

Allocation Efficiency in the Context of Water Security

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Introduction

Efficiency in water allocation is achieved when water resources are put to their highest valued use (Kemper 2001). Allocative efficiency is a desirable goal in the face of shortages and increasing costs to develop new water resources (Kemper 2001). There is a well developed literature that explores approaches to improving efficiency in water allocation (e.g., Grimble 1999; Bjornlund 2003; Cantin, et al. 2005).

Climate change, the focus of this workshop, is pertinent to the topic of water allocation for two reasons: (1) anticipated changes to the climate are expected to transform the hydrologic cycle in North America (Bruce, 2007), and (2) water allocation systems will be a major determinant of capacity to adapt to those changes (Miller, et al. 1997; de Loë, et al. 2001; Kabat and van Schaik 2003).

Efficiency in water allocation clearly is an important concern. However, how important is efficiency relative to other considerations that are pertinent to water allocation? In this paper, I argue that allocative efficiency should be treated as one of many considerations that must be balanced in order to achieve a broader goal: *water security*.

Focusing on water security – and thus putting allocative efficiency into a wider context – has several potential benefits. First, doing so is pragmatic in that it recognizes that many non-economic considerations actually are important in water allocation (e.g., political feasibility, state sovereignty, Aboriginal rights, local community sustainability, ecosystem quality). Second, emphasizing water security helps to elevate the significance of water allocation to human wellbeing and environmental quality. Third, attention to water security positions climate change as one of many important challenges faced by societies, and reinforces the idea that climate change must not be dealt with as a separate concern. Instead, it should be mainstreamed into processes such as water allocation. These themes are explored briefly in this discussion paper¹.

Water Security and Allocative Efficiency

“Water security” is a multi-dimensional concept that has widely differing interpretations. For example, in the United States, fears about

¹ Portions of this paper are drawn from a recent report to the Walter and Duncan Gordon Foundation by de Loë, et al. (2007), *Water Allocation and Water Security in Canada: Initiating a Policy Dialogue for the 21st Century*.

terrorist attacks have spawned an industry focused on identifying vulnerabilities in drinking water systems (e.g., Haestad Methods ND). A much broader perspective on water security is offered by the Global Water Partnership (GWP), which defines it as “access to adequate quantities of water, of acceptable quality, for human and environmental uses” (GWP 2000). It is the broader perspective of the GWP that informs this discussion paper. Water security exists when sufficient water of good quality is available for social, economic and cultural uses while, at the same time, adequate water is available to sustain and enhance important ecosystem functions. In this context, water security requires good governance.

One specific area in which links between water security and good governance are strong is *water allocation*. Water allocation systems are the rules and procedures through which access to water for both consumptive and non-consumptive uses is determined. By establishing the availability and priority of access to water resources for consumptive uses such as cities, agriculture, and manufacturing, and for non-consumptive uses such as hydropower, recreation and environmental protection, water allocation systems influence economic productivity, social and cultural wellbeing and ecosystem quality (Gleick 1998; Ferreyra and Van Beek 2006; Warner, et al. 2006)

The socioeconomic, cultural and ecological implications of water allocation are amplified

when water resources become scarce due to population growth, climate change, and changes in societal preferences. In the context of scarcity – whether created by societal or natural processes – water allocation systems can increase or decrease water security. Thus, effective, efficient, and equitable water allocation systems are critical to maintaining and enhancing environmental quality, economic productivity, and social wellbeing.

Allocative efficiency is an important determinant of water security. In Table 1 (below) allocative efficiency is critical in the context of two water security considerations: *economic production* and *water conservation*. However, from the *overall* perspective of Table 1, the extent to which water allocation systems permit re-allocation between water users, sectors and/or regions must be balanced against considerations such as protection of aquatic ecosystems; equity, and participation by affected parties in decision making; integration within hydrological systems; state sovereignty; Aboriginal water rights; and, especially pertinent in the context of this workshop, adaptation to climate change. In any particular region, whether or not sufficient water of good quality is available for social, economic and cultural uses while, at the same time, adequate water is available to sustain and enhance important ecosystem functions, will depend on the extent to which the seven considerations outlined in Table 1 are addressed in water allocation systems.

Table 1: Key Considerations Linking Water Allocation and Water Security

Broad Water Security Consideration	Specific Concerns Pertinent to Water Allocation
Ecosystem Protection	<ul style="list-style-type: none"> • Environmental water allocation • Monitoring and enforcement for ecosystem protection • Creation and incorporation of ecological knowledge
Economic Production	<ul style="list-style-type: none"> • Clear and stable allocation rules • Water allocation and related information to make economically sound decisions • Ability to re-allocate water between users, sectors and/or regions
Equity and Participation	<ul style="list-style-type: none"> • Equity • Sustained and meaningful stakeholder and public participation • Mechanisms to address potential conflicts at different scales
Integration	<ul style="list-style-type: none"> • Integration between groundwater and surface water resources occurs • Integration between water quality and water quantity • Integration between land use planning and water allocation
Water Conservation	<ul style="list-style-type: none"> • Conservation-related charges • Re-allocation of water to more efficient and less consumptive uses • Incorporation of water conservation practices
Climate Variability and Change	<ul style="list-style-type: none"> • Investments to understand impacts of climate variability and change • Development and application of adaptation strategies
Transboundary Sensitivity	<ul style="list-style-type: none"> • Coordination of water allocation systems across political boundaries • Respect for state sovereignty • Respect for indigenous customary allocation

Most water allocation systems in North America have deep historical roots, and were not designed with many of the concerns outlined in Table 1 in mind. Thus, it should not be surprising that enormous variability in the extent to which they are addressed exists. This is illustrated in a recent evaluation of the link between water allocation and water security in Canada (de Loë, et al. 2007), which used the framework outlined in Table 1 to evaluate ten provincial and three territorial systems:

- Ecosystem protection is an explicit concern addressed to some extent by the allocation systems of most jurisdictions, but monitoring and enforcement for ecosystem protection is limited, and fewer than half of the ju-

risdictions had mechanisms in place to incorporate ecological knowledge into water allocation decision making.

- From the perspective of economic production, relatively clear allocation rules are a positive feature of Canadian water allocation systems, but monitoring and enforcement is not systematic, and accurate data are not available in most jurisdictions. At the same time, with very few exceptions, water allocation systems reduce flexibility by constraining re-allocation.
- Equity is not a dominant concern in water allocation systems, and no system recognizes a human right to water. Citizens in all jurisdictions have opportunities to partici-

pate in water allocation decision making, which is becoming more decentralized – but governments retain primary or final decision making authority in all jurisdictions.

- All jurisdictions at least acknowledge the need for integration of water quality and quantity, surface water and groundwater, and land and water management – but significant knowledge gaps exist, especially in relation to groundwater. Water allocation decisions and land use planning decisions tend to remain separate in most jurisdictions.
- Water conservation is recognized as a concern in all jurisdictions, but mechanisms that promote conservation at the provincial or territorial scale are not widely used or consistently applied. Pricing to promote conservation is not a commonly used instrument. The limited monitoring of actual water use in most jurisdictions poses a fundamental challenge to water conservation using pricing or other instruments.
- Climate change is recognized as a concern in most jurisdictions, but very few have actually incorporated knowledge about climate change into their water allocation systems. In general, historical patterns and observed trends continue to guide water allocation decisions despite the fact that these patterns and trends are not likely to be representative of future hydrological conditions.
- Coordination of transboundary water allocation decision making occurs in specific contexts, such as along the Canada-US boundary and between selected provincial/territorial boundaries. Issues of state sovereignty regarding water allocation across the Canada-US boundary are a concern despite the arrangements that exist. Aboriginal customary allocation boundaries are not acknowledged in Canadian water allocation systems – although there is increased recognition of their importance in some jurisdictions.

Conclusions

Thinking about water allocation from the perspective of water security has important bene-

fits. In Canada, as is the case in many parts of the world, water allocation is treated as a relatively low level administrative function. Hence, it should not be surprising that many of the water security concerns discussed in this paper were not addressed effectively in existing Canadian water allocation systems. The failure to recognize appropriately the significance of water allocation systems should be a concern because water allocation *decisions* have major implications for environmental quality and human societies. By drawing attention to the ways in which this occurs, a water security perspective can help to elevate the significance of water allocation.

Allocative efficiency is an important consideration in water allocation, but it should be seen as one among several concerns that must be balanced to achieve water security. Following from this point, the relative importance of each of the seven broad water security considerations discussed in this paper will vary strongly from place-to-place, and from time-to-time. Thus, water security must be treated as a moving target.

Returning to the specific focus of the workshop, a final benefit of a water security perspective is that it can position climate change more appropriately. As intimated in this discussion paper, climate change competes for the attention of water decision makers with numerous other significant challenges, including economic development, stresses produced by growth, competition for scarce resources, etc. Thus, adaptation strategies are more likely to be successful if they can integrate concern for climate change with other concerns that decision makers (at all scales) are facing. This notion, commonly referred to as *mainstreaming* climate change, is increasingly seen as the appropriate way to proceed (e.g., Kabat and van Schaik 2003; de Loë and Berg 2006). Treating climate change as one key contributor to water security is another way of mainstreaming it into existing decision making processes.

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