) Amendment Act 2004*) to address water allocation in the catchment by establishing a Board to prepare a regional plan. While the plan preparation process was changed, the resulting regional plan was prepared under the same RMA framework as other regional plans.

3.2 Individual Consent Structure

Under Section 14 of the RMA the taking, use, diversion and damming of freshwater requires a resource consent (termed a water permit) for uses other than stock, domestic and cultural uses as defined in subsections (b) to (e). Regional plans may also define a permitted activity threshold under which water can be taken, used, diverted or dammed without requirement for resource consent. This permitted activity



criteria varies between individual regions reflecting a range of factors including cumulative demand and water availability.

A water permit basically confers the right to access and use water at a specified rate, at a particular location(s) for a given purpose subject to certain conditions. Conditions attached to a water permit may include:

- The location(s) of the point of take or diversion;
- The ultimate use of the water;
- Volumetric controls on the rate of take (instantaneous, daily, weekly, monthly, seasonal, annual);
- Land titles (or designated areas) over which the consent may be utilised;
- Controls on the technical or physical efficiency of water use;
- Specification of environmental compliance monitoring requirements;
- Implementation of controls or restrictions on the exercise of the consent; and,
- Provisions to enable review of the consent.

The RMA also establishes a framework for the management of resource consents (water permits) that includes a number of provisions that control the exercise and term of the consent. These provisions include:

- A water permit is not tied to a particular land title but is personal to the consent holder. However, a water permit may be transferred to a new owner or occupier of the site, or on a temporary or permanent basis to another site within the same catchment or aquifer (RMA Section 136);
- The maximum term of a resource consent is 35 years after which time the holder must apply for a new resource consent (RMA Section 123). Possession of an existing resource consent does not confer any right of renewal once the term of the consent expires;
- A water permit may lapse if not given effect within 5 years of granting (Section 125) or be cancelled if not utilised for a period of 5 years (RMA Section 126);
- The conditions of a water permit may be reviewed by the regional council to deal with any adverse environmental effect not anticipated at the time the consent was granted or to meet standards set in an operative regional plan (RMA Section 128); and
- In limited circumstances a regional council may issue a water shortage direction (RMA Section 329). This process enables a regional council to restrict or suspend any permitted or consented water abstraction within a specified area during periods of serious temporary water shortage.

3.2.1 Property Rights in Relation to Water Allocation

It has been clearly signalled through the Sustainable Water Programme of Action that water will continue to be managed as a public resource under the Resource Management Act. As a result, “property rights” in relation to water do not correlate to ownership of the resource but describe the quality of right to access and use a given water resource.

A recent discussion paper on the practice and perceptions of property rights in relation to water⁴ concluded that security of tenure was the major issue for current water users in relation to rights to access water. This issue was mainly associated with future availability of the resource, consent review initiated by alteration to minimum flow or allocation regimes in regional plans, reduction in supply reliability due to granting of additional consents and ability to renew the consent at the expiry of the current term. These concerns must be considered in any future development of systems for the allocation of freshwater.

3.3 Flexibility of Existing Consent Structure

At the present time the structure and scope of conditions attached to individual resource consents to access water for consumptive and non-consumptive uses may constrain the potential to achieve optimum results from the allocation process. Potential limitations include:

- **Consent structure**

Conditions attached to current resource consents control both access to the resource (peak rate and/or volumetric limitations, access restrictions) as well as the ability to utilise the water in a given manner (nominated use, land titles, technical controls on efficiency of use). Separation of the “**right to take**” from the “**right to use**” may provide a means to facilitate reallocation of water within a nominated management zone while ensuring potential issues related to the use of water at a given location are adequately controlled.

- **Specification of peak rate and/or volume of abstraction**

Specification of a peak rate and/or volume of abstraction on a resource consent is intended to manage the individual and cumulate impact of water abstraction on a particular water resource. However, in situations where the availability of the resource is uncertain or where resource availability changes over time, an alternative entitlement based on a “share” of the available resource, while guaranteeing the access to the resource, may enable a regional council to control the total allocation available in line with established sustainable limits.

- **Consent duration**

At the present time there is a tension between investment certainty and planning flexibility with regard to the terms of resource consents issued. While the RMA provides for a maximum terms of up to 35 years, it is common practice for consents to be issued for significantly shorter durations. In many instances the reluctance to grant consents for the maximum duration reflects uncertainty inherent in the resource consent decision making process. With improved ability to review or control total allocation, the term of resource consents may be able to be extended to provide greater ongoing certainty of access to the resource.

- **Technical efficiency of water use**

Many current resource consents are issued subject to criteria for efficient utilisation of water. This only relates to single use at given site so if allocation is transferred this has to be reassessed for transferred allocation complicating the transfer process.

Management of water permits on the basis of physical or technical efficiency may also prevent consents being obtained for purposes other than consumptive or non-consumptive use (e.g. enhancement of stream flows above specified environmental thresholds).

⁴ Harris Consulting and the AgriBusiness Group (2003)



- **Renewal of existing water permits**

At the present time no specific provisions exist for the renewal of existing resource consents once their current term expires. However, the established custom is for consents to be renewed albeit subject to modified conditions. Section 104A requires consent authorities to have regard to the value of existing investment when determining applications for new consents to replace existing consents. This requirement only applies to applications made under section 124 of the Act, that is, where the existing consent holder applies for a new consent for the same activity and the application is made at least three months before the expiry of the existing consent.

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4. Definition of Rights to Take and Initial Resource Allocation

4.1 Overview

The basic objective of a water allocation process is to enable equitable provision to be made for existing and future water users in a way that optimises environmental, social, cultural and economic outcomes for the community. However, as definition of both the constraints and opportunities that relate to a sustainable level of resource use may change over time, there is always a level of uncertainty associated with the decision-making process. Thus, the outcome from the time of the initial allocation tends to be 'precautionary' in the absence of complete information.

The initial step in the development of a water allocation framework is definition of the resource available for allocation to consumptive and non-consumptive uses after provision has been made to maintain common pool resource values (i.e. minimum flow requirements and volumetric allocation) and allowance made for uses with public interest components (e.g. RMA Section 14 (3) (b) stock and domestic requirements and permitted use specified by regional plans). Methods for establishing environmental flows are not covered in any detail in this report but form a separate work stream under the SWPoA.

The outcome of this step is confirmation of whether there is sufficient resource available to provide for consumptive and non-consumptive uses that, in the main, represent private goods. The remaining resource available for allocation may then be considered in terms of access rights that can be issued to additional users. If the current level of allocation exceeds the allocation limit determined then the resource is deemed to be over-allocated. This situation and possible options to deal this situation are examined in detail in Section 6.

Once a maximum allocation limit has been determined, a regional council may also select specific shares of the available resource and make these available to specific industry sectors. A regional council may also divide the resource into various reliability bands or shares of the resource, and specify regulatory constraints applicable to specific consent categories. Aspects of this decision process are formally represented within regional plans. Once the total allocation available from the resource is defined, this can then be issued to individual users through the resource consent process.

The process of developing a broad strategy for water allocation from a resource is iterative. It must have regard to the range of potential water use applications (both local and regional), the likely timing as to when uptake is possible and/or likely, the minimum 'parcels' required to ensure economies of scale are preserved, and the consequential impact upon environment related values for various water applications. This process enables a cap on available allocation to be determined.

Later sections of this report discuss methods by which the uncertainty inherent in the resource consent decision-making process can be managed through a combination of regulatory and market-based approaches. Within this section, a summary of the broad structure of initial allocation decisions is presented, and this is followed by a review of the First in, First Served method of individual consent allocations and the alternative of primary market auctions and a ballot system. The allocation options considered are idealised in the sense that they assume a clean slate (i.e. allocation from a zero base). However, in practice, one of the major issues for regional councils in developing future water allocation



policy will be any transition required to revised consent structures and supporting management arrangements.

4.2 Approaches to Allocating the 'Rights to Take'

In developing a strategic framework for the allocation of a water resource, an initial step is to develop an understanding of the likely nature of resource development. This process may include identification of potential consumptive and non-consumptive uses, determination of appropriate supply reliability for each use followed by definition of appropriate priority for access, restrictions and efficiency of use criteria to maximise utilisation of the available resource. In the following sections the basic concepts of developing right-to-take 'products' that reflect sector priorities, reliability bands and resource shares are discussed. Clearly defining these 'products' is an important component of the overall definition of property rights related to water.

In New Zealand, most water resources have at least some level of allocation through permitted or previously consented usage. In determining future allocation methods, the transition of these existing interests must be considered, and in fact may represent the most complicated aspect of achieving equity for resource users.

Rather than being viewed as separate methods to facilitate water allocation, the methods discussed in the following section should be considered as options that can be combined in various forms to provide catchment-specific outcomes. Where appropriate, examples drawn from either local or Australian experience are presented to illustrate potential application of alternatives discussed.

Development of specifications for available allocation in terms of sectors of use, sector priorities, supply reliability and resource share require a significant level of information in order to improve definition of future demand. In part these information requirements may be addressed through strategic regional water use studies that provide assessment of current and potential future resource utilisation.

4.2.1 Sector Priority

Once the availability of water for allocation has been determined, priority may be assigned for alternative sectors that may access the resource. As described in section 3.3.3, sectors of use may include any grouping of users deemed appropriate by the regional council. Sectors of use may be defined on the basis of criteria as diverse as geographic area (e.g. users within a sub-catchment or nominated land area), public interest (e.g. municipal water supply), economic benefit and technical water use efficiency but are more commonly determined on the basis of economic or public interest criteria.

Where a sector has not developed to the extent that the water is fully utilised, then a 'parcel' of water may be reserved to facilitate growth when it occurs.⁵ The parcel of water may reflect a nationally important outcome, or instead ensure required economies of scale exist to support particular industries. Table 2 describes sectors of use utilised in the development of the Waitaki Catchment Water Allocation Regional Plan.

⁵ The outcomes of the Waitaki Catchment Allocation Board addressed these issues as part of the decision process.

■ **Table 2: Sectors of use defined in the Waitaki Catchment Water Allocation Regional Plan**

New Zealand Example 1: Waitaki Catchment Water Allocation Regional Plan

The Waitaki Catchment Water Allocation Board was created by the government by way of special legislation (*Resource Management (Waitaki Catchment) Amendment Act 2004*) to develop and approve a regional plan to guide water allocation in the Waitaki Catchment. While enacted by special legislation the plan was prepared following standard RMA process.

One of the key outcomes of the process was the development of a framework for water allocation between competing consumptive and non-consumptive uses in the catchment. Key sectors of use were identified according to policy guidelines and an annual volumetric allocation to each sector specified at a number of points within the river system. The sectors of use utilised in the determination of final water allocation were:

- Town and community water supplies
- Industrial and commercial activities
- Tourism and recreational facilities
- Agricultural and horticultural activities
- Hydro-electricity generation
- All other activities

A simple application of sector allocation to a hypothetical surface water resource is illustrated in Figure 6. In this application individual sectors of use have a specific reservation of water, the availability of which depends on river flow. The order in which each sector is restricted depends on the defined sector priority, with environmental flows and permitted uses assigned highest priority.



■ **Figure 6: Simple application of sector priorities for allocation of a water resource**

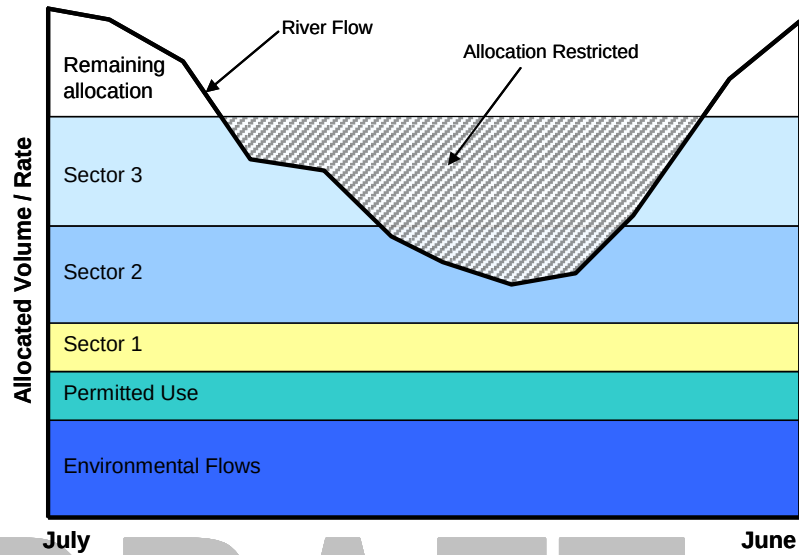
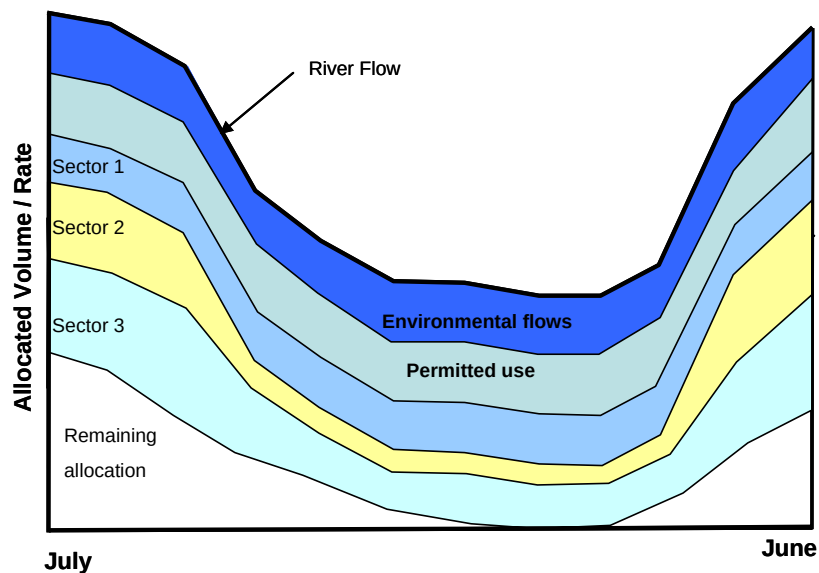


Figure 7 illustrates a slightly more complex application of sector priorities for water allocation to a hypothetical water resource where the available allocation is based on peak abstraction rate defined as a portion of actual river flow. Under this scenario allocation to various sectors (including environmental flows) may vary seasonally reflecting environmental or water demand requirements.

■ **Figure 7: Application of temporally variable allocation to individual resource use sectors**



In the case of groundwater allocation, the seasonal (or volumetric) allocation is likely to be a key factor in determining resource availability.

In developing sector allocations it is important to promote flexibility until individual sector allocations are fully utilised. If a portion of allocation for a given sector remains unused, then it is important this allocation can be accessed on a temporary basis by other sectors (if demand exists) to facilitate optimum utilisation of the available resource. Sector reservations made by regional councils may seek to protect the potential growth of regionally important industries, but temporary assignment to alternative uses should be encouraged during interim periods until such growth occurs.

The major disadvantage with allocations to individual sectors of use is that over time, the most economic use of the water may not be consistent with the intended reservation made at the time of allocation. Sectors may be given incentive to develop on the sole basis that a reservation exists. Also, temporary reallocation between sectors is likely to result in a limited guarantee of continued right to access for users who utilise this mechanism. A possible remedy for this eventuality is to include defined sunset clauses on certain sector allocations which would be made available for re-allocation if not utilised within an appropriate timeframe.

Definition of appropriate allocation to individual sectors of use may be problematic for water resources where current demand does not exceed the volume of allocation available. In this instance regional councils may be required to forecast potential future demand based on incomplete information. However, provision for new sectors and changes in individual sector usage can be enabled through establishment of appropriate transfer mechanisms to enable reallocation of initial allocation. Identifying appropriate sector priorities may also be difficult given competing demands for water in many catchments. However, as shown by the outcomes of the Waitaki Catchment water allocation process, these issues can be addressed through development of appropriate policy guidance.

Triggers governing water restrictions on the basis of the sector importance are another form of sector priority, which tend to reflect different reliability bands and resource shares within consent definitions. These reliability bands are discussed in greater detail below.

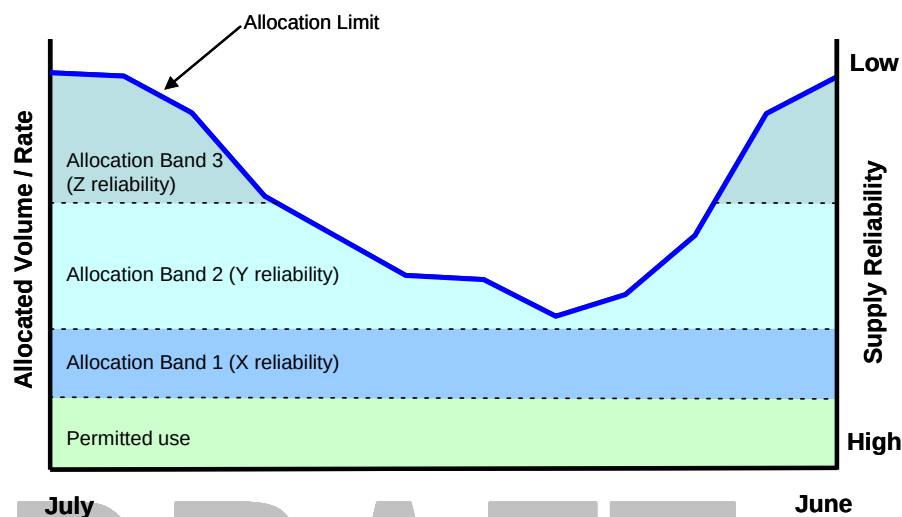
4.2.2 Reliability Bands

A means to avoid a gradual reduction in supply reliability with increases in allocation over time is to allocate the available water resource on the basis of “bands” with defined supply reliability. Under this scenario, as illustrated in Figure 8, users are assigned a volumetric supply with defined supply reliability. This provides a means to protect the rights of existing users while allowing additional allocation and has been implemented in a several regions around New Zealand.

Under the current first-in first-served system the available allocation is granted sequentially as applications are received. This results in higher supply reliability being assigned to initial users as allocation with higher reliability of supply is progressively taken up (effectively equivalent to the North American system of prior appropriation). For surface water takes the lower supply reliability for users accessing lower reliability bands makes this water most suitable for water harvesting or out-of-season uses.



■ **Figure 8: Allocation on the basis of supply reliability bands**



In combination with sector allocation, reliability bands provide an option for prioritising access to the available water resource for different uses. This combination would enable regional councils to offer higher supply reliability to uses that involve public benefit or are likely to provide highest environmental, social, cultural or economic benefits. Priority bands can also be established to reflect the supply reliability required for different end uses. For example, the supply reliability required by a high value horticultural crop may be significantly greater than that required for pastoral irrigation.

Table 3 describes the application of supply reliability bands to water allocation in the Awatere Catchment in the Marlborough Region.

■ **Table 3: Water allocation in the Awatere Catchment, Marlborough**

New Zealand Example 2: Water Allocation in the Awatere Catchment

The Marlborough District Council manages water allocation in the Awatere and Wairau catchments under the Proposed Wairau/Awatere Management Plan. This plan contains provisions a water allocation system which consists of three classes of water permit each with a specified supply reliability:

Class A water permits enable the holder to take water with a high degree of reliability. Class A water permits are only restricted when the flow drops below the assessed one in five year low flow at a nominated monitoring point

Class B water permits enable the holder to take water with a moderate supply reliability. Class B water permits allow for partial takes at flows above the specified one in five year weekly flow and full abstractions above the 80 percentile flow. As a result a Class B permit will be fully available for 80 percent of the time, partially restricted 18 percent of the time and unavailable 2 percent of the time.

Class C provide for relatively low reliability water abstraction to supply storage, recharge groundwater or generate electricity. Class C permits are only available when flows are greater than the flow exceeded 80 percent of the time.

Table 4 describes an example of the application of reliability bands adopted in the State of Victoria, Australia to control additional water that can be accessed during high flow months (July to October).

Typically these diversions are into on-farm storages for use by licence holders (consent holders) throughout the remainder of the year.

■ **Table 4: Sustainable diversion limits, Victoria, Australia (SKM & CRCFE, 2002, 2003)**

Australian Example 1: Sustainable Diversion Limits

The Victorian State Government has defined **sustainable diversion limits** for harvesting additional water from unregulated streams. This diversion limit represents an upper limit on diversions beyond which there is an unacceptable risk that additional extractions may degrade the environment. The sustainable diversion limit calculations were based on trialling different diversion regimes and examining impacts on ecologically important flow indicators.

In Victoria, new diversion from a catchment can only occur over winter months (July to October inclusive) and is subject to:

- A maximum annual diversion from the catchment – this ensures that the reliability of winterfill supply is at least 80%.
- A maximum diversion rate at any given time from the catchment – this is defined as the difference between the median winterfill flow exceeded in 50% and 80% of years, computed over the months July to October
- A minimum flow at which diversions cease - this is defined as the maximum of (i) 30% of the mean daily flow from July to June and (ii) the median daily flow from July to October that is exceeded in 95% of years.

These values have been incorporated into a GIS-based Sustainable Diversion Limit Viewer, which allows licensing authorities to rapidly assess any applications for new diversion licences.

The sustainable diversion limit is a precautionary value that does not necessarily represent an absolute upper limit on development, but rather is used as a trigger for undertaking more detailed ecological studies under a streamflow management plan or other environmental flow assessment process.

The major advantage with this right-to-take 'product' is that it provides specified *historical* reliability for resource users. It also provides a signal that as resource access increases there is a need to consider storage to support extractions resulting from continued growth.⁶ Most importantly, it facilitates a structure of prioritised access to the available water resource for uses providing the highest environmental, social, cultural and economic values.

The major concern with this methodology is that the regional council is defining reliability in terms of a fixed volume that it may not be able to deliver in the future due to external climate variables. As a result, if observed reliability declines from that specified, consent holders may form the expectation that the regional council will revise other consent holder rights (in other reliability bands) to maintain the access right to the originally specified level of supply reliability.

A regional council may be tempted to create many right-to-take 'products' each with a different reliability characteristics to meet specific demands within the catchment. However, by increasing the number of products this reduces the potential for direct transfer between users. In terms of market transfer, this segregation makes valuation of the right difficult (as there is a reduced secondary market) and financial

⁶ In terms of storage the likely outcome in the New Zealand context will be greater development off-stream storages to sustain extractions over a continuous time period. On-stream storages are considered less likely in the future.

risks associated with transfer are increased. In a situation of over-allocation, increased numbers of products also make the process of redistribution of consents more complex.

4.2.3 Resource Share

Proportional water allocation (resource share) is a variation on the existing system of water allocation whereby users are granted the right to access a given share of the total allocable volume and peak extraction capacity up to a maximum allocation limit. The allocable volume or peak extraction rate can be varied on a temporal basis to reflect changes in water availability both through the year and over subsequent years. This allocation system also establishes equity between individual users or, if combined with sector allocation, groups of users.

A system of resource share starts to delineate the 'right' to access the resource from a 'right' to a set volumetric or peak rate allocation established by resource consent conditions. Ultimately, regional councils do not have a great deal of control over the resource availability but consent holders tend to remain focussed on the reliability of rights observed historically when the resource was not fully allocated.

Figure 9 illustrates the concept of resource share in a situation where the available allocation changes as a result of a review of the total sustainable allocation from the resource. This review may be triggered by long-term changes in climate affecting the availability of the resource or by environmental monitoring that indicates an adverse impact on common pool resource values intended to be protected by the previously established allocation limit.

Under a resource share specification each individual user (or sector of use) may be equally restricted as result of changes to the allocation limit for the resource. However, in combination with sector priorities, different sectors of use may be restricted to a different degree reflecting established priority of access (e.g. environmental flows or permitted use may not be restricted as a result of changes to allocation limits reflecting their public interest components).

■ Figure 9: Water allocation in terms of resource share

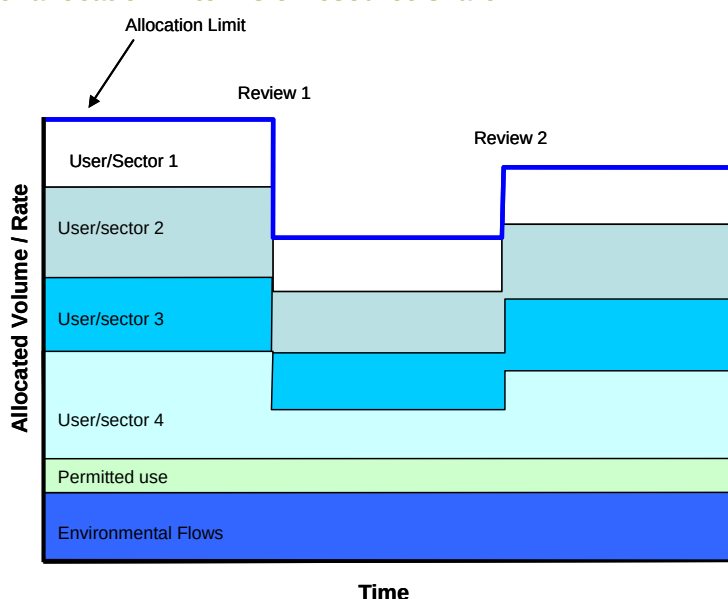


Table 5 below illustrates the application of a resource share arrangement for the allocation of water in unregulated streams in the state of Victoria, Australia.

■ **Table 5: Streamflow management plan development in Victoria**

Australian Example 2: Streamflow Management Plans The Victorian Government is developing Streamflow Management Plans (SFMPs) in priority unregulated rivers where the river is flow stressed or there is increasing demand for water. SFMPs aim to provide a balanced and sustainable sharing of streamflows between all water users in unregulated river catchments. SFMPs in Victoria are legally binding on individual water users and authorities. Emphasis of the plans is on water sharing between consumptive users and the environment during periods of flow stress. SFMPs develop rules for how entitlements within the stream catchment are to be managed to meet the objectives for the stream developed by a community based consultative committee. The outcomes of the rules for entitlements and the historical reliability of these entitlements is underpinned by a computer model (e.g. REALM) and forms the benchmark for understanding future SFMP management decisions. The plans include: ■ an environmental flow regime; ■ rules for sharing the available streamflows between users during times of shortage; ■ monitoring and metering programs; ■ decisions on the amount of additional water that can be allocated, and rules for allocating it; and ■ conditions under which licences may be traded or transferred. A consultative committee made up of representatives from a range of stakeholder groups develop SFMPs. Representatives include consumptive water users, non-government organisations and government organisations with statutory responsibilities. Decision-making in the consultative committee is by consensus. This means that committee members agree in principle that the recommendations in the Draft Plan overall are a fair and reasonable means of achieving the objectives. The Draft Plan is then the basis for public consultation. It is a community plan until approved by the Minister.

Resource share-type specification can provide equitable access to the resource for all users or, if combined with sector allocation and reliability bands, provide for prioritised access to nominated categories of users. Resource-share arrangements can also be associated with alternative options for initial allocation (i.e. percentage landholding within a nominated catchment or area). However, possibly the greatest advantage relates to ongoing management of the resource in that volumetric and peak extraction rates can be varied on a temporal basis to respond to climate variability as well as evolving knowledge and changing environmental, cultural and economic values associated with water.

Potential disadvantages of this approach include that existing consent holders may perceive greater uncertainty of supply security with a 'resource share' type consent that can be adjusted at any time. However, options exist for retaining a maximum volume and peak extraction specification within a consent. The adoption of this method of allocation also requires a cap on total volume and peak extraction rate allocated in order to prevent gradual erosion of security of supply for consent holders. Similarly, there is a requirement for greater monitoring of consent compliance if allocable volume or peak extraction rates are to be varied on a temporal basis.

To support property 'rights' under a resource share arrangement, the criteria that govern the calculation of the total share available must be well defined and subject to review at certain times. Engagement of



existing consent holders is crucial such that they understand the reasoning for any requirement to change the pre-existing rules and have input into the structure of the changes that might be adopted.

4.2.4 Summary

In the previous sections, discussions have identified three important options for developing a water allocation process: sector priorities; reliability bands and resource shares. Ultimately, any water allocation framework may reflect aspects of these three key attributes. If the overall goal is a responsive water allocation system in the long-term which promotes continued investment opportunity, then it is suggested that consideration also be given to:

- Clear specification of sector priorities and their individual requirements in respect of parcel size, reliability and resource share;
- Where possible, grouping of sector priorities into various right-to-take 'products' which satisfy user requirements and facilitate relatively straightforward, temporary and permanent transfer between consent holders over time;
- Definition of allocation in terms of as a resource share with upper limits on allocated volumes and peak extraction rates, with indicative bands of resource reliability forming an important target characteristic of each resource share product;
- Establishment of explicit rules for resource shares including terms of review that reflect a reasonable time-frame in respect of economic certainty while enabling sufficient flexibility to manage environmental outcomes.

The following sections examine alternative mechanisms for allocating the rights-to-take associated with a water resource.

4.3 Options to Facilitate Initial Allocation

Once the volume of water available for allocation has been determined and specific 'right to take' products defined the available allocation can be issued to consumptive and non-consumptive users under the resource consent process. Available options to facilitate this process include the current First In, First Served system as well as primary auction or ballot systems. The following section described the potential application of each of these options to the initial allocation of a water resource.

4.3.1 First In, First Served

In situations where a water resource is able to support water allocations to consumptive and non-consumptive uses, regional councils currently implement a First In, First Served approach to allocation under the RMA. Under this approach, regional councils may grant additional resource consents to individual users in sequential order where it can be demonstrated that the nominated use will not have material impact upon existing consent holders, or an adverse impact on attributes required for environmental or permitted uses.

Historically this approach has been adopted on the basis that:

- Demand does not exist at the time of initial allocation that would fully exhaust the available resource;
- Definition of the resource at the time of initial allocation is insufficient to determine sustainable allocation limits but is increased over time in response to resource development. The process of

resource exploration adds to the information available of the resource as a whole in the public domain and First In, First Served generally rewards those users that seek this information⁷;

- Demand may exist at the time of initial allocation, but the priority of consents to be assessed in part or in full reflects the overall objectives of the water allocation in the long-term therefore market-based mechanisms do not represent a more efficient outcome.

The approach taken to issue resource consents on a First In, First Served basis is administratively simple and proceeds on the basis of continuing information discovery until sustainable limits have been formally recognised. Guidance for resource consent applications is provided by objectives, policies and rules articulated in regional planning documents and other aspects of RMA Section 104. The wide application of this method also provides an advantage in terms of well developed case law to support the decision-making process.

Beyond the constraints of the consent structure discussed earlier, the major limitations of First-In, First-Served allocation methodology relate to:

- Approving resource consent applications at the risk of denying alternative consumptive use options for a fixed period of time if transfer mechanisms do not exist;
- The limited ability to effectively deal with situations where many applications are received in a short period (i.e. a 'gold rush')
- Encouraging potential applicants to apply for consent before they have any intention of using it (or of putting it to the most valuable use) simply because water is available.
- Ensuring that a resource consent issued to individual consent holders represents the amount of water required to sustain the required activity if transfer mechanisms do not exist;
- Situations where resource 'share' specifications and restrictions vary between individual consents, effectively create many different right-to-take 'products'. This introduces administrative problems in relation to transfer and consent review processes; and,
- The potential for the reliability of issued consents to be undermined by expanded consents for 'higher priority' uses identified (e.g. increased minimum flows, increased individual stock and domestic requirements) where these entities are not required to access common consent transfer mechanisms first.

In a static industry environment where security of supply is not affected and demands reflect a low percentage of available allocation, the process of first-in, first served is considered an appropriate allocation model to have in place. For this reason First In, First Served is used widely and is appropriate for many water resources in New Zealand. However, even in this instance, the consent specifications should reflect a consistent structure which can be advanced, if necessary, as the level of allocation increases and facilitate administratively simple adjustment⁸ should new information require the level of water availability to be reviewed.

⁷ An exception is where information 'discovered' by initial users may benefit subsequent consent applications in terms of information requirements.

⁸ The term 'administratively simple' does not necessarily imply that the methodology for consulting with relevant stakeholders on such changes is straight forward.



Essentially, the limitations of the First-In, First Served consent process do not emerge until the resource approaches full allocation. In this situation initial consent holders will start to experience restrictions in access to water. When the resource is fully allocated, users who may enable better utilisation of the resource will be denied access.

4.3.2 Primary Market Auction

An alternative to the First-In, First-Served allocation method is to organise a primary market auction of consent rights.⁹ The overall objective of the auction is to allocate water to its higher value use and therefore the auction must be designed in a manner that provides for this outcome. The ability to use auctions is limited to the following circumstances:

- Existing demand for water resources is in excess of available water allocation available;
- Market participants must reflect all desired sectors of water use for which allocation is made available;
- Market participants must be pre-qualified to take water for their proposed use; and,
- The auction 'rights' must be specified clearly and enable participation that maximises the depth of the market for price discovery; and,
- Market participants must have sufficient information on the nature of the resource and the conditions on any consents granted (e.g. reliability). Market participants would benefit from information on the marginal value of water for their uses.

In order to promote active utilisation of available allocation there may be a formal requirement within the rights that they must be exercised within a fixed period of time to ensure that the intended development supported by the water allocation occurs. If the rights are not exercised, the option exists to require forced transfer in the secondary market, or forfeiture and subsequent reallocation of rights by the regional council.

The ability for all market participants to be pre-qualified may be constrained due to the resource consenting process for activities that are not identified as 'permitted' or where the consent application process is relatively specialised for the intended use. In such cases pre-qualification may not be necessary however consents could be issued conditional on certain usage criteria being satisfied.

In terms of auction design, Jehle & Reny (2000, pg 374) identify four main types of auctions:

⁹ A primary market is one where the good, in this case resource consent rights, are issued for the first time. A secondary market is one where the good is transferred between market participants.

■ **Table 6: Common auction types (from Jehle & Reny, 2000)**

First-Price, Sealed Bid: Each bidder submits a sealed bid to the seller. The high bidder wins and pays the bid for the good

Second-Price, Sealed Bid: Each bidder submits a sealed bid to the seller. The high bidder wins and pays the second highest bid for the good

Dutch Auction: The seller begins with a very high price and begins to reduce it. The first bidder to indicate wins and pays the bid at the current price

English Auction: The seller begins with a very low price (perhaps zero) and begins to increase it. Each bidder signals when they wish to drop out of the auction. Once a bidder has dropped out, they cannot resume bidding later. Only one bidder remains, declared the winner and pays the current price.

In terms of recent Australian experience, the Dutch Auction system has been used effectively (with some modifications) for recent groundwater allocations in Victoria. An overall observation is that this method allows market participants to discover the price as the auction progresses, and the overall allocation available can be exhausted with multiple rounds of bids advanced in a timely fashion. The modified method has the following attributes:

- The volume to be auctioned starts at a small parcel that would possibly reflect a fraction of a stock and domestic demand, the winner of this volume has the option to purchase any additional volume at this price up to the remaining allocation available; and,
- The volume to be auctioned is gradually increased as the price bid decreases

The limitation of the auction process described is that it only relates to the annual extraction volume, and not the peak extraction requirement which will be relevant for surface water resources (or hydraulically connected groundwater resources). A potential option to address this issue is to hold a second auction process for the peak extraction rate, bid in terms of a fraction of the volumetric entitlement held, with the factor starting at a high multiple (for example three) and gradually reduced to zero for each of the reliability bands in a priority from highest to lowest band. Any auction design should be structured to ensure that a bidder has reasonable access to both the volumetric and peak extraction rights.

Primary market auctions could be expected to work reasonably well for consumptive users (including municipal requirements to satisfy demand growth), and non-consumptive users that are treated in a consistent manner to consumptive users in the context of water allocation process. Other advantages of this approach are the ability to deal with a 'gold rush' situation where demand is likely to exceed available allocation. A primary market auction is also likely to deliver an outcome where the available resource is allocated to the highest value use.

However, primary market auctions are generally not preferred to deliver common pool resource outcomes (e.g. discretionary water for environmental or cultural attributes) as it requires an independent entity to be charged with the responsibility of bidding on behalf of the outcome desired. If this entity does not have the required financial resources (due to poor coordination of beneficiaries and potential for free-riding) to match other bidders, there is a risk that these outcomes will not be achieved in full.

Other disadvantages with application of a primary market auction system may include:

- The process may not effectively deal with externalities (e.g. social benefits of a proposal such as maintaining a rural community);



- Issues related to perceptions of ownership and where the money paid by resource users goes;
- Issues related to determining who qualifies to participate in the auction; and
- Issues associated with understanding the actual effects of each combination of potential users.

4.3.3 Ballot

An alternative to the primary market auction system is the allocation of water via a ballot system. This option could be applied in similar situations to an auction system (i.e. demand in excess of remaining allocation) and may avoid issues created by the financial transactions involved in the auction process. These issues may relate to both perceived 'ownership' of the resource as a result of a successful auction bid as well as the ultimate use of funds generated by the auction process.

However, potential disadvantages of the application of a ballot system either on a catchment-wide basis or without relatively strict pre-qualification criteria include:

- The outcome of the process is likely to be random and unlikely to optimise outcomes for allocation between competing consumptive and non-consumptive uses, particularly in terms of public interest (i.e. local, regional or national benefits);
- The potential to encourage speculation to obtain allocation for later transfer or to take advantage of potential windfall gain (particularly in terms of the potential impact on property values or subsequent ability to transfer allocation in a secondary market);
- Issues related to establishing potential individual and cumulative environmental effects of potentially random combinations of users.

One potential application of this system is for allocation to a single sector of use within a given geographic area where demand is likely to exceed available sector allocation. This would enable the attainment of overall sector allocation objectives while providing equal access to all potential users within the given sector.

In the New Zealand context application of a ballot system is likely to be more suited to allocation of groundwater allocation where a single sector allocation can be determined in terms of an annual allocation for a given aquifer system. In this instance the cumulative impacts of abstraction on sustainability of the resource are likely to be similar given a range of possible user combinations.

However implemented, a ballot system would likely require a relatively high level of regulatory intervention to pre-qualify potential applicants, ensure optimum use of available allocation, and discourage speculation. In addition, the issue of windfall gain and potential speculation would possibly require regulatory control by way of a requirement to either utilise allocation within a given period or alternatively restrictions on ability to transfer allocation.

5. Transfer of Allocation

5.1 Overview

In economic terms the broad objective of water allocation policy is to ensure that the rights to the water resource are utilised in such a manner to maximise the contribution to the economy as a whole. This condition is commonly referred to as 'allocative efficiency'.¹⁰ Achieving this outcome is dependant upon three conditions:

- **Economic efficiency:** ensuring that the resource is used in such a way that maximises its value to the economy;¹¹
- **Consumer efficiency:** where the allocation structure enables consumption of the resource to reflect wider commodity market and business profitability signals. For example, if agricultural returns provided greater returns than industrial water use, then water rights would be transferred from industry to agriculture to enable this outcome to maximise profits overall; and,
- **Equality of Marginal Social Costs and Marginal Social Benefits:** ensuring that water allocation at any point in time reflects an outcome where the positive externalities of accessing resource are equal to the negative externalities of accessing the resource. Externalities reflect those outcomes that occur but do not impart a direct economic outcome to the consent holder.

The process of initial allocation reflects the regional council's policy in relation to each of the above conditions at a fixed point in time. The question is whether the policy reflects continued satisfaction of these conditions at any time after the initial allocation process.

While it might be a broad generalisation (possibly somewhat generous) to assume that all methods of water application represent *physical efficiency*, it can generally be accepted that water will only be utilised in a manner consistent with positive economic outcomes, and therefore the condition of economic efficiency can be expected to persist with the initial allocation outcome over time.

To satisfy the condition of consumer efficiency over time, consents must be easily transferred (i.e. include a clear definition of peak rate or volumetric allocation and supply reliability as well as involve a timely process with low transfer costs) to reflect other commodity market signals and there must be sufficient information on market prices and supply/demand. "Thin" markets will tend to militate against efficient outcomes. Alternatively the regional council must implement a relatively interventionist approach to reallocate issued consents to reflect the available market signals. While a regional council may be positioned to consider large, industry-based signals with major implications for water allocation, it is unlikely to be adequately placed to assess individual consent holder profitability to support localised policy on reorganising existing rights.

¹⁰ This condition is also known as 'Pareto optimality'

¹¹ It should not be assumed that economic efficiency represents technical or physical efficiency of the application of the water volume to its intended use. Where water is not applied under gravity, the market signal for efficiency is driven by pumping costs so broad assumptions about the need for technical efficiency can be made in this regard. For gravity systems the linkage between economic efficiency and technical efficiency is less clear.



The final condition regarding the equality of marginal social costs and marginal social benefits is initially considered as part of the initial allocation process. However, environmental conditions may subsequently change from those conditions experienced historically and exogenous impacts may become issues in the management of the resource. Well known examples include climate change, the appearance of invasive pest species, or change in recreational and aesthetic requirements.

If initial allocations do not change over time regulatory intervention may be required to address over-allocation resulting from exogenous impacts. However, if allocations are free to change over time through transfer between users this process may enable allocations to readjust accordingly and reduce requirements for regulatory control to be exercised.

In the Australian context, it is common for individual licence (consent) transfers to be restricted within specific transfer zones, and broader transfer mechanisms, such as salt disposal entitlement 'trading' and restrictions on certain types of water transfers (e.g. proportional reduction or purchased entitlement), are also used to manage externalities that might otherwise occur.

The focus of this section of the report is the methods of transfer that exist at present and the potential enabling requirements, benefits and costs of supporting a secondary market for water resource consents. Facilitating greater ease in transfer of existing rights is consistent with achieving the condition of economic efficiency and will improve the ability to achieve the consumer efficiency outcome over time.

However, the final condition of ensuring the equalisation of social marginal benefits and costs will require regulatory oversight both in respect of approving transfers and also through regular reviews to establish whether the cumulative impacts of current resource allocation support long-term environmental outcomes.

5.2 Transfers Consistent with RMA Section 136

5.2.1 Property Transfer

The most common method of transfer of water permits between resource users occurs via sale or transfer of property title. In this case the right to access the resource is transferred directly to the new owner or occupier of the property, generally with no change to the associated consent conditions (e.g. point of take, peak rate/volumetric allocation, restrictions, conditions of use). This process requires written notice of the transfer to be provided to the regional council under Section 136 of the RMA.

In general, this transfer process is undertaken to enable the purchaser (or new occupier) to preserve access to water held by the existing owner. However, instances may occur where the transfer seeks to enable:

- Existing consents on adjacent properties to be aggregated so that water volumes may be directed to either property; or,
- The utilisation of the existing allocation on an adjoining property via additional infrastructure.

Such applications may require changes to conditions relating to property titles over which the water can be utilised under RMA Section 127.

Depending on location the existence of a resource consent to abstract water may confer significant value on a property title. This value is associated with a perceived 'scarcity' value of water in the local area, conditions of the consent (volumetric and/or peak rate allocation, restrictions), as well as the ability of the purchaser to utilise the available water to support their investment decision.

At the present time there is no significant holding cost for individual resource consents¹², therefore there is limited incentive for existing consent holders to actively engage in trying to sell surplus rights-to-take. Future uncertainty in resource availability may also encourage existing resource consent holders to adopt a more conservative approach to transferring allocation based potential reduction in existing allocations.

5.2.2 Regulatory Transfer of Allocation

Section 136 of the RMA provides for transfer of allocation within a given catchment, aquifer or geothermal field if the transfer is expressly allowed in a regional plan or gains regulatory approval. Following the 2005 RMA amendment, transfers of water allocation can occur on either a temporary or permanent basis and involve part or the whole allocated volume and/or peak rate.

A few regional plans currently contain provisions related to the transfer of water permits that provide for the transfer of part or whole of an existing water permit within a given water resource

Although there is provision for the transfer of water permits under the RMA, anecdotal evidence¹³ suggests limited use of this provision other than in localised areas. The exception to this observation would be for co-operative irrigation schemes where internal water trades (although technically part of the same consent) occur on a regular basis. This is consistent with Australian experience for unregulated streams and groundwater resources at the current time. While these forms of transfer are increasing in number, the majority of transfer continues to be within regulated streamflow resources which are large and inter-connected allowing a much greater depth of market.

5.3 Secondary Market Transfer

Following on from the previous section, secondary market transfer relates to the transfer of specific consented rights between individual users without the need for regulatory assessment (beyond basic approvals) for the trade proposed. The objective of secondary market transfer is to make water more available where it is needed and lower the transaction costs associated with moving the rights between users to facilitate highest value water uses. In the New Zealand context, the most likely component of water resource consent rights that could be transferred using a secondary market are:

- 1) rights to extract water up to a maximum specified peak rate; and
- 2) rights to extract water up to a specified annual volume for a particular reliability band.

Depending on the water allocation model design, extraction rate and volume rights may be traded in aggregate or instead separately.

Separation of peak extraction from volume rights is more of an issue in surface water resources than groundwater. While recent water transfer in Australia has seen the aggregated form of trade for these rights occur in the past, this appears to be shifting towards separate transfer for surface water resources in particular. The groundwater storage characteristics of aquifers without significant surface water interaction imply that separation of peak extraction rates is less of an issue.

¹² Other than RMA Section 136 charges

¹³ Hill Young Cooper (2005)



The typical driver for seeking more volumetric water is to expand productive capacity from application of the resource. However, in the Australian transfer environment, individuals have sought to increase their volumetric right to increase their personal ability to manage extraction restrictions, essentially allowing greater extractive capacity than previously available. Under this approach of securing a greater amount of extractive share, there is an opportunity cost of the volumetric water that is not accessed during normal climatic or flow conditions. By separating the entitlements between peak and volume rights, this impact is removed.

In fully allocated surface water catchments, the price signal for shares of peak extraction capacity provides a comparison as to the efficiency of developing viable off-stream storage as an alternative.

Parameters required to establish a secondary market to facilitate transfer of water consents relate to:

- Creation of 'rights to take' that are transferable but remain subject to regulatory rules and provisions that ensure transfers do not result in adverse effects on the environment or public interest outcomes;
- Definition of conditions relating to the exercise of these rights in a central management document that address conditions relating to specific reliability bands. These documents should define the period of review and necessitate the engagement of consent holders as part of this process. (Australian examples: Victoria: Bulk Water Entitlements, Streamflow Management Plans, Groundwater Management Plans, NSW: Water Sharing Plans);
- Estimation of the reliability of rights estimated in base models that assume full extraction of existing and future consented takes, including the impact of water transfer resulting from periods of restrictions¹⁴;
- Creation of a register of rights relating to volumetric and peak extraction capacity and the user holding those rights. It is recommended that a degree of consistency in the structure of consent registers is achieved across regional councils. This process should also establish processes to approve or reject applications for transfer in a cost efficient and timely manner;
- A supporting monitoring and compliance framework, in particular a focus upon measurement devices fitted to all extraction locations where transfer of rights can occur. To adequately monitor peak extractive capacity, additional technology (e.g. telemetry) may be required to ensure that peak extraction rates do not exceed specified limits¹⁵; and,
- The presence of a mix of potential water use sectors within a catchment each with specific volumetric and supply reliability requirements.

There is not necessarily a role for regional councils to create a market environment, as private individuals will seek out opportunities within the secondary market. In Australia, some larger rural water delivery agencies are operating transfer exchanges (e.g. www.watermove.com.au) but it should be recognised that

¹⁴ Once secondary market transfers are in place, the imposition of restriction policy may generate consent transfer that then has adverse water quality outcomes. For example, increased pressure on the resource in specific locations may result in triggers being implemented more frequently than if a condition of no transfer is assumed.

¹⁵ An alternative is that the infrastructure limit or existing consent rate is adopted as the peak extraction capacity, but the reliability band is defined in a manner where the right to access water is either true or false and linked to defined operational periods (eg. months of the year.) An Australian (Victorian) example is 'winterfill' licences that allow extractions to farm dams during certain months of the year.

these only represent part of the transfer market within these regions. However, these systems do have the advantage of providing public price information on the value of water transfers.

The discussion above highlights the increased administrative infrastructure requirements that are required to facilitate an active secondary market with low transaction and opportunity costs. This level of investment may not be justified where:

- Market depth is limited as full allocation has not been reached, and First-In First Served approach is still valid for initial allocations;
- Market depth is limited by the numerous reliability band products that exist in relation to a single resource;
- Market depth is limited as utilisation of individual resource consents is well below consented water allocations; or
- Mechanisms for price discovery are limited by the large consent holders that dominate individual resources.

In relation to the last point, it is noted that two specific examples should be highlighted in terms of the potential for secondary market transfer in New Zealand:

- Irrigation co-operatives hold water consents on behalf of their shareholders. Often there is very limited individual customer water measurement within these networks, and customers do not hold a individual share of the consent. In this situation, surplus water within the co-operative scheme may not be able to be transferred outside the irrigation co-operative¹⁶ (although trading may occur within the scheme itself).
- The market dominance of large consumptive and non-consumptive users within some surface water catchments is acknowledged as a barrier to trade if transfers that would otherwise enable water to be traded to a higher economic use are blocked by existing consent holders. These barriers typically result from information asymmetries related to resource data, operational objectives and value of output derived from existing water access.

The extent to which these barriers to trade might exist and the extent to which they might be remedied through regulatory means will remain an important question for regional councils in the formulation of future water allocation policy.

5.3.1 Issues Arising From the Australian Experience

Based on Australian experience, the facilitation of secondary market transfer, while enabling efficient utilisation of the resource, may create other complex land and water resource management issues for regional councils to deal with. Potential issues include:

- The need for regulatory mechanisms to deal with the potential for speculation in the water market and to prevent the emergence of 'water barons' controlling a significant share of the resource

¹⁶ Net trade out of an irrigation area is a key concern of several irrigation co-operatives within Australia. The structure of infrastructure tariffs is transitioning towards those charging properties on the basis of service delivery rights regardless of how much water customers hold.



(although it may be argued this situation already exists in some locations under the current First-In, First-Served system);

- A requirement for regulators to play a role in forecasting potential impacts of water transfer on water quality and water quantity outcomes and to establish designated zones and rules for transfer;
- Increased requirements for management of compliance information related to volumetric and peak water usage;
- Potential land management and stewardship issues associated with previously irrigated land no longer used in this manner. For example, an emerging issue within Northern Victoria is that of existing distribution networks now serving a 'quiltwork' of farms that while financially sustainable for the irrigated agriculture are too small for economic dryland farming. Issues such as weed and pest management have emerged as key issues on land otherwise 'abandoned' by vacating irrigators;
- The ability to account for the value of water entitlements as part of rating basis calculations;
- The ability to provide for additional water allocation through improvements in the technical efficiency of conveyance and application. Increases in technical efficiency can result in adverse effects on secondary users (e.g. groundwater users receiving a portion of their current supply from current inefficiencies); and,
- Increasing urban water demands resulting in the reallocation of existing irrigation rights to municipal supply and resulting impacts on the reliability of supply required for different categories of use.

Rather than necessarily a criticism of secondary market transfer the points outlined above are intended to convey the complexity of issues that may arise in facilitating a solution where available water can be applied in its most productive outcome for the national benefit. The key message for local government is that detailed analysis of associated land management and regional economic questions is required to fully evaluate the potential of secondary markets to achieved desired outcomes.

However, secondary market transfer does avoid the need for a regulator to 'pick winners' on a continual basis to ensure that the allocation of water is optimal. When a secondary market is combined with a situation of over-allocation, as discussed in the next section, it allows an authority to make a single informed regulatory determination and then let the market decide on those individuals and entities that will continue to ensure that water is applied to its most optimal application through the access to the secondary market.

6. Management of Over-Allocation

Over-allocation of a water resource can be considered to occur where:

- common pool resource and private good values associated with current resource use cannot be sustained to a minimum standard if all resource consents are fully exercised; and/or,
- the total volumetric or peak rate allocation from a water resource exceeds that having been deemed appropriate through the regional planning process if all consents are fully utilised.

Situations of over-allocation for a particular water resource may occur:

- in the absence of rules relating to environmental flows or allocation volumes;
- where rules governing water allocation have been developed, or altered after a significant volume of water has already been allocated;
- where rules are based on old or insufficient information (e.g. with respect to environmental flows);
- where water has been allocated in excess of nominated allocation figures (in the case of a non-complying activity); or,
- “on paper” where the total volume of allocation exceeds sustainable allocation limits for the water resource although actual usage does not. This situation commonly occurs where there are significant numbers of takes for irrigation where no seasonal volume has been specified. In this case, actual usage, allowing for seasonal variation in crop water requirements, will be significantly lower than that permitted if only a peak extraction rate is specified.

In order to maintain common pool resource and private good values associated with water, situations of over-allocation require that the total volume of allocation be reduced to the level deemed appropriate assuming that all consents are fully utilised. Where situations of over-allocation are identified or predicted to occur, this can act as a trigger for a broader review to establish a more effective and sustainable water allocation policy for the particular water resource.

Under the RMA regional councils have a range of options to deal with situations where over-allocation occurs. Under Section 128 regional councils have the ability to set common review dates for water permits in an operative water plan. This provision allows all consents for a given water resource to be re-consented at the same time, following reassessment of minimum flow and/or level restrictions that redefine volumetric allocations to bring them in line with sustainable limits although the duration of existing consents cannot be altered. Although occurring over a relatively long timeframe, this process has been utilised in several regions to address over-allocation.

A number of regional councils also operate a ‘sinking lid’ policy in catchments where over-allocation is an issue.¹⁷ This involves adjustment of peak rate or volumetric allocations based on actual use, technical efficiency or reasonable use criteria for consents when they expire and an application for renewal is received. Councils may also enforce the lapsing of consents (RMA Section 125).

¹⁷ Hill Young Cooper (2005)



Where a situation of over-allocation results in adverse environmental effects, regional councils also have the ability to review consents under provisions of RMA Section 128 (a), provided review provisions are included in conditions of the consent. A provision also exists for regional councils to issue a water shortage direction (RMA Section 329) to deal with a serious, temporary shortage of water typically resulting from climatic extremes.

The following sections describe a number of different regulatory models and market-based methodologies that exist to remedy over-allocation situations once a review process has been initiated.

An important observation is that any approach to managing over-allocation is likely to result in 'winners' and 'losers' in terms of existing consent holders in its initial application. However, if adequate transfer provisions are facilitated, this situation can self-correct over time as users readjust to the new allocation regime.

6.1 Increased Frequency of Restrictions

In situations where the total peak rate or volumetric allocation from a water resource exceeds sustainable limits, an option is to increase the frequency of restriction applied to resource users. The over-allocation situation is mitigated by increasing minimum flow or aquifer level restrictions to a point which provides adequate protection for common pool resource values during periods of limited availability. This action does not alter the total peak rate or volumetric allocation but increases the frequency and duration of restrictions faced by resource users, with a consequent reduction in supply reliability.

This method has been utilised in a number of areas of New Zealand to implement higher minimum flow thresholds set through the regional plan process. In this situation, the altered restriction levels are set by the regional councils but commonly implemented through rostering or other means agreed by the actual resource users via user groups.

This type of resource sharing provides an effective system of protecting common pool resource values during periods of limited availability but has disadvantages in terms of:

- It does not alter the level of over-allocation of the resource;
- It may significantly alter the supply reliability for resource users to a point where the economic viability of use may be significantly impacted;
- The uncertainty in supply reliability resulting from natural climate variability may be translated to more conservative levels of output productivity and limitations on the borrowing capacity of individual consent holders;
- Without appropriate transfer mechanisms between consent holders, the additional restrictions only apply to those taking water and 'sleeper' consents (i.e. consents which are not regularly exercised but may be in the future) remain unaffected;
- Where appropriate transfer mechanisms exist, the potential variability in supply reliability is likely to reduce incentives for temporary transfer of excess allocation;
- The uncertain supply reliability may also impact on valuations of the consent rights, whether as part of the overall property value or as an individual asset; and,
- Providing an incentive for existing users to explore alternative options for maintaining supply reliability (alternative supply options, off-stream storage).

6.2 Last In, First Off

One of the simplest methods to address situation of over-allocation is the cancellation of the most recently issued consents until the level of allocation reaches sustainable limits.

Implementation of Last In, First Off as a method to manage over-allocation, particularly where access to effective transfer mechanisms do not exist, it is likely to generate significant equity issues for individual resource users in that:

- A subjective judgement remains as to whether consents close to expiry should be included with the most recent consents issued as part of the reductions required to remedy over-allocation;
- Similarly, long established users who have recently renewed their consents may be considered 'last in';
- Removing individual consents may have no impact on mitigating adverse environmental effects resulting from over-allocation (e.g. non-consumptive applications);
- Recently issued consent holders are likely to have improved physical application efficiency through adoption of more advanced technology by investment nature and by technical efficiency controls imposed by the regional councils. As a consequence there is likely to be pressure from a concurrent review of site application requirements for all consent holders;
- Where adopted, improved technology is more likely to be capital intensive and location specific, leaving limited options for property transfer and high risk of wasted investment for those with consents cancelled; and
- The method rewards by chance those consent holders who have issued consents earlier but have not necessarily developed the consumptive use to the consented maximum.

For the last point in particular, it is unlikely that implementing this method will encourage transfer of the consent or property for remaining consent holders. If the likelihood of further revisions to resource access remain, then this is likely to create further upside potential for the existing consent holder's property value.

There is also a wider issue of equity that is raised under this method. To reach a condition of over-allocation, the regional council has previously approved the existing level of allocation as being a sustainable level for all resource users. It could therefore be argued that it is not the fault of the most recent extractive users that remedies are required to address over-allocation concerns, and therefore, all existing consent holders should share the impacts of consent reductions that are required.

6.3 Regulatory Reduction of Existing Consents

To deal with issues of equity raised above, an alternative option for situations of over-allocation is for the scaling back of all existing consented water allocations to a level where the over-allocation condition no longer exists. In order to reduce the peak rate or volumetric allocation in line sustainable limits, three basic options exist:

- Reduction of the peak rate and/or volumetric allocation for all users by a set amount;
- Reduction of the peak rate and/or volumetric allocation for all users on a pro-rata basis;
- Reduction of volumetric allocation on the basis of actual historical use;
- Reduction by 'sinking lid';



- Reduction of the peak rate and/or volumetric allocation for all consents that are transferred between entities
- Reduction of the peak rate and/or volumetric allocation for users within a set priority band by a set amount; and,
- Reduction of the peak rate and/or volumetric allocation for users within a specific sector by a set amount.

Under each of these methods of reduction there will be winners and losers depending on current usage relative to consented allocations. In broad terms, addressing over-allocation in unregulated surface water resources is likely to require adjustment of consented peak extraction rates, whereas for groundwater resources the over-allocation is more likely to be addressed by reducing consented annual volumes. The systematic reduction of consent rights without appropriate transfer mechanisms may result in an unsustainable production model for existing resource users. However, by facilitating access to the secondary market, individual consent holders can then make a financial choice as to whether additional investment in securing additional water consents is worthwhile for their particular enterprise, or instead whether transfer of their consented rights to other users reflects a better outcome.

The effectiveness of broad scale entitlement reductions is limited in situations where:

- Different categories of consent exist within the over-allocated resource, and a judgement is required as to the normalisation parameter or incremental methodology used to reduce all allocations in a fair and equitable manner;¹⁸
- Municipal water use, stock and domestic demands, and other uses that are provided on the basis of public interest may require priority treatment (thereby breaching the policy principle of 'sharing the pain' across all consumptive users).

Reduction in allocation in line with actual historical usage provides an option to improve locative efficiency and may reduce potential issues related to 'sleeper' consents (i.e. consents which are not regularly exercised but may be in the future). However, this option requires knowledge of actual water usage over a representative period that in many cases is not universally available thereby necessitating arbitrary estimation. Also, practical implementation of 'use it or lose it' systems have proved counterproductive in situations where the incentive to retain as much of the allocated volume as possible results in usage that may not have otherwise taken place.¹⁹

In the Australian context there have been several recent examples in Victoria and New South Wales where consents have been reduced to the level that reflects average usage over a previous multi-year period, others where the policy has introduced scaled reduction factors to any future transfers, and also examples of basic 'scale' type reductions of consented rights. An overall observation of this process is that solutions developed as a result of engagement with resource users are frequently substantially different to initial options put forward by regulators.

¹⁸ The normalisation of a hydro-electric use with storage release rules and that of consumptive users is considered one of the most complicated situations that might be identified. A potential solution is to consider zoning of the resource, consider hydro (or other non-consumptive use) to be a consumptive user at the downstream limit of the zone, and share reductions on the basis of total consumptive use within the zone.

¹⁹ Harris Consulting and the AgriBusiness Group (2003)

An alternative to a fixed reduction in allocation is application of a policy of differential reduction to individual water use sectors. This process may enable regional councils to afford higher levels of protection to public interest or promote particular regional or national outcomes. Under this option, the reduction applied to an individual sector use is weighted according to arbitrary criteria determined by the regional council (e.g. technical efficiency, contribution to regional economics, national importance, water quality considerations) with the cumulative reduction across all sectors sufficient to align total allocation with sustainable limits.

In the Australian context, regulatory redistribution of existing entitlements has also been attempted by:

- paying for improved infrastructure efficiency, and securing the savings that are received as reductions in entitlement for that particular consent holder; or
- substitution of existing raw water consents with treated effluent supplies.

In relation to the first point above, the return of 500 million m³/annum to the Murray River (the 'Living Murray' project) in Australia is predicated on the search for infrastructure savings. However, based on current progress this target looks increasingly ambitious. An alternative to enter the market directly to buy-back entitlement looks to be the most economically efficient manner in which desired reduction of consented volumes can be achieved. In New Zealand the potential for improving infrastructure efficiency is likely to be limited to the irrigation co-operatives, or funding grants towards on-farm irrigation technology more broadly.²⁰

Similar to the discussion of previous options, the priority afforded to certain use sectors to achieve regulatory redistribution of allocation is likely to generate issues of fairness and equity, particularly in terms of differential access to the resource and the valuation of consent transfer.

6.4 Application of Consumptive Based Charging

The 'cost' of water can be said to include not only the cost of extraction, treatment and distribution, but also the opportunity cost (in this case the benefit that could have been gained from using the water in the best alternative use) and the cost of any adverse impact (e.g. on environmental or cultural values). If a secondary market or transfer mechanism is not in place, an alternative is to introduce a regulated price for holding of water consents that is set by an independent entity.

Under the 'pure form' of such a system there might be no limit on the amount of water that could be drawn from any particular source, but users would face a water charge that would fully reflect any adverse effects. An alternative system might involve determination of allocable volumes based on non-market criteria. Water prices would then be set periodically with the aim of selling the allocable volume, with water required to maintain common pool resource values either not introduced to the market or priced at a level that would prohibit economic utilisation. Prices would vary through the year from zero during periods of high flow to a maximum during droughts. Allocation of water between different users would then take place in the market, based on willingness to pay.

²⁰ It should be noted that achieving irrigation network distribution efficiencies is actually a complex area, where natural inefficiency may contribute towards the estimates used to calculate the sustainable amount of annual groundwater extraction. By improving efficiency, an impact is imparted to the groundwater users of a reduced sustainable level of allocation.



This method could, theoretically be used on any water source. It would be economically efficient in allocating water to the most productive users and encouraging efficient water use. It would also cope easily with new users; anyone who is willing to pay the going price would be able to buy water. Under this system regional councils would effectively be collecting a 'resource rental' reflecting the scarcity value of water.²¹

However, there are potentially some significant disadvantages to this option. There would be substantial monitoring and enforcement costs; a continuous role of independent price setting; increased frequency of recording metered consumption, and financial mechanisms to ensure consumptive users do not default on water charges outstanding, councils would need to know the elasticities of demand, a law change is needed, and ownership, and hence Treaty, issues may arise. Users are likely to perceive a significantly reduced security of supply and this may threaten the growth of high value investment within a region. Also, such a scheme is also likely to encounter significant opposition to the concept of effectively paying for access to a public resource.

An alternative approach may be to increase the administration charges for water permits on a rate and/or volume basis. This increased charging regime may provide water permit holders the incentive to relinquish some of their allocation where this was surplus to their requirements. This type of approach has been applied successfully in the Taranaki Region, and is estimated to have reduced allocated amounts by as much as 30 percent in some catchments.

6.5 Primary Market Auction for Buy-back of Consents

A primary market auction for buy-back of consents is a method whereby a regulator, such as a regional council, issues an order to purchase back a certain amount of entitlement. Resource users are then required to offer a portion of their allocation to the regulator at a price that reflects their willingness to reduce current levels of allocation. Depending on the structure of regulator, the costs of achieving this allocation reduction may be passed onto all tax or ratepayers or instead to the remaining consent holders for the resource concerned through water management charges. It is considered that this approach has the benefit of making explicit the value of any overallocation.

In this manner, the regulator acts as the required market maker and pays out all silent bids required to remedy the situation of over-allocation, starting with the lowest priced bids first. This method has three major limitations:

- If insufficient bids are received to achieve the remedy required then the actions of the regulator should be articulated to the market participants;
- The approach of the regulator to valuing different categories of consents, and the extent to which this information is disclosed to existing consent holders; and,
- The impact of increased water management charges upon remaining consent holders if the option to charge interest and principal repayments are levied to them.

²¹ An example of this approach from Australia is the government mandated 'inclining block tariffs' and 'environmental water contribution' that apply for many municipal water authorities in Victoria.

In financial terms, this method is similar to a share buyback scheme whereby it enables a co-ordinated response to remedying over-allocation by creating a market. It is a relatively risky proposition in terms of not achieving the desired remedy, or achieving this outcome but at a cost that essentially has material viability impacts for the remaining consent holders. The system also has the potential to disproportionately reward users who do not fully utilise current entitlements.

6.6 Augmentation

A further option is to improve water availability through augmentation. This is not necessarily a policy option to address over-allocation but may result from implementation of policies to define available allocation or address current or future water allocation.

Augmentation may be in the form of individual or community storage schemes, supplementation from alternative water sources or a combination of the two. These options could partially or fully offset any shortage that may occur due to over-allocation of the principal water resource. This option may happen in conjunction with other options discussed earlier. Individuals may provide augmentation by developing on farm storage dams that are able to capture and store winter run-off or diversions, or to store a week or a months supply.

Larger scale community based augmentation schemes are likely to be expensive although they will provide a higher value water supply through increased reliability. Options which provide high security of supply for some water permit holders are likely to exclude these parties from any need to contribute to augmentation. Management of over-allocation which treats all users the same will provide greater incentive for all parties to contribute to augmentation. Augmentation will have to be considered for its environmental effects and may impact on flow regimes and anticipated flow variations in an unregulated river situation.

The application of augmentation to address situations of over-allocation requires the availability of allocation either within the catchment during periods of lower demand or from an external source. Augmentation schemes also require suitable sites for storage development and may involve complex planning issues related to infrastructure development for storage and conveyance.

6.7 Voluntary Reduction

This option allows for user group initiatives to bring allocated volumes back in line with established allocation limits. Although requiring good communication between the regional council and user group and co-operation between individual user group members this option has a number of potential advantage of being user driven and avoiding the need for regulatory intervention. It allows the overall change in total allocation required to be specified by the regional council while enabling the actual extent of any reduction on an individual entitlement to be determined by agreement between resource users.

This option may also be incentivised by the resulting increase in supply reliability and may, in effect, become self policing due to the incentive for individual users to ensure equitable treatment. This option should be explored before implementation of the alternative policy options discussed previously in this section.



7. Summarising Model Outcomes

Regional councils have a statutory role in the management of water allocation in New Zealand. This role includes implementation of the Resource Management Act 1991 through the regional planning framework. These planning instruments include regional policy statements and regional plans that provide a framework for water allocation to consumptive and non-consumptive uses through the resource consent process.

An idealised water allocation process can be characterised in terms of three main components:

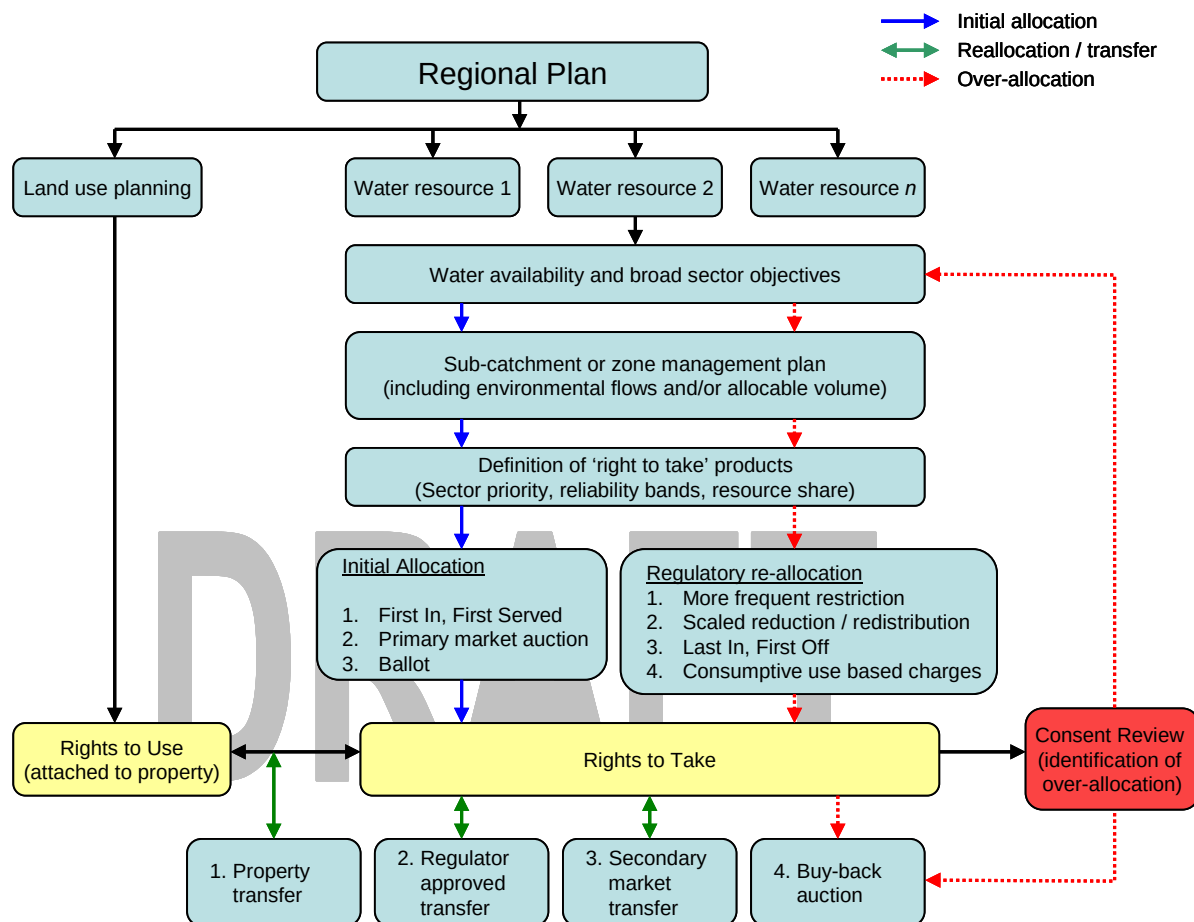
- **The policy and regulatory role of regional councils in establishing a framework for resource allocation.** This process is formalised through a combination of legislation and supporting instruments such as regional policy statements and plans. These documents provide overall guidance for the resource allocation process. Potential options exist to modify current policy to enable provision of prioritised access or reliability to individual sectors of use. Options may involve development of mechanisms to facilitate both initial allocation and/or transfer of existing allocation to achieve policy objectives.
- **The resource consent process through which access to water resources are granted to, or transferred between, resource users.** In terms of water allocation this paper has discussed the concept of separating the 'right to take' from the 'right to use'. This separation may facilitate alternative methods of allocation and transfer that simplify transaction requirements and enable water to be utilised for highest value environmental, social, cultural or economic uses.
- **A formal review process to identify situations of over-allocation and implement processes to ensure common pool resource and private good outcomes are adequately protected.** These processes may involve regulatory and/or market-based interventions to enable allocation objectives to be maintained.

Figure 10 provides an overview of an idealised water allocation process and indicates the potential application of the various allocation options outlined in this report.

Prior to allocation of the resource to consumptive and non-consumptive users through the resource consent process, two important steps are required to establish a robust framework for water allocation. The first step is the definition of an allocation limit for the resource that affords an appropriate level of protection to common pool resource and public interest values. The second step is the specification of the available allocation in terms of various 'right to take' products.

Specification of 'right to take' products may involve definition of available allocation in terms of sectors of use, priority of access, reliability bands or resource share to provide support for the resource allocation decision-making process, particularly when levels of allocation approach sustainable limits. These options may be applied in various combinations to develop catchment-specific outcomes that include reservation of allocation for future use, prioritisation of allocation or restriction across various sectors of use and allocation of water with reliability characteristics that match intended use. Specification of allocation in terms of resource share may also provide a means to optimise allocation in response to inter-annual climatic variability or provide for the impacts of long-term climate change.

■ **Figure 10: Overview of an idealised water allocation process**



At the present time many water resources in New Zealand remain within what can be considered the 'initial allocation' phase where current demand can be accommodated within available allocation. In this situation the First In, First Served system provides an appropriate mechanism for water allocation and enables each application to be judged on its individual merits. A key issue for management of these resources is the degree to which the regional council should be prescriptive in promoting technical efficiency and the ability to move towards consistency in consent definition.

However, it is also recognised there are also a significant number of water resources that are rapidly nearing a condition of full allocation or where current applications are likely to exceed sustainable limits if granted. Without alternatives to First In, First Served, regional councils will remain in a position where they are required to decline applications or apply regulatory amendments to 'fit' remaining consent applications within defined resource constraints. Consideration of auction models in this situation may optimise economic outcomes that result from issue of the remaining allocation and provide a signal that active secondary transfer markets transfers are likely to be the only reliable mechanism by which allocation can be secured in the short to medium-term. The auction process may also assist in establishing a 'market price' for subsequent transfer of allocation.



For water resources where current allocation exceeds sustainable limits, a number of mechanisms exist by which the situation of over-allocation can be addressed. These methods include increasing the frequency of restriction, regulatory reduction of allocation through to market-based systems of consumption-based pricing or buyback auctions. However, it is also recognised that the potential application of such options may act as a catalyst for transfer or amendment of allocation to provide a level of self-correction without the requirement for regulatory action.

Even in the absence of secondary markets transfers (and the related supporting consent definition requirements), consistency in individual consent characteristics is an important attribute for over-allocation remedies to be structured in a fair and transparent manner. Where consents cannot be categorised with common conditions applicable to access rights, regional councils will be required to consider methods by which 'normalisation' occurs across consents to enable scaled reduction or redistribution methodologies to be applied. Whatever option is adopted, observation would indicate effective stakeholder engagement is a critical component of developing effective solutions to deal with over-allocation.

Consumption based pricing approaches that reflect a 'resource rental' are a potential alternative option for ensuring levels of allocation do not exceed sustainable limits. The major limitation of this method is a requirement for accurate forecasting of water availability. As a result, potential application of this method is likely to be limited to groundwater resources with a large storage capacity or surface water resources with large storage reserves. Application of administrative charges based on allocated volume may however provide an incentive for users to reduce allocation in line with actual water usage and provide a means to address situations where over-allocation is essentially 'on paper'.

provides a summary of the potential application of the various allocation options discussed in this report. As previously discussed, First-In, First Served is likely to be the most suitable model in the short to medium-term until demand growth exceeds remaining resource availability. Once this condition occurs, primary market auctions or the alternative of a ballot system (in restricted instances) may provide improved outcomes which assist optimisation of the water allocation process.

Options to facilitate transfer of allocation are unlikely to be used until there is a relatively high level of allocation. Possible exceptions may occur where costs to access the resource are significant to the point where it is easier for individuals to purchase property with existing water access rights. Overall however, transfer will also be optimised where the overall process is simple, with low transaction costs and can occur in a timely manner. Alteration of existing consent structure and establishment of transfer 'zones'

may also facilitate this process.

Table 7: Application of available options for water allocation

Water Allocation Models	Rights Allocated as Proportion of Total Allocation				
	Low <25%	Medium 25%-75%	High >75%	Full 100%	Over >100%
Initial Allocation					
First In, First Served ¹	←————→			-----→	
Primary Market Auction			←————→		
Ballot			←————→		
Transfer					
Property Transfer ^{2,3}	-----←		←————→		
Regulatory Approval of Transfer ^{2,3}	-----←		←————→		
Secondary Market Transfer ³				←————→	-----→
Over-Allocation					
Increased Frequency of Restrictions					←————→
Last In, First Off					←————→
Regulatory Reduction of Consents					←————→
Regulatory Redistribution of Consents					←————→
Consumptive Based Charges ⁴	←————→				
Storage ⁵	←————→				
Buyback Auction					←————→

- Notes:
- 1) First In, First Served currently applies through to applications that are submitted that if approved, would result in over-allocation.
 - 2) It would be expected that a regional council would not approve transfer if the resource was known to be over-allocated, and the transfer would be expected to increase actual utilisation of water consents. Once a secondary market is operational, a regional council may require special transfer rules to be able to suspend certain types of trade if over-allocation is suspected to exist, but these must be specified in advance to provide clear and transparent signals to the market.
 - 3) It is possible for transfer mechanisms to be considered at low levels of overall resource utilisation where the costs to access the resource for economic application (drilling and source development, storage construction) are considerable.
 - 4) Consumptive based charges relating to resource rental could be employed at all stages of the allocation phases.
 - 5) Provision of storage is not necessarily an allocation option per se but may be an outcome of the application of other allocation options.

The advantages and disadvantages of the various allocation options discussed in this report are more fully documented in Table 8 below.

■ **Table 8: Advantages and disadvantages of allocation options identified**

Water Allocation Model	Advantages	Disadvantages	Potential Application
Initial Allocation			
First In, First Served	- Administratively simple - Established case law	- Poor and relatively arbitrary decisions required when resource is close to reaching allocation limit - May progressively reduce security of supply as resource allocated - Limited ability to provide for future resource utilisation - May create a 'gold rush' mentality	- Water resources where available allocation in excess of demand - Moderate to highly allocated water resources when combined with sector priority, reliability bands or resource share specification
Primary Market Auction	- Achieves maximum allocation outcome when resource demand is shown to be in excess of remaining allocation available - Resource generally allocated to highest value use - Can deal with 'gold rush' scenario	- Administratively complex and requires some testing of auction design - May create issues related to 'ownership' of the resource - Requires pre-qualification of all bidders at auction - Potential to attract speculators (control through holding cost) - Difficulties in establishing potential impacts of all combinations of potential users - Limited effectiveness in accounting for externalities	Highly allocated water resources where demand is in excess of available allocation
Ballot System	- Reduces 'ownership' issues associated with financial transactions - Can deal with 'gold rush' scenario	- Arbitrary allocation to users that may not promote efficiency or optimise community benefits - Potential to encourage speculation - Difficulties in establishing potential impacts of all combinations of potential users - May create significant issues related to potential windfall gain - Requires pre-qualification of potential recipients - Limited effectiveness in accounting for externalities	For individual sector allocation where demand exceeds available allocation

Water Allocation Model	Advantages	Disadvantages	Potential Application
Transfer			
Property transfer	- Administratively simple - Achieves transfer aims of consent holder	High transaction costs in terms of property purchase (taxes and duties) and also may require construction, operation and maintenance of transfer infrastructure from acquired property.	Any stage of water allocation process
Regulatory Approval of Transfer	Lower transaction costs	- May need to demonstrate impact of individual transfer is not a material impact on others - Time and resources required to obtain approval of transfer could be seen as a barrier to trade - Monitoring and compliance requirements of councils increase significantly.	Up to situations of full resource allocation
Secondary Market Transfer	- Lowest transaction costs - Resource generally transferred to higher value use	- Pre-clearance within particular zones required to facilitate efficient transfer - Creation and maintenance of central register of rights - May require mix of land use in catchment to create conditions for transfer - Monitoring and compliance requirements may increase significantly.	Situations where resource has significant level of allocation or is fully allocated. May also be utilised in situation of over-allocation where a portion of allocation is surrendered as a condition of transfer
Over-Allocation			
Voluntary Reduction	- Driven by resource users - Avoids requirement for regulatory intervention		Options for voluntary reduction should be explored prior to implementation of alternative policy options
Increased Frequency of Restrictions	- Administratively simple - Provides incentive for users to seek alternative supply arrangements	- May require different levels of restrictions for different priority bands requiring stakeholder consultation - May impact upon maintaining existing industries if security decreases below critical thresholds - Does not necessarily deliver desired redistribution without secondary transfer mechanisms - Does not alter the level of over-allocation	

Water Allocation Model	Advantages	Disadvantages	Potential Application
Last In, First Off	Administratively Simple	- Detailed consultation required - May require subjective judgement as to which users affected - Likely to be interpreted as a bad investment signal on any resources nearing full allocation. - Does not necessarily deliver desired redistribution without secondary transfer mechanisms - May not recognise technical water use efficiency	
Regulatory Reduction of Consents	- Administratively Simple - Attempts to deliver desired redistribution with reduced need for secondary transfer - Legislative support to ensure outcomes are achieved	- Complex consultation required - Does not necessarily deliver desired redistribution without secondary transfer - Scaling transfers may take a long time to achieve overall objectives. - Arbitrary approach to redistribution required. - May require subjective judgement to deal with variable consent specifications	
Consumptive Based Charges	- Seeks to reflect seasonal demand with reduced need for secondary transfer - Encourage efficient water use	- High level of variation in cost and security of supply for consent holders - May impact upon continued industry growth. - Arbitrary approach to determining price inevitable on annual basis. - Substantial monitoring, enforcement and administrative costs	
Buyback Auction	Attempts to deliver desired redistribution with reduced need for secondary transfer.	- If willing sellers less than that required to deliver outcomes or requested price too high, then auction will not correct over-allocation - Potential to disproportional reward users who do not fully utilise allocation	
Storage	Addresses shortfalls in allocation by increasing availability of resource	- More likely applicable to surface water - Requires spare allocation outside peak periods and appropriate sites for construction	Any stage of water allocation process but ideally before sustainable limits are reached

8. Structural and Functional Changes to Achieve Allocation Objectives

Potential improvements to the current water allocation framework in New Zealand may involve application of alternative policy models. The following section outlines at a basic level potential changes to the structure and implementation of the resource consent process that may facilitate improved water allocation outcomes.

8.1 Policy Direction

The overall water allocation process in New Zealand may be enhanced by provision of national guidance to assist councils in developing water allocation plans. This guidance may take the form of national policy statements that specify national outcomes for water allocation, specification of requirements for councils to consider when developing water allocation plans or guidance on allocation between competing uses.

The water allocation process may also be enhanced by central government assistance with the development of mechanisms to facilitate transfer of allocation either by regulatory or market means. This process could potentially require amendments to current provisions of the RMA to facilitate appropriate allocation options.

8.2 Structural Changes to Resource Consents

In terms of resource consent structure, separation of the “right to take” from the “right to use” may facilitate redistribution of allocation. Under this scenario the “right to use” would remain specific to a particular land parcel while a “right to take” could be transferred between users within a nominated management zone. This separation may facilitate transfer of allocation to optimise resource utilisation while enabling regional councils to retain control of the technical efficiency of water use and adverse environmental effects resulting from the utilisation of the water.

Specification of maximum rate and volume of allocation in terms of an ultimate resource share would guarantee ongoing access to the resource for existing users while providing a regional council the ability to adjust total allocation in line with changes in water availability. Any accompanying reduction in supply reliability may be addressed through application of structured resource access for various water use sectors. With an increased ability to manage overall resource allocation a resource-share system may enable regional councils to extend consent duration to provide greater security for investment in associated infrastructure.

Regardless of the actual system of allocation utilised, formalisation of the process for renewal of existing resource consents would assist to reduce uncertainty for existing resource users.

A system to enable optimum outcomes for water allocation may also enable a consent to be granted for purposes other than consumptive or non-consumptive use. For example, if the highest value use of water is for in-stream purposes (e.g. enhancement of stream flows above specified environmental thresholds) this outcome should be enabled through relevant allocation or transfer mechanisms.

8.3 Requirements for Monitoring and Management

Effective and timely monitoring of resource usage is an integral component of development of effective options for water resource management and allocation. Measurement of peak rate and volumetric usage



is key to establishing the current level of resource utilisation and has an important role defining resource availability, enabling effective compliance monitoring and facilitating effective systems to enable transfer of allocation to optimise available allocation.

In water resources where there is significant demand for allocation, establishment of water management zones at a sub-catchment/aquifer scale is likely to be required to enable transfer of allocation between users with minimal requirements for regulatory approval. Facilitation of this process may require an ability to accurately predict resulting impacts of a range of transfer scenarios.

Greater utilisation of consent transfer mechanisms is also likely to require an improved ability to model potential environmental impacts of various allocation scenarios. The establishment of a system for secondary market transfer may also be required to consider wider land management and economic issues associated with resulting changes in water utilisation.

Where allocation and/or restriction is defined on a resource share basis, establishment of water-user groups should be encouraged to enable resource users to determine practical implementation of changes in total allocation or restrictions on resource access. Effective stakeholder engagement should also be sought at an initial stage of any initiative to address situations of over-allocation.

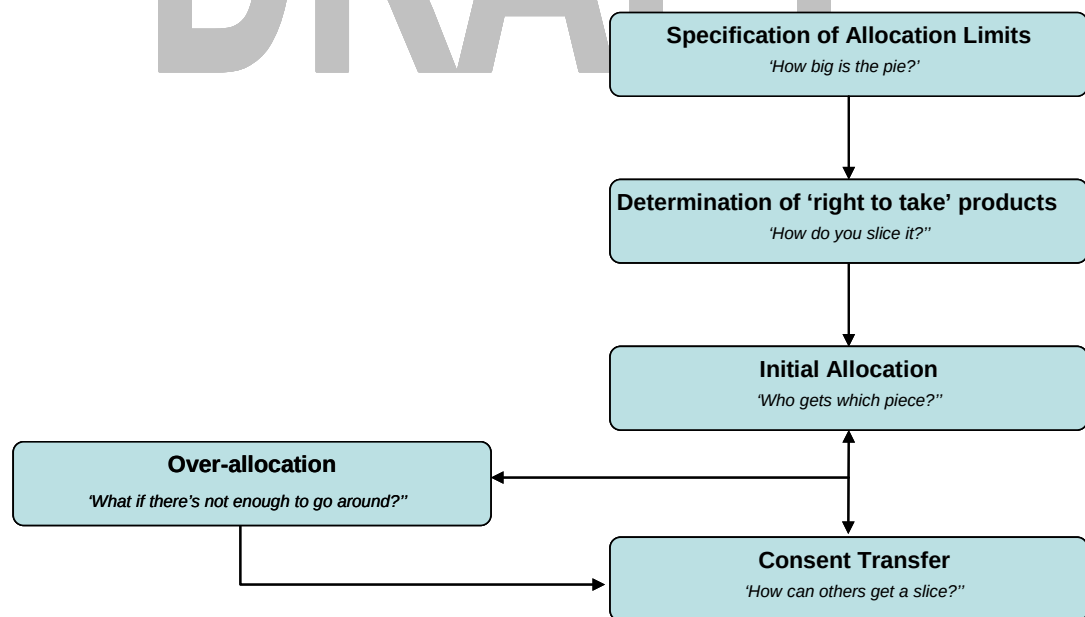
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9. Conclusions

The basic objective of a water allocation process is to enable equitable provision to be made for existing and future water users in a way that optimises environmental, social, cultural and economic outcomes for the community. The process is required to provide sufficient flexibility to account for uncertainties inherent in the management of a natural system while providing adequate security for users.

Once a policy framework for water allocation has been established (in terms of resource allocation limits and specification of 'right to take' products), the process of water allocation can be implemented in terms of three major components. During the initial allocation phase sufficient resource is available to provide for all users within limits established to protect a combination of public and private good values. As the level of allocation approaches the sustainable limits focus is shifted toward processes that facilitate transfer between new and existing users to achieve highest value use of the resource. The final component of the water allocation process involves mechanisms established to deal with situations where the total volume of allocation exceeds sustainable limits as a result of historical allocation process or changes in allocation required to maintain common pool resource and public interest values. Figure 11 below provides an overview of the water allocation process.

■ **Figure 11: Overview of the water allocation process**



A range of possible options may be utilised to facilitate water allocation through the resource consent process. These options range from queue-based systems such as the current First In, First Served through to market-based models. Each option has associated advantages and disadvantages, with the potential application for each dependant on factors specific to an individual water resource. These factors



may include the current level of allocation, future growth in demand for water resources as well as resource-specific factors such as the nature of the water source and sectors of use present.

For many water resources in New Zealand the current First In, First Served option is likely to provide an appropriate allocation mechanism. However, where a resource is close to or at sustainable allocation limits, market-based options including auction systems and secondary market transfer may assist the allocation process to ensure water is committed to the highest value use. Where allocation exceeds sustainable limits the options exists for regulatory intervention or market-based options to be implemented with stakeholder engagement to reduce allocation to the desired level.

Regardless of the particular allocation option adopted for a specific water resource, it must to be accompanied by a robust framework that clearly specifies the characteristics of the available allocation. This may include definition of sectors of use, identification of priorities for access or restriction, reliability and resource-share requirements. These options may be applied in various combinations to develop catchment-specific outcomes that may include reservation of allocation for future use, prioritisation of allocation or restriction for across various sectors of use, allocation of water with reliability characteristics that match intended use and may enable effective management of overall allocation in terms of future resource availability (e.g. climate change impacts).

Ideally the resulting framework will provide certainty for users while enabling sufficient flexibility for a regional council to deal with uncertainties in current usage, demand growth, the dynamic response of natural systems to abstraction as well as external factors such as climate change. Development of such an allocation framework should be considered prior to resource allocation reaching sustainable limits.

Application of some of the alternative allocation options described may require adjustment to the current policy and legislative framework for water allocation and consequent alteration to existing resource consent structure. To ensure the allocation process is managed in a fair and equitable manner these adjustments are also likely to require additional policy development and technical inputs and be supported by additional compliance monitoring. These changes are likely to incur increased costs for administration and management of water allocation.

Potential allocation options that involve financial transactions to secure allocation (e.g. primary market auction, resource rental, secondary market transfer and buy-back auctions) inevitably will introduce a level of concern surrounding potential 'ownership' of the resource. As a result, an effective water allocation framework must clearly specify property rights in relation to water permits including quality of title, flexibility, exclusivity, transferability and duration and make clear these rights do not correlate to ownership of the resource.

In developing or adopting alternative options for water allocation regional councils have to consider a range of factors including:

- Assessment of current utilisation of water resources in terms of consented allocation, actual use and sustainable limits;
- Where sustainable limits are already defined, the degree of uncertainty attached to the sustainability of this outcome in the long-term;
- Consideration of future demand growth in terms of sector usage;

- Application of sector priorities, supply reliability or resource share specifications to improve definition of available allocation;
- Consistency in consent definition to provide greater flexibility for future management of water allocation;
- Issues related to the transition from the current system to any modified options for water allocation;
- The benefits and costs of separating the 'right to use' from the 'right to take' as a means of facilitating particular allocation or water quality outcomes;
- Key limitations of various allocation options available to achieve required outcomes for individual water resources. This may include considerations such as inconsistency in consent definition, the potential impact on existing resource users and their likely response to changes to the allocation framework, market depth, economic growth as a driver for access to the resource, and potential changes to regulatory functions including technical input and compliance monitoring requirements; and,
- Wider environmental and economic considerations arising from changes to land use due to current and future utilisation of water resources.

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10. Glossary

Allocation limit:	Specification of the resource available for consumptive and non-consumptive use.
Common pool resource:	The characteristics of a common pool resource are described as rivalrous but non-excludable. Environmental flows are an example of a common pool resource.
Consumptive use:	Public or private good uses of water that involve abstraction or diversion of water from an individual waterbody. This definition also includes uses that involve temporal delay in the return of water to the original source (e.g. hydro storage, irrigation net-use).
Environmental flows:	The water regime (minimum flows, flow allocation or volumetric allocation) required to sustain common pool resource and public interest values associated with a water resource.
Initial allocation:	The allocation by regional councils of water through resource consent procedures until a maximum allocation threshold is reached.
Market mechanism:	An instrument that encourages behaviour through market signals rather than through regulatory (command and control) intervention .
Non-consumptive use:	Public or private good uses of water that do not physically remove water from an individual waterbody, but may impact on water quality (e.g. cooling water supply, some hydroelectric generation applications, fish hatchery supply and maintenance of water quality).
Opportunity cost:	The forgone benefits from the next best alternative use of a resource.
Over-allocation:	A situation where either: - Common pool resource or private good values associated with current resource use cannot be sustained to a minimum standard if all resource consents are fully exercised; and/or, - the total volumetric or peak rate allocation from a water resource exceeds that having been deemed appropriate through the regional planning process if all consents are fully utilised.
Peak rate allocation:	The instantaneous rate of abstraction from a water resource
Permitted use:	Uses of water that are permitted as of right under Section 14(b) of the RMA or specified in a regional plan.
Private good:	The extent to which a good benefits private individuals rather than the community as a whole. The characteristics of a private good can be described as rivalrous and excludable.
Public good:	The extent to which a particular good benefits the community as a whole rather than individuals. The consumption of a public good can be described as non-rivalrous and non-excludable.

Public use:	Uses of water that meet the basic public interest elements defined by legislation e.g. domestic and stock water supply, environmental flows;
Public interest:	An action or outcome that represents an important outcome for the community
Right to take products:	Individual units of available allocation reserved for individual sectors of use or specified in terms of an assigned supply reliability, priority or resource share
Sector of use:	An individual category of use with particular economic, social and environmental considerations.
Sunset clause:	A restriction on one duration of a consent term if not utilised within a given period
Supply reliability:	The ability of an individual water user (or sector) to access the resource on an ongoing basis.
Transfer (or reallocation)	Reassignment of existing allocation between individual water users or sectors of use.
Volumetric allocation:	Allocation of water in terms of a specified volume available over a given period (commonly expressed in terms of m ³ /annum).

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