

Asymmetry and Equity in Water Resources Management; Critical Institutional Issues for Southern Africa

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Abstract Water users wish to achieve the highest benefits from water resources. Rules limit the manner in which water users may utilise the water resources occurring within their constituencies or territories. However an asymmetrical situation exists whereby downstream users may not affect upstream users but upstream users do cause downstream impacts. Because of this asymmetry the equitable sharing of water resources between upstream and downstream users will always imply that upstream users have to forego some potential water benefits. The general question that this paper addresses is: which institutional arrangements can be devised to (re-)establish an equilibrium between up- and downstream entities within a catchment area or river basin? The paper addresses this question by first focusing on some local and national water allocation arrangements. After briefly reviewing the different management regimes, customary and colonial, that co-evolved in Southern Africa, it assesses the water management principles that are currently being espoused. The focus then turns to the principles in international water law that deal with the allocation of water in transboundary river basins. It is concluded that it often proves difficult to reach agreement over how to share the scarce resource. The paper then discusses the current trend to look beyond water and beyond the river basin when seeking peaceful means to share a common water resource. The concept of “hydrosolidarity” emerges as a normative value that may help to recreate a balance between the various (asymmetrical) interests that exist within a river basin. The paper concludes that water resources can only be governed wisely if there is capacity to understand and monitor the water fluxes within a river basin. If such capacity is wanting, priority should be given to strengthen it.

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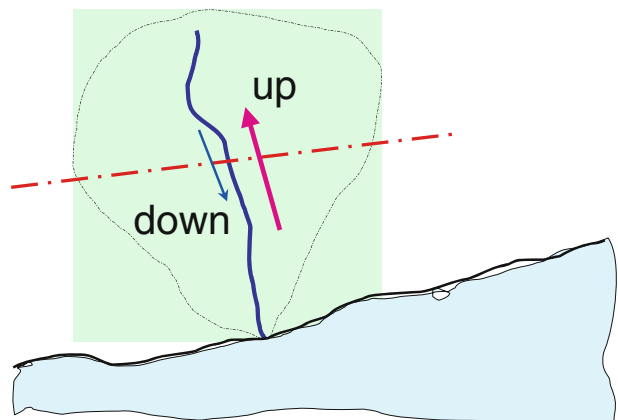
1 Introduction: Overcoming the Asymmetrical Divide

Individual water users, communities of irrigators and countries all wish to achieve the highest benefits in negotiating shared water resources. Rules, enshrined in local customary arrangements or national water laws or regional and international conventions have put limits to the manner in which water users may utilise the water resources occurring within their constituencies or territories. In this context it is important to recognise and acknowledge the asymmetrical situation in river basins, whereby downstream uses may not impact upstream users, if at all, but upstream uses do cause downstream impacts. Downstream users may affect upstream users, such as through interfering with navigation, or through the construction of reservoirs which may have upstream impacts such as on fish migration, and back water effects that may extent to the territory of an upstream user. However in most cases these impacts are small compared with the impacts that upstream users have on downstream users.

Because of this asymmetry the equitable sharing of water resources between upstream and downstream users will always imply that upstream users will have to forego some of the potential water benefits. This also applies to countries in transboundary river basins because of the principles codified by the UN Convention (1997), that establish the right of a riparian country to a reasonable and equitable share and the concomitant duty not to cause significant harm. Both principles have been adopted by the revised Protocol of Shared Watercourses of the Southern African Development Community (SADC 2000), which came into force in 2004 while ironically, the UN Convention is not yet in force.

There can only be one sustainable solution to the asymmetry problem, namely to restore the equilibrium through reciprocating the flux of water flowing in the downstream direction with a flux that points in the opposite direction (Fig. 1). This flux may consist of matter such as money, but it may also consist of immaterial or symbolic “substances” such as power or solidarity. The general question that this paper addresses is: which institutional arrangements can be devised to (re-)establish an equilibrium between up- and downstream entities within a catchment area or river basin? The attention will be on issues concerning

Fig. 1 Sharing water resources between an upstream and downstream water user through reciprocating the downstream water flux with an upstream flux of matter



water quantity; water quality issues and pollution loads fall outside the scope of the present paper.

The paper attempts to address this question at a conceptual level. It first focuses on the local and national water allocation arrangements (Section 2). After briefly reviewing the different management regimes, customary and colonial, that co-evolved in Africa, the paper assesses the water management principles that are currently being espoused. However, without sufficient hydraulic infrastructure these principles will be difficult to implement. Section 3 deals with the allocation of water in transboundary river basins. It describes the two principles that have been codified by international law, as well as attempts to operationalise these principles in concrete and measurable criteria. It is concluded that it often proves difficult to reach agreement over how to share the scarce resource. The fourth section deals with the current trends to look beyond water and beyond the river basin when trying to seek peaceful means to share a common water resource. The concept of benefit sharing is critically reviewed. Section 5 draws the findings of the preceding sections together by examining the concept of “hydrosolidarity.” This concept emerges as a normative value that may establish a certain degree of balance between the various (asymmetrical) interests that exist within a river basin. The concluding section provides four lessons as well as one overarching conclusion that emphasises the capacity to understand and monitor the water fluxes within a river basin if the water resources are to be governed wisely. If such capacity is wanting, priority should be given to strengthen it.

2 Water Allocation – Lessons from Local and National Arrangements

In many places in Africa water sharing arrangements evolved that were firmly embedded in the local culture and that reflected core values of communities, their knowledge and understanding of the physical environment and how they related to it. Local level water management practices were therefore consistent with, and a constituent part of, customary principles (Mohamed-Katerere and van der Zaag 2003). Water was, and continues to be, considered God-given and hence cannot be denied to anyone. The source of fresh water, rainfall, is nearly everywhere in Africa revered, acknowledging that rain is a constraining element in (rainfed) food production. It is as if many African societies established a profound respect for “green” water well before this concept was introduced in 1993 by Falkenmark (1995). Concepts such as fairness and “giving each other chances” signified a strong notion of equity if not solidarity. Taboos often reflected respect for the environment and frequently dealt with the protection of the water source against pollution (van der Zaag 1999). Customary principles often also respected, if not protected, prior investments in water infrastructure, and thus reflected a notion of hydraulic property (Coward 1986).

With the colonization of Africa, nation states were carved out of the continent, and new legal principles were imported and imposed. National legal systems emerged, and specific legal arrangements were established with respect to water. These arrangements often reflected the legal principles of the colonising country. That is why the legal systems related to water in neighbouring countries often differed (e.g. Mozambique and South Africa). It is curious how South Africa and Zimbabwe ended up with such different water rights systems, whereby South Africa inherited the system of riparian rights developed in Britain and Zimbabwe adopted the prior appropriation doctrine developed in the western parts of the USA. In 1998 both countries, however, replaced their inherited water rights systems with new legal systems that are both based on two similar principles (South Africa 1998; Zimbabwe 1998). The first principle is that primary water requirements have priority over

any other type of water use, and the second is that the remaining water, i.e., for non-primary purposes, will be shared equally among users through a system of proportional water allocation.

These and other newly developed national water rights systems, coupled with some other recent legal developments, allow the distillation of some core values underlying access to water. The first core value is that access to water may be considered a human right and thus it is a constitutional task of a nation state to ensure that all its citizens have access to a reasonable amount of clean fresh water. Such a right is enshrined in the South African constitution, but has also been asserted by the Committee on Economic, Social and Cultural Rights of the United Nations, when it proclaimed in its comment no. 15 issued in November 2002 that:

The human right to water entitles everyone to sufficient, affordable, physically accessible, safe and acceptable water for personal and domestic uses.

This means that in allocating water for various uses, uses that satisfy the primary requirements of humans should receive priority, and may not be curtailed by other types of uses, such as water for productive uses, e.g., industry and agriculture, nor by environmental allocations.

The second core value that may be inferred from recent developments is that the environment is considered a legitimate water user, and its requirements must be respected. In the South African case, the water requirements of the environment have been given priority over the productive uses of water. So in South Africa two types of priority uses have been defined, those for primary and environmental purposes, and the water required to satisfy those purposes have been called “the Reserve” (DWA 1997; South Africa 1998; van Wyk et al. 2006). All other water requirements should be met from the water that remains, with the exception of water required to meet international obligations and those water uses that have been declared strategic by the government.

A third core value is that the use of water for non-primary purposes needs to be “permitted” and requires a permit or right. Such a permit is valid for a limited period of time, and the permit holder has to pay an annual fee. This fee symbolises the fact that the water user derives direct and private benefit from using a public good, and that in so doing s/he denies another person the opportunity to use that water productively and reaping similar private benefits.

A fourth core value is that water for non-primary purposes will be allocated in an equitable manner, and in times of water scarcity, the shortage will be borne equitably by all permit holders, in proportion to the size of each permit.

If equity can be defined as affording everyone a fair and equal opportunity in the utilisation of the resource according to one’s needs (WRMS 1999), then the above core values as it were translate it into practical criteria. It should be noted that equitable access does not necessarily mean access to equal quantities but rather equal opportunity to access water. Equity also presupposes the existence of procedural and distributional justice (Syme and Nancarrow 2006).

One thing is to have these principles defined, quite another is to implement them and make them operational (Swatuk 2005; Manzungu 2002, 2004). In river basins where water is not scarce, not much is needed: all water requirements can be met most of the time and no specific arrangements are required. In river systems where water demand is on the increase, water allocation principles may only be implemented if sufficient storage capacity is in place. Without storage infrastructure it may be quite difficult to control water. If also

measurement infrastructure is lacking in the form of gauging stations that are operational, then the equitable allocation of water will remain a dream.

3 Water Allocation in International River Basins

Principles underpinning the sharing of transboundary waters evolved quite separately from national water allocation systems. With the “Helsinki rules on the uses of the waters of international rivers” the ILA (1966) codified the principle that “Each basin State is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin.” There was insufficient support within the United Nations to adopt the Helsinki Rules as UN law. This was because many countries with well-developed water systems wanted their current water uses explicitly defended. To counter-balance the equity principle, the principle of the obligation not to cause significant harm was formulated (Article 7 of the UN Convention).

The question is frequently asked: which comes first, the right to equitable and reasonable use or the obligation not to cause significant harm? Those riparian states with a stake in the status quo tend to stress the importance of the latter principle (which appears to recognise established uses however inequitable these may be), while those riparians who lagged behind in water development tend to use the former principle to claim waters already used by ‘more developed’ riparians. The differential application of both principles should, however, be considered a false dilemma. Both principles apply concurrently and represent, as it were, two sides of the same coin. They convey the basic tenet that riparians have rights and duties in the uses of water resources, in line with the second principle of the Rio Declaration:

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and development policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction (UNCED 1992: 9).

Both principles imply that also downstream countries would need to seek a declaration of no-objection from upstream riparian countries when planning large-scale water development projects. In this context the current World Bank policy that only require upstream countries to seek a declaration of no-objection from downstream riparians (Subedi 2003) is inadequate.

Some authors have argued that the principle of equity is key to water allocation (Wouters 1997; Wolf 1999), which was also the premise of the 1966 Helsinki Rules (McCaffrey 1993). The principle of reasonable and equitable use (Article 5 of the UN Convention), however, is defined in general terms. To establish what is an ‘equitable share,’ the UN Convention in Article 6 directs riparian countries to consider a wide variety of aspects, such as the natural characteristics of the watercourse, the social and economic needs of the states concerned, the population dependent on the watercourse, the existing and potential uses, the costs of development and protection, the effects of the use of the watercourse in one state on other watercourse states, and the availability of alternatives, of comparable value, to a particular planned or existing use. These factors have also been included in the SADC Protocol and as such are in force within the SADC region.

van der Zaag et al. (2002) attempt to define measurable criteria on the basis of which water resources can be allocated to the riparian countries in an equitable manner. Such measurable criteria may facilitate negotiations between riparian countries that are in conflict over the issue. Jointly defining such criteria could be a central activity during negotiations. A key parameter for establishing an equitable share is the number of people living in the various parts of the basin. In addition, not only the availability of “blue” water should be considered, which is the water in rivers, lakes and aquifers and that has pre-occupied most water engineers, but also the availability of “green” water. “Green water” is the moisture in the unsaturated zone of the soil that directly stems from rainfall, which is consumed and transpired by vegetation when producing biomass. Two important variables have been identified over which the riparian countries could reach consensus:

1. The value of green water relative to blue water
2. The fraction of reserved water, which is defined as the basic entitlement of each riparian country¹

4 Beyond Water, Beyond the Basin?

When negotiations between riparians (be they countries, communities or individual water users) prove to be difficult or stall, it may help to introduce completely new issues to the table. These may relate to issues in adjacent river basins, or may be entirely unrelated to water, such as trade, access to ports, to energy, to markets etc. When searching for additional issues to be brought to the negotiation table, what is in fact happening is the search for other interdependencies that exist between the riparians and that counterbalance and reciprocate the inherently one-sided upstream–downstream relationship referred to in Fig. 1. Two examples are briefly mentioned to illustrate this point.

The deadlock that existed in the negotiations between Swaziland, South Africa and Mozambique on a water sharing agreement over the Incomati river basin could only be broken when the adjacent Maputo river basin was included in the negotiations. This was because the interests that the three riparian countries had in both basins differed and, to some extent, could be traded (van der Zaag and Carmo Vaz 2003). Another example is the negotiations between the Belgium and The Netherlands, where the key issue of Belgium concerned the Scheldt river basin (namely securing access to the port of Antwerp by large vessels through the Scheldt estuary located in Dutch territory) whereas the main concern of the Dutch was related to the Meuse river basin (reducing pollution of the upper parts of the river Meuse). Only when these issues were linked (where the Dutch were “downstream” (Meuse) with where the Dutch were “upstream” (Scheldt)) was a creative deal possible.

Notwithstanding the above, reaching agreement over the sharing of transboundary waters resources frequently proves difficult (see e.g. Meissner and Turton 2003). Negotiations are tedious and often complicated by the sovereign sentiments that tend to emerge. During the last few years a solution to this problem has been suggested; namely share benefits derived from water rather than the water itself (Sadoff and Grey 2002). This is a suggestion with appeal. The concept of “benefit sharing” appears the obvious, rational

¹ This “Reserve” may be likened to the South African Reserve, including water for consumptive use to satisfy primary requirements, and largely non-consumptively used water to satisfy the requirements of the environment.

and preferred strategy beyond reproach. But there are also some limitations, among them the following:

1. Benefit sharing presupposes a consensus over basic entitlements, which is likely to have been a major obstacle in the first instance. Once basic (water) entitlements have been agreed upon, all kinds of compensation arrangements may be worked out. This may boil down to transactions that are very similar to the (temporary) leasing of water (cf. the Coase theorem).
2. Equitable use of transboundary water resources should not only focus on the benefits but also on the costs, since nearly any water use or water development is likely to cause some negative impacts somewhere.
3. Due to the interconnectedness of the river basin, the sharing concept should cover the entire watercourse, including all costs and benefits and how these are (differentially) distributed.
4. Moreover, the sharing concept seems to suggest that all benefits (and costs) are quantifiable (and commensurable), which is an assumption that may not hold. Will those uses of water whose benefits are difficult to quantify or that are indirect or less tangible be treated on an equal footing? Will the communities that live off environmental resources indeed be included in such benefit sharing arrangements? Will those who bear the costs be compensated? In all, will benefit sharing indeed lead to social equity?

Many examples have been given in support of the benefit-sharing concept. In Southern Africa the following are frequently mentioned: Kariba reservoir (Zambezi), the Lesotho Highlands Development Project (Senqu-Orange-Gariep) and Maguga dam (Incomati). All three examples are cost and benefit sharing projects involving only a part of these watercourses and not all riparian countries and are all limited to one or two sectors only. This raises the question whether in these and other cases indeed all the costs and benefits are equitably shared by all.

It has been suggested by various authors (Sengo et al. 2005; Hermans et al. 2006) that ideally all users of water and water-related environmental services should be involved in the process of assigning values to these services, and to jointly conduct sensitivity analyses of the “what if” type: “what if this type of use would have a higher or lower value than...” Negotiations may therefore shift to agreeing over the relative values and preferences of the various types of goods and services that the water provides, rather than on absolute values expressed in monetary units.

5 Reciprocating Water Flows: Towards Hydrosolidarity

As was observed in the introductory section, water tends to build asymmetrical relationships between people, communities and nations; because of the simple fact that water flows downhill. The action of the upstream riparian impacts on the downstream riparian and not vice versa. We all tend to emphasise that we are at the receiving end, living downstream, and that somebody else upstream constrains our options (Fig. 2). Our claims to water therefore travel upstream; and expectantly we look up the river: when will the water arrive? But do we also consider the impact of our own actions downstream? Do we indeed ever look downstream? Our vision and understanding of particular water situations is therefore often partial and biased. Misunderstandings, tensions and ultimately conflicts may arise as a

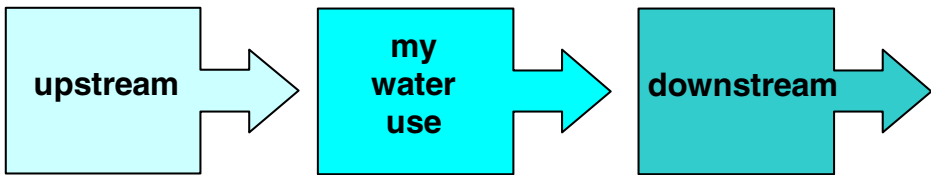


Fig. 2 Everybody lives downstream...("Everybody lives downstream" was the theme of the 1999 World Water day and of the Stockholm Water Week of that same year) and looks upstream

consequence. Conflicts do indeed occur. But cooperative deals are being brokered more often than one would expect. This is so because neighbours, be they persons, neighbouring villages or riparian countries, seem to understand that they are doomed to live together in future; and realise that short term gains, accrued through selfish behaviour, in the long run will prove self-destructive.

The crucial point is to institutionalise the interdependencies that exist within catchment areas and river basins in order to foster hydrosolidarity (Falkenmark and Lundqvist 1999; Falkenmark and Folke 2002). But this indeed raises some pertinent issues. An example is the following question: Whose responsibility is it to preserve the environmental status of the headwaters (and, for that matter, any other part) of a catchment area or river basin? Should the environmental status be considered a public good, and should the government therefore take responsibility for its upkeep? Or is it opportune to delegate this responsibility to the catchment level, and in a way "privatise" it? For isn't this the case where those situated downstream, who depend on the blue water resources generated by those who live upstream, are expected to compensate those living upstream, for example through payment schemes for environmental services (see e.g. Hermans and Hellegers 2005)? Couldn't this be construed to imply that those who live in the well-watered upper parts of river basins have in fact become the owners of the rain and the resulting runoff? A more practical question may also be posed in the context of payment for environmental services: how much downstream users of so-called "blue water" would have to compensate their upstream "green water" users. Is our understanding of the hydrological processes sufficient to quantify with any measure of precision the relationship between land use upstream and the resulting water availability downstream?

Another aspect that is frequently linked to watershed and catchment management problems is the existence of large power differences between actors. It is often suggested that social homogeneity facilitates collective action (see e.g. Turton and Henwood 2002). Interestingly, Baland and Platteau (1999) have shown that cooperation may prevail even in cases with large power differences. A strong upstream community or nation may indeed respect a water sharing agreement with a weaker downstream community or country. It appears that the risk of the rich or stronger party to lose a lot is sufficient incentive for them to cooperate and broker cooperative and equitable deals with their less powerful counterparts. It could therefore be hypothesised that the larger one's stake, the larger one's interest in the common good and thus the more responsibly one may act. Alternatively, it could be argued that the recognition by those in a more advantageous position of their dependence on the cooperation of those in a less advantageous position ensures the former's willingness to forego immediate and short-term benefits. This latter argument may possibly form the basis of the hydrosolidarity witnessed in many customary water-sharing arrangements in Eastern and Southern Africa (Fleuret 1985; Grove 1993; Adams et al. 1994; Potkanski and Adams 1998; van der Zaag 1999) and elsewhere (e.g. Martin and Yoder 1988).

One striking omission in many transboundary basin agreements is mechanisms of monitoring and enforcement. It would be interesting to consider the reasons why this could be so, but the empirical basis of such a discussion is missing. Of greater interest is that new technologies are available that provide new possibilities. Monitoring through remotely sensed images from satellites poses an interesting opportunity in that these are, in principle, accessible to all. The fact that all parties have the possibility to observe each other's compliance at all times, and are aware of this, may be sufficient incentive for all to comply. This may strongly support confidence building (not very different from the means of verification of the movements of NATO and Soviet troops during the Cold War). This argument not only holds for state actors, but also for non-governmental actors and even individuals. All actors are thus in a position to monitor the compliance of the other riparian countries, as well as of their own government! The new observation technologies may therefore trigger a push from various sides in favour of monitoring and compliance. Data sharing, then, is not merely a first step in transboundary cooperation. Data sharing, be it from remotely sensed sources or from the World Hydrological Cycle Observing System WHYCOS network or from national sources, remains the foundation of cooperation.

6 By Way of Conclusion: Good Governance of Water Resources

To govern transboundary water resources in a manner that will contribute to peace, prosperity and justice requires an acknowledgement of the fundamental asymmetrical interdependencies that exist in river basins between upstream and downstream units (be they countries, states, communities or individuals). Can this asymmetry be reconciled practically? It may, but it will require political, institutional, technological measures as well as investments in capacity building and research.

First of all must there be the realisation by riparian states and water users groups and individuals that they all are dependent on each other, not only now but also in future. This realisation must trigger their willingness to forego immediate and short-term individual benefits in favour of long-term basin-wide gains. This will only happen if the institutions through which groups of users act collectively are functional and interlinked. Clearly the local level institutions are critical, and should form the foundation and building blocks of catchment and basin-wide institutions. The public has a potentially large role to play in promoting peace, prosperity and environmental justice in water stressed transboundary river basins of the world. However, this does not diminish the responsibility of national governments and transboundary institutions to coordinate activities. Without coordination and regulation public participation may result in fragmented water management, and potentially in inequity (van der Zaag 2005b).

Second, local, national and regional principles governing the allocation of water should be consistent with each other. A SADC study found that the need for harmonisation of national policies and laws in light of the SADC Protocol was, in fact, limited. Probably there is less need for harmonisation than for a holistic and common understanding of the values that should underpin water sharing, both in local watersheds and at the basin level.

Third, integrated water resources management (IWRM) in this upstream–downstream context means designing institutional linkages that reciprocate and mirror the water flows. This will promote equity and cooperation and may help to forestall conflict. Such fluxes in the upstream direction may be in the form of matter (compensation in kind, money, linkages to other issues where the dependency points in the opposite direction) or immaterial (solidarity, good neighbourliness). The more the focus is restricted to water only, the more

difficult it will be to identify dependencies that could balance the asymmetry that may exist in a particular river basin.

Fourth, in the face of growing demands and dwindling supplies, equitable sharing of water will require a steadily increasing physical capacity to store water. It is unclear whether such storage capacity should be centralised in the form of conventional large reservoirs, or de-centralised and distributed in the farmers' fields (e.g. storing rainwater in the soil of non-tilled or ripped fields or fields that are ploughed along the contour or on terraced fields, and "harvesting" runoff water by storing it in small farm ponds), and at the scale of the micro-watershed and village (tanks, micro-dams and aquifers). The policy choice between developing centralised and distributed water storage is an important one, and requires critical analysis. This is because institutional complexity increases more than proportionally with increased physical scales (Gupta and van der Zaag 2006). Designing and building large reservoirs is a relatively modest challenge compared with developing the institutional capacity to manage them in accordance with IWRM principles. The new water management institutions that are currently being developed throughout Southern Africa and elsewhere, do have the potential to become governance structures that can upscale local natural resource management practices. These will have to dovetail with upscaled local and foreign technologies for water control. The perfect fit that is needed is, however, by no means self-evident. It will require African ingenuity to confront and engage modernity while building on the deeply rooted core values of equity and ecological integrity (van der Zaag 2005a).

Finally, if we remain unaware of the complex interactions between upstream and downstream users, blue water and green water, non-consumptive instream water uses and consumptive use of water abstracted from rivers, and the tangible and less tangible benefits derived from the freshwater resources and its environmental services, it will be difficult to reach agreement over the equitable utilisation of the water resources of a transboundary river, let alone of the equitable distribution of the costs and benefits. In case such knowledge is unequally distributed among communities and between riparian countries, serious investments in human capacity need to be done before equitable and robust sharing agreements are likely to be reached and sustained (Savenije and van der Zaag 2000).

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