ISCR

SUPPLEMENT

MARCH 2004

New Zealand Institute for the Study of Competition and Regulation Inc

P O Box 600, Wellington
New Zealand.
Ph. 64 4 463 5562
Fax 64 4 463 5566
E-mail: iscr@vuw.ac.nz
Website: www.iscr.org.nz

STRUGGLING UPSTREAM

Towards a Framework for Efficient Water Allocation on the Waitaki River and Elsewhere

Kevin Counsell and Lewis Evans*

Introduction

The Waitaki River in South Canterbury is a significant and precious natural resource. At 209 kilometres long, draining a catchment area of 976 000 hectares, it provides for a multitude of uses and activities. Fishing and jet boating are popular on the Waitaki and the surrounding land use is changing and intensifying with increased irrigation. The upper and middle reaches of the Waitaki are dominated by Meridian Energy's hydro dams, generating a large portion of the country's electricity needs. The river also holds significant traditional and cultural value with local Maori, and sustains a variety of plant and animal communities.

The water in the Waitaki catchment is scarce and valuable in these alternative uses. With such a wide range of competing water uses, conflicts of interest can, and do, arise. In addition to a number of existing resource consents, there are currently many more new applications before local councils for resource consents to take or use water from the Waitaki catchment. These include Meridian's Project Aqua seeking water for hydro development in the lower reaches of the river, two large irrigation proposals and a number of smaller applications, many also for irrigation purposes.

In response to this growing demand for Waitaki water, the government has introduced the Resource Management (Waitaki Catchment) Amendment Bill (known hereafter as the Waitaki Bill). Under the current framework for water allocation in New Zealand, legislated by the Resource Management Act (RMA), new applications would be considered on a first-in first-served basis. Each application would be assessed against its effects on the environment and impact on existing water users. The Waitaki Bill aims to address what the government considers to be problems with this existing water allocation framework. These include the inability to make a comparative assessment of competing applications, and an allocation process that can take a significant time and be subject to costly delays. The lack of a regional plan for the Waitaki catchment is seen as an additional impediment to water allocation in

the catchment. Although not mandatory under the RMA, a regional plan arguably should have already been prepared for a significant catchment such as the Waitaki.

The situation on the Waitaki River and the resulting Waitaki Bill gives New Zealand a timely opportunity to develop a water allocation framework on a single catchment that builds on the existing framework of the RMA and provides a model for the future allocation of New Zealand's increasingly scarce water resources throughout the country.[1] In this paper we present the key desirable aspects of a water allocation framework suitable for the Waitaki and other catchments, which is consistent with economically efficient arrangements and international best practice. We build on the work of Counsell (2003), which reviews overseas water arrangements and highlights the aspects of these arrangements that could generate benefits for New Zealand. The water allocation framework presented in this paper differs somewhat from that proposed in the Waitaki Bill, but is able to promote efficient water allocation under increasing demand as it becomes more common in New Zealand. The Waitaki is but one example of water allocation issues that confront New Zealand.[2]

Desirable Aspects of a Water Allocation Framework

Recent overseas experience has recognised that increasing demand for water resources requires new and innovative approaches to their management that differ from the traditional riparian and administrative regimes.[3] In this section we outline the key features of a water allocation framework, based on this overseas experience, which aims to address the crucial issues in the Waitaki catchment. Our proposed water allocation framework will also serve as a wider framework for the country as a whole, as water issues like those facing the Waitaki become more common in other areas. Indeed, the ability to serve as a nationwide framework is a desirable requirement of developments in water allocation more generally. To suggest the issues on the Waitaki are unique, and to treat them differently from other catchments could cause conflict with water users on other catchments also wishing to develop the general RMA framework.

The following list outlines the key requirements of an efficient water allocation framework. The list is not intended to be exclusive or exhaustive, as with any mechanism for resource allocation there will always be many issues of detail that are very important in its operation. Nonetheless, the following points do represent the broad aspects of a water allocation framework that can achieve a more economically efficient allocation of water while ensuring sustainable management of the resources.

1. Establish well-defined property rights

Any new water allocation framework should firstly ensure that property rights to water are clearly defined. A property right entitles the holder to the use of the resource, although ownership of a property right does not necessarily imply ownership of the resource. A well-defined property right includes ensuring a clear specification as to what may be taken, allowing tradability of rights, and ensuring rights are not subject to pre-expiration judicial or governmental review. It also includes ensuring in-stream rights are clearly specified, such as through the setting of minimum flows. Rights should also be defined so that they are independent of use, allowing tradability of rights across alternative uses.

* The authors are grateful for helpful comments from Phil Barry, Glenn Boyle, Rod Feller, Graeme Guthrie, Richard Hawke, Colin Keating, Raewyn Moss and Tim Stewart. This paper draws heavily on the earlier research of Counsell (2003).

1 We are not advocating the explicit testing of legislation on the Waitaki. Rather, that the situation provides an opportunity for a generic New Zealand wide water allocation framework that can be informed from first principles and overseas arrangements and experience.

2 It is not our intention in this paper to argue for or against the water in the Waitaki River being allocated to a particular use. We merely present the key aspects of a framework for making these allocation decisions, which provides an approach to achieving sustainable management of water resources that better caters for increasing demand and competition.

3 Improved water allocation institutions have recently been put in place in countries that include Australia, England, Wales, Mexico and Chile.

The duration of rights is another element of well-defined rights. An indefinite time-limit ensures continued access to water and therefore encourages investment.[4] Nonetheless, preserving the status quo of New Zealand's current system by allowing periodic review of water rights may be more socially acceptable. If this is the case, then at the very least, rights should be defined so that their duration is significant enough to encourage investment and innovation.[5] There should also be a relatively straightforward and costless 'presumption of renewal' provided water has been, and will continue to be, used in a relatively efficient and environmentally sustainable manner.[6] Significant alteration to consent conditions on renewal is undesirable as it creates uncertainty regarding the scope of potential investments.

Ensuring well-defined rights is particularly important for water rights associated with non-consumptive uses. Water for non-consumptive uses such as hydro-generation is returned to the river and, under New Zealand's current allocation system, is available to downstream users. However, this creates an incongruity between those who generate the return flows and those who use them. As the water right for a non-consumptive use does not endow the holder with the right to the return flows, there is no incentive for that water user to ensure either the timing or volume of return flows is appropriate for downstream users. In Chile, for example, this has caused significant conflict between hydro-generators and downstream irrigators over the timing and nature of hydro releases. In a paper outlining the evolution of water rights, Scott and Coustalin (1995) suggest that future water rights should endow the rights to return flows with those who generate them. The right to the use of these return flows by downstream users can then be developed through bargaining and contractual arrangements between competing users. Defining rights for non-consumptive uses in this way on the Waitaki would help resolve conflicts over releases between hydro-generators and users downstream of their dams. It would also facilitate trading in water (see point 4 below), as the nature of the right is exactly the same whether used for a consumptive or non-consumptive use,[7] enabling water to move between different uses more readily.

2. Re-allocate existing rights based on historical use

Any new water rights regime requires some mechanism for the initial allocation of water rights. The two common mechanisms are grandfathering – or allocating based on historical usage – and auctioning. Auctions allocate rights to those who value them the most and, in the process, discover the price of water. Allocating water rights by auction will generally be efficient for rights to unallocated water.[8]

Grandfathering of rights to water already allocated under a previous allocation framework ensures the protection of existing rights and existing investments. It is a widely accepted principle that in the creation of new water rights regimes, existing rights should be re-allocated based on historical usage, to ensure fairness and social acceptance (in addition to the normal economic efficiency of historical usage in the presence of tradability).[9] Existing rights were grandfathered when the RMA implemented a new water rights regime to replace that of the Water and Soil Conservation Act 1967. Section 386 of the RMA ensured that existing water rights acquired under the WSCA were valid as resource consents under the RMA with their existing conditions.[10] Such a provision is crucial to any new rights regime.[11]

4 An indefinite time-limit does not preclude reallocation of water rights provided tradability of rights is allowed.

5 A duration of 35 years (the maximum time-limit on resource consents under the RMA) would probably be sufficient to encourage investment. However, many existing water rights only have a duration of 5 to 15 years, which would be too short for many investments.

6 This is the case under new legislation to be introduced in England and Wales, where water rights are issued for 12 years with a presumption of renewal if certain environmental and resource use conditions are met.

7 Indeed, there is little difference between a non-consumptive hydro-generator who can store water and return it to the river at a later date, and a consumptive user such as an irrigator, who consumes water of which a portion may be returned to a groundwater resource through infiltration over time. The key difference is only in the timing and nature of their return flows.

8 There is a vast literature on the ability of auctions to deliver the socially desirable outcome, see for example Krishna (2002).

9 See for example Simpson (1994) and Thobani (1997). These authors advocate allocation based on past usage for the initial allocation of rights in a water market, although the same result holds for any new rights regime.

10 However, the RMA did impose on most of these rights a duration of only 10 years before renewal was required.

11 Grandfathering of existing rights does not preclude the transfer of these rights to higher value uses.

3. Develop a system to manage water variability

Variability in water flows requires a system to manage the effect that ongoing changes in water availability has on water users. One way to do this is by defining priorities on water rights. A high or senior priority user has the right of water use over a more junior priority in times of scarcity.[12] Such a system works best with a functioning water market, as it allows risk management by water users. Water users can hold a portfolio of different priority rights that provides more certainty in water flows to the user's desired risk level. For example, a hydro-generator requires significant water supplies in winter when demand for electricity is high. Hence, they may choose to hold a senior water right giving certainty in supply. A portion of this senior right could be temporarily traded with an irrigator in summer, who requires more certainty in supply due to generally drier conditions in that season.

An alternative system, and one that can work for allocating water within the priority groupings, is to allow proportional sharing. In times of low flow, all users would have their allocations proportionately reduced. Proportional adjustments would also apply in times of high flows, so that users would receive additional water. Such a system avoids the need to rely on administrative decisions to determine whom water should be allocated to in times of scarcity. Both the proportional and priority systems require water trading for them to foster efficiency.

Priority and proportional systems are common in parts of New Zealand. For example, on the Waimakariri River Environment Canterbury issues 'A' and 'B' permits, with 'A' permit holders having priority. The Wellington Regional Council allows proportional allocations on some of the rivers in the region. As the flow on a river approaches the minimum flow, there are designated flow cut-off points at which rights holders must reduce their extractions. These types of priority and proportional systems are not mentioned in the existing legislation and are only implemented on an ad hoc basis. An effective water allocation framework would ensure provision is made for these systems.

4. Establish a functioning water market

A water market allows a water user to trade all or part of their water right on a temporary or permanent basis, so that water can move to its highest societal valued use.[13] A market also allows potential water users to purchase water when there would otherwise be none available under an administrative allocation. For example, in a recent Environment Court decision it was noted that the Upper Waitaki is fully allocated to Meridian and other existing users. Although the decision is under appeal, if it is upheld then it is difficult for a new user to gain access to this water unless they agree with Meridian (and any other affected parties) that the application to use water shall not be challenged. Such a process has significant transaction costs and is unlikely to result in efficient use of water over time. However, if a water market existed where rights were well-defined and tradable, then the use of the water could be traded between existing and potential users. In this case, a potential water user in the Upper Waitaki could negotiate and purchase a portion of any existing user's water rights, entitling the new user to water they would otherwise not have. An existing user would, on a commercial basis, release water to higher value uses than its own.

A water market requires more than just an allowance of trading specified in the legislation. It requires institutional arrangements that encourage and facilitate trading.[14] These arrangements would include:

12 Of course the criteria for determining the initial allocation of priorities will have to be determined. In the Western United States priorities are ranked on a first-in-time basis.

13 The societal value of water in its various applications will generally be represented by private values in exchange, particularly where externalities peculiar to industries that make any use of water are priced properly (for example, in the case of CO_2 emissions deemed to be an externality, when there is a carbon tax).

14 Note that a large number of trades or a formal trading exchange are not necessary for a water market to be of benefit. The evolution of markets reflects the transaction costs of trading as well as the intrinsic nature of the goods. As a consequence, markets take various forms.

- a single public registry recording the full ownership details of water rights and the details of rights transfers.
- an effective volumetric monitoring system to record amounts abstracted and return flows at all sites.
- a catchment users association or water brokers to facilitate the flow of information on water availability and trades.[15]

A water market itself is also not constrained to being purely a spot market. The use of derivative instruments such as option contracts for water would further facilitate trading and generate efficiency gains.

Overseas experience in water markets is demonstrating that these markets can generate significant benefits. In Australia, McKay and Bjornlund (2001) report that water markets in Victoria, South Australia and New South Wales have allowed water to move to irrigators producing higher value crops and with more efficient irrigation technology. This has lead to economic benefits that include both positive environmental outcomes (such as a reduction in polluted water draining back into waterways) and social outcomes (such as the improved allocation of water and profitability of irrigators generating jobs in small communities).

The example of Australia shows that significant efficiency gains can be realised when irrigators can trade water between themselves. When water is not scarce, it is more efficient (when capital costs are included) to use low capital, low water efficiency irrigation methods such as border dykes. However as scarcity increases, then border dyke irrigators can reduce their water consumption by investing in capital equipment such as spray systems. The excess water available can then be transferred to other irrigators. The efficiency and suitability of various irrigation systems will vary depending on the circumstances, and it is only understood by those who know the activity and accept the risks of the enterprises that use water. Thus, how the balance of capital and water efficiency use is managed is best left to decentralised trades.

5. Provide an effective regulatory and administrative system

Notwithstanding the benefits water markets can generate, there is still an important role for an administrative body (which may be local government) in an effective water allocation framework. For example, recent reforms in Australia have recognised the need for administrative bodies by requiring state governments to undertake comprehensive planning processes in relation to the allocation of water resources. Where water resources are not fully allocated, administrative allocation by local government under the current system of the RMA is a constructive way to allocate excess water. Although there are problems with this first-in first-served system when demand exceeds supply, the addition of a water market would resolve this by incentivising reallocation of water to higher valued uses. First-in first-served is a sensible approach to allocating a resource that is not scarce.

The administrative body would also play a valuable regulatory role in the trading of water rights, particularly with regard to the enforcement of property rights. Trades can have significant effects on third parties – particularly where trading of upstream rights influences water available to downstream users. Thus, trades to a location upstream of the current location would require administrative approval (based on the approval of affected users upstream of the current location) to ensure that adverse third party

15 A regular newsletter such as the recently developed *Catchment Waitaki Newsletter* would also help facilitate information exchange. The Internet is also a valuable tool in lowering the costs of information exchange, and regional councils are increasingly using it in relation to water resources.

effects are avoided or compensated for before trades can proceed. More generally, an administrative body is required to ensure the correct application of water property rights. Additionally, regulation of monopoly behaviour in water trading may be another important role to be played by an administrative body.[16]

6. Build on the current framework

The existing water allocation framework provided by the RMA is not in dire need of a complete reform. It does create a good underlying basis for an efficient allocation system, which requires some fine-tuning of particular aspects as mentioned above. The RMA also has the advantage that a significant amount of case law has already been established about its processes. Incorporating the right institutional arrangements and clearly specified property rights into the existing framework would improve existing outcomes in relation to water allocation. Indeed, particular aspects of the RMA – such as setting aside minimum flows for environmental uses – are similar to features that are considered an integral part of overseas water reform programs, such as in Australia. Furthermore, there do exist institutional structures in place that would facilitate the operation of an efficient allocation mechanism, as we outline in the next section. A desirable water allocation framework would build on the platform provided by the RMA and these structures.

Valuing Water in a Water Market

In the previous section we outlined some of the benefits that would result from allowing trading of water rights through the establishment of a water market. An important requirement for a water market to work well is that water users have information on competing inputs and outputs to the uses of water and on the value of water. It is for this reason that a catchment users association can facilitate trades by allowing the free flow of information on water values. Despite the lack of water-specific arrangements like this in New Zealand, there are other existing structures in place that provide information on the value of water. In particular, wholesale electricity prices provide a lower bound for the value of water on rivers with existing hydro-generation. The rationale for this is sketched in this section. It is a relatively specific aspect of the general framework presented in this paper, nonetheless it is an illustrative and important part of enabling the efficient use of water in New Zealand.

That electricity prices provide the minimum water value is relatively intuitive. At a point on a river upstream of a single hydro power station, the value of water to the hydro-generator is given by the price at which it sells electricity.[17] If the value of water in an alternative use at the same point were lower than this price, an efficient market would allocate water to the higher value use of electricity (as the alternative user would be worse off by paying a price for water that is greater than the value they attach to it). Thus, the wholesale price of electricity at the relevant network node gives the minimum value of water at points on the river upstream of the power station.

The non-consumptive use of water by a chain of hydro stations affects the value of water entering the top of the chain. Consider water at a point upstream of several power stations. As water must pass through a number of stations, it is more valuable than water downstream with fewer power stations to pass through. This is because the minimum value of water at any point will be the sum of the electricity prices at all downstream nodes – so

16 Nonetheless, the ability to trade water rights – even in a market with monopoly behaviour – will be more efficient than the monopoly implied by the complete absence of tradability.

17 Strictly, the value of a unit of water in electricity generation is the value of the electricity it generates less the cost of any other resources used. In the short-term, where these costs are fixed, units of water can be measured so that their value is the price of electricity. The ability to store water creates a timing option in the generation of electricity and therefore adds a premium to this value.

that the more power stations water will pass through, the higher its value. By implication, as water flows downstream through successive power stations, it becomes less valuable in its electricity use.

The value of water provided by the electricity market also reflects environmental constraints on water used for electricity generation. For example, river heating by Huntly power station and reservoir levels on the Waikato River are subject to environmental rules specified in the conditions of resource consents. The provision of minimum flows to the lower Waitaki for abstractive users and to protect in-stream values is another example. These rules are designed to maintain or enhance the environment. The price of electricity at the relevant network nodes values these constraints on water use when they are operative.[18]

The electricity market values the scarcity of water both across the country and across alternative electricity generation fuels, in addition to valuing the effect of environmental constraints.[19] It thereby encourages water use that promotes national economic efficiency. The across-region effect is illustrated by the case where hydro-lake inflows have been low in one region of the country and high in others. Setting aside the role of other electricity generation fuels, the price of electricity at any location on the National Grid appropriately reflects the higher (lower) electricity production from regions with the relatively lower (greater) scarcity of water. Hence, the electricity market discovers the value of water in electricity at hydro locations, effectively accounting for water scarcity, and it appropriately allocates water used for electricity. It conveys the value of water in electricity production (and consequently the minimum value of water) across the country.[20]

Similarly, the price of electricity reflects the price and substitutability of fuels other than water: gas for example. If gas generation is setting the price of electricity then it is also determining the value of water for electricity being generated in hydro-generation locations. This is because if one more unit of electricity was supplied by hydro-generation, the benefit would be the price of the gas-supplied generation it substituted for. If the price of gas were to increase, then the value of water in generating electricity, and thereby other uses, would also increase.[21] Thus, the electricity market is conveying the value of water for those catchments that have hydro generation, taking into account the price and availability of other fuels no matter where their generation is located.

The coordinated water value function that results from the issues explored in this section is an illustration of the efficiency gains available from trading – where water moves to its highest value uses. Thus, it is important that the use of water is flexible so that both within-industry and cross-industry transfers can occur. For example, it is easy to imagine a situation, perhaps lasting only a few weeks or months, where the use of water is better for irrigation than generation, or vice versa. In such circumstances, low cost, quick and simple transfers could save a valuable crop or address energy shortages such as those seen in recent years. The wise application of water should therefore reflect all its potential uses. It would be enhanced by a mechanism with institutional arrangements that built on existing frameworks, such as the RMA and the wholesale electricity market as described above.

Water Allocation Under the Waitaki Bill

The Waitaki Bill seeks to allocate the water in the Waitaki in a more effective way than that

18 The valuation of water as an input in the electricity market gives the cost or value of relaxing the operative constraint; in this way it values the trade-off between water used for electricity and for the environment.

19 Moreover, storage allows water to be substituted across time for whatever use. The electricity market also values the scarcity of water across time, as may markets for irrigation water.

20 The behaviour of wholesale electricity prices is not inconsistent with how the price of water should behave. Low lake inflows into southern hydro lakes in the winters of 2001 and 2003 led to high wholesale electricity prices. This is perfectly consistent with the way water prices should move in water markets: scarcity forces prices up to create incentives to conserve water.

21 This is consistent with the results of Guthrie and Videbeck (2003), which show that the prices at a sample of nodes in the New Zealand electricity market show significantly similar movements to suggest there is generally one and occasionally at most two separate markets across all nodes.

available under the first-in first-served approach of the existing legislation. Indeed, the stated public policy objective of the Waitaki Bill is "to create a decision-making process that results in equitable, efficient, and transparent decisions on competing uses of water in the Waitaki catchment for both existing and future uses". It is therefore useful to consider how the framework proposed by the Bill sits in relation to the desirable aspects presented above. In the following sections we firstly outline the approach taken by the Waitaki Bill and then consider, based on our interpretation of the Bill, the points on which it differs from the framework we have proposed.

To establish a method of allocating the water in the Waitaki River, the Bill outlines three specific courses of action: setting up a Water Allocation Board, establishing a water allocation framework and creating a Panel of Commissioners. The primary function of the Water Allocation Board is to develop and approve the water allocation framework, which details the way water is to be allocated in the Waitaki catchment. The Board is made up of at most five members appointed by the Minister for the Environment. The Bill provides no indication of the criteria by which they are to be appointed.

The water allocation framework itself will become a regional plan for the Waitaki catchment. Although the framework's inclusions and exclusions are the responsibility of the Board, the Waitaki Bill does specify some matters that must be included. These matters give a reasonable picture of the way water is to be allocated under the framework.

The framework must firstly specify the amount of water set aside for in-stream values (including Maori values) and for current and likely future domestic, stock water and fire fighting purposes. Following that, the framework will define the amount of water that is available to be allocated to other competing uses. Implied here, although not explicitly stated in the Bill, is some measure of the total water available in the Waitaki catchment. [22]

Given the water available for competing uses, the Board must decide how much water is available to present and likely future categories of competing uses. That is, it decides how much water is available for hydro-generation, how much for irrigation and so on. In making these allocation decisions the Board must apply a three-step process. It firstly applies the purpose and principles of Part II of the RMA.[23] Secondly, it considers the benefits and costs of each particular water use from a national perspective, which includes the regional and local benefits and costs.[24] Finally, the Board takes into account existing resource consents on the Waitaki, although this does not give explicit protection to existing rights. As existing rights are considered last in the priority order, it is possible the allocation framework could impede such rights.

Once the framework is specified, it is subject to a process similar to that used for regional council plans. The framework is publicly notified and subject to submissions, which are to be considered at a hearing held by the Board. Following this, the framework must be approved by a majority decision by the Board. Once approved, the decision may be appealed to the High Court, although only on matters relating to the application of the law.

With the framework approved, a separate Panel of Commissioners is appointed by the Minister for the Environment to consider individual applications for resource consent in the Waitaki catchment. Members of the Panel are nominated by local authorities and so will mainly be people from the local area,[25] although the Minister may also make

22 That is: if A equals the total water available in the catchment, and B equals the water set aside for in-stream, domestic, stock water and fire fighting, then A – B equals the water available for other competing uses. The Bill gives no indication, however, of the method for determining the total water available. Volatility in flows and the impact of storage lakes will make this a difficult task in that available water will vary over location and time.

23 This ensures (among other things) that the water use has no adverse effects on the environment and does not impinge on the reasonably foreseeable needs of future users. The latter requirement is quite general and the RMA provides little guidance as to how it is to be implemented.

24 The Bill does not clearly specify the treatment of any trade-offs between local (or regional) and national interests.

25 The Waitaki River comes under the domain of the Canterbury Regional Council. However, other relevant local authorities are the Otago Regional Council and the Waitaki, Waimate, McKenzie and Timaru District Councils.

direct appointments to the Panel.[26] The Panel has the powers and functions of a regional council, although unlike a regional council it does not have to consider applications for water on a first-in first-served basis. The Panel may make a comparative assessment of competing applications, firstly by applying Part II of the RMA and then by cost-benefit analysis from a national perspective. The final decisions on individual applications must be made in accordance with the water allocation framework. Some applications may be passed from the Panel to the appropriate local authority, which must also make decisions based on the framework.

As with ordinary resource consent decisions, those made by the Panel or a local authority may be appealed to the Environment Court. However the Bill introduces a number of measures to reduce delays that often occur in this process. The Environment Court is to take a rehearing approach, where those appealing cannot introduce new evidence not already heard by the Panel. The Court may also conduct a preliminary review of the appeal to ensure the case is actually worthy of the Court's time. As with ordinary resource consent decisions made by the Environment Court, questions of law may be appealed to the High Court.

How Does the Bill Fit a Desirable Framework?

The allocation framework presented in the Waitaki Bill has numerous aspects that are likely to be contentious and will be vigorously debated during its approval stages. However, the argument here is not focussed on these relatively detailed issues. It is that the overall economic framework of the Waitaki Bill does not include certain features that are suggested as being desirable requirements of an efficient water allocation framework. Thus it is unlikely to be an effective model for future water allocation issues in the country as a whole. Although the Bill does have some positive aspects, such as its attempt to reduce the costly delays of the existing planning process,[27] it places too much reliance on central planning and administrative allocation of water resources without provision for key aspects identified earlier.[28]

The Waitaki Bill shifts a significant portion of decision-making from the local government (or decentralised) level to the central government level.[29] This represents a move away from a key premise underlying the RMA: that decision-making on resource allocation should be made at the level closest to the actual resource. This view, endorsed by the Brundtland Commission and Agenda 21 reports on sustainable development,[30] allows improvements in efficiency and accountability by ensuring decisions are made by those who bear the consequences. As Hawke (2003) notes, centralised decision-making can result in problems such as an inability to achieve a consensus that fits the preferences of any sub-group of society and an allocation of resources that is based on only a single view of the trade-offs relating to any consent.

The requirement in the Bill to base planning decisions on cost-benefit analysis is a common feature of centrally planned decisions, but such analysis is relatively subjective and relies heavily on underlying assumptions.[31] There is an incentive for the water claimant to underestimate costs and overestimate benefits in order to attain their favoured allocation. Such a system is an undesirable method for resource allocation where other methods are possible, and the misallocation that results is common with centrally planned investment decisions.[32]

The Waitaki Bill and the RMA itself also place considerable weight on the allocation of

26 The Bill does not specify what level or type of expertise is required of Panel members.

27 The trade-off with this, however, is that procedural rights of affected parties become more limited. Further research is required to work through the implications of this trade-off. The other obvious corollary is if it is efficient to reduce delays as per the Bill for a particular catchment, then it will be efficient to do so more widely – at the national level.

28 In this paper we do not consider the political economy issues that generally affect central planning institutions, such as which particular political and economic interests will be influential, and the social costs of these interests being expressed in the absence of a market (see for example Noll, 1989).

29 Although the Bill does aim to preserve some form of decentralised decision-making by ensuring the Panel of Commissioners is made up of local representatives, allocation decisions by the Water Allocation Board are made at the central government level.

30 See respectively WCED (1987) and UNCED (1992).

31 In the existing legislation, section 32 of the RMA requires cost-benefit analysis for most rules, policies and methods in regional council planning.

32 See the examples in Evans and Quigley (2003, p.7).

water by an administrative body. Allocation by administrative fiat (regardless of whether it is at a decentralised or centralised level) without the possibility of reallocation by market participants (i.e. exchanging) means water is not necessarily going to those who value it the most. Concomitantly, the Waitaki Bill does not account for changes over time in the way users value water, as allocations by the Board are made at a one-off point in time. The absence of a reallocation mechanism also means that once water is allocated users have no incentive to implement conservation measures. Without the ability to resell water, a water user faces no opportunity cost from wasting or consuming too much, thus giving no incentive to prevent such habits.[33] Moreover, if water users are unable to trade water rights then reallocation must be administrative. The criteria by which rights are reallocated will be subject to administrative decision-making, limiting the certainty of water rights and investments that utilise them.

Although the Waitaki Bill does include provision for trading of water rights, this is only in accordance with the existing section 136 of the RMA (and so is not directly attributable to the Bill), and little trading under this section has taken place to date. Section 136 allows water users to trade all or part of their right to the same site or another site in the same catchment, provided it is allowed in the regional plan and approved by the regional council. However, the right institutional arrangements need to be in place for trading to occur, ones that minimise the transaction costs of reallocation. But both the Waitaki Bill and the RMA are silent on such arrangements.

There are two other aspects of the Bill that are worth noting, which do not conform to the desirable aspects identified earlier. Firstly, the Bill provides no protection for existing rights. This would have serious consequences for current and future investment decisions made by water users. Existing investments by water users have been made under the certainty of a predefined time-limit on the water right. To truncate this time-limit and alter the nature of existing rights will, at best, reduce the value of existing investments or, at worst, lead to stranded assets, and signal that this may happen again in the future. The risk this creates that rights may be expropriated in the future could deter investment by water users.

The second point is the difficulty in making a one-off measurement of the total amount of water available. A distinctive feature of water is that flows are variable, thus the total water available is never constant. This volatility has short-term, cyclical and trend elements. To have institutional arrangements that do not provide for the management of these, as seemingly the Bill does, could result in significant conflicts between users in the future.[34] For example, consider the situation when flows are significantly lower than those used by the Water Allocation Board to calculate the total water available. As water rights are defined volumetrically, an upstream user may still be able to satisfy their entire water allocation but, as flows are low, there will be insufficient water available to meet a downstream user's allocation. The upstream user's priority due solely to their geographic location is inefficient if it cannot be traded. The situation could be resolved by specifying tradable contractual priorities or allowing proportional reductions to both users in times of low flow.

Conclusion

The situation on the Waitaki of increasing demand for water and intense competition between water users is not a unique, one-off occurrence. With increasing population and

33 See Counsell (2003, p. 19) for a review of reallocation through water trading rather than administrative fiat.

34 Water demands will also change over time and climate change may alter the total amount of water available.

incomes, and demand for commodities and services that New Zealand produces, comes increasing demand for water and goods that use water as an input: these include electricity, agricultural products, recreation and environmental demands. Thus, there is a need to manage water resources in a way that satisfies competing demands in an efficient manner that applies water to its most societal valued use including environmental stewardship. The situation on the Waitaki provides an excellent opportunity to develop a framework to achieve just that, but is just one example of New Zealand catchments with competing demands for water.

Governments worldwide are responding to increasing demands for water by developing legislation and institutions that provide incentives for more efficient allocation and management of water resources. In Australia, for example, nationwide reform of the water sector has been underway since 1994, and indications are that it is progressing well and delivering beneficial changes. In England and Wales there is currently a Bill before parliament that aims to improve the way these countries allocate their water resources. These arrangements generally have the central feature of enhanced tradability and preservation of existing rights.

Aspects of the framework presented in the Waitaki Bill differ from recent developments in other countries. There is a need for a framework that balances administrative and market allocation mechanisms, while allowing for the unique characteristics of water as a dynamic, flowing resource. Market mechanisms, including associated property rights, are an essential part of an effective allocation framework. While such a framework is not a panacea, and not easy to implement, it is a necessary step to manage New Zealand's scarce and precious water resources well for the foreseeable future.

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Kevin Counsell is a research assistant at the New Zealand Institute for the Study of Competition and Regulation and a Masters student in economics at Victoria University of Wellington. His recent research has been focused on the efficient allocation of water among competing users. This has included an analysis of overseas water allocation mechanisms and the implications for New Zealand's current framework, and modelling the value of water over time under uncertainty.

Lewis Evans is Professor of Economics at Victoria University of Wellington where he has held the positions of Associate Dean and Deputy Dean of Commerce. He was responsible for setting up the New Zealand Institute for the Study of Competition and Regulation in 1998 and he held the position of Executive Director of it until early 2004. His specialist interests are in the economics of organisations and markets. Recent research includes the efficacy of regulation, network interconnection contracts and the measurement of performance of organisations and markets