Linkages between Productivity and Equitable Allocation of Water

Hervé LÉVITE and Hilmy SALLY

International Water Management Institute (IWMI),
141 Cresswell Street, Private Bag X813, Silverton 0127, Pretoria, South Africa.
Tel: 27 12 845 9100; Fax: 27 12 845 9110
E-mails: h.levite@cgiar.org; h.sally@cgiar.org

Abstract

The rapid development of water resources in the Olifants River Basin in South Africa, while stimulating economic growth, paid little attention to equity considerations among different users. Some 90% of the population of the basin was excluded from access to water when the present pattern of water allocations was developed. The recently enacted and very progressive water law aims at ensuring greater equity in access to water so that the benefits accruing from different water uses will be felt by a larger number of users. This paper examines the implications of water reallocations on water use and productivity at the basin level with a special focus on opportunities for revitalizing and expanding smallholder irrigation systems that are currently performing poorly and in many instances going out of production.

Keywords: water allocation, equity, productivity of water, river basin management, South Africa

INTRODUCTION

South Africa has embarked on a courageous reform of its legislation in order to deliver water for all and redress past inequities in the sharing of this resource. Decentralization of decision-making is expected to replace the former top-down management of water in this water-scarce country. While major, economically influential water-users are likely to express their views and be listened to during the new allocation process, small-scale irrigators could experience a much harder time. The notions of productivity and equity, supposed to guide allocation decisions, are sometimes antagonistic in nature. The example of the Olifants river, where competition for water is particularly significant, is used to discuss some of the challenges and opportunities that arise in trying to reconcile these different considerations and trace a way forward.

WATER USE IN THE OLIFANTS RIVER BASIN

Abstractions from the rivers in the Olifants basin have grown dramatically during the last century. The Department of Water Affairs (DWAF) estimated that abstractions were a few million cubic meters at the beginning of the century, then around 350 million cubic meters in 1950, 500 million cubic meters in 1970, and about 1000 million cubic meters in 2000 (DWAF 1991). The average rate of water abstraction was therefore around 5 % per year since the fifties, which represents a doubling every 15 years. This development, shown in the step-wise profile of figure 1, was entirely supply-driven, accompanied by the construction of major dams.

Molden (2000) has suggested that the development of a river basin could be broken down into three phases, as shown in figure 2: a) a phase of development of water resources; b) a period of utilization and, c) a phase of reallocation, once the resources are fully utilized. However, it is essential to know where we are on the depletion curve, in order to be able to make rational reallocation decisions (Murray-Rust 2001).
According to a recent technical assessment (BKS (Bruinette, Kruger and Stoffberg), 2000), the water resources are expected to be fully utilized for large parts of the Olifants river basin by 2010.

Indeed the projected demand for 2010 is 1375 million cubic meters. The study further states that environmental considerations as well as new water users will require decisions of reallocation between sectors, improvement of efficiency and possibly importation from other basins.

All types of water users are present in the 55 000 km^2 Olifants basin where 3.4 million people live.

- Agriculture is well developed, including livestock and an irrigated area of 107 000 ha.
- Afforestation represents 80 000 ha
- Domestic water demand from urban areas (middle sized cities)
- Power generation in the upper part of the basin; 55 % of the country's power is generated in thermal plants using coal from 50 mines.
- The mining sector is of paramount importance with 200 active mines (gold, platinum, tin, coal, etc.).

It is generally accepted that the water demand will increase during the next 10 years (see figure 3). However, it is worth emphasizing that half of the population is settled in former homelands and is particularly poor, having been forced into marginal areas, with few basic services (Wester et al, 2002).

From figure 3, it is immediately apparent that the main water user remains irrigation, which consumes nearly 50 % of the total.

White commercial farming dominates the sector with 95 % of the irrigated area, thanks to huge investments in the past (there are 30 major dams and a total of 2500 dams in the basin) and services provided by the state for decades. In the former homelands specific investments for agriculture were made for black people but one must highlight that it was essentially in order to develop subsistence agriculture or during the 60's to stop erosion (Thompson 2001).

Moreover degradation of the water quality in the rivers is increasing, due to direct and indirect pollutions from certain users (mines, industries), and difficulties of dilution. BKS gives an impressive list of water quality variables of concern: pH, Potassium, Sulphate, Fluoride, Magnesium, Sodium, Chloride, Fluoride, Aluminum, Iron, Manganese. A recent newspaper article entitled "A river dammed and destroyed" highlights the problems facing the Olifants (Mail and Guardian 2000).

The risk of heath problems is indeed high. The Olifants River has been ranked number 2 among the top 120 high potential health risk areas of South Africa (National Microbial Water Quality Monitoring Programme, August 2000). This is especially worrying given the fact that a large number of people in rural areas still take their drinking water from the rivers.

Insofar as quantity is concerned, low flows occurring during the dry season in the Olifants are sometimes so acute that it has even experienced periods of zero flow in the Kruger National Park. Although the calculation of ecological requirements is underway, it is likely that the minimum ecological requirements are already not being met in some parts of the rivers (Tharme R., personal communication 2001).

AN URGENT REFORM TO REALLOCATE WATER

Water sector reform was a priority in the agenda of the Mandela government (Turton 1999). As a matter of fact "the bulk of water available at the national level was consumed by the minority of the population", a phenomenon described by Turton as 'resource capture in hydropolitics'.

The unfairness of the situation in the water sector was so enormous that the constitution itself now guarantees access to water and a healthy environment for every citizen. Water resources, which were a private asset, become an indivisible national asset and riparian rights were abolished. The amount of water required to meet basic human needs and to maintain environmental sustainability, designated as the ‘Reserve’, is considered as a right.

In the National Water Act of 1998, three principles are underscored: equity, sustainability and efficient and beneficial use for the society, forming a kind of triangle of constraints for decision-making, as shown in figure 4.

The new legislation has also introduced the principle of management by catchment, which is now a notion accepted worldwide. The Catchment Management Agency (CMA) will be the apex body, governed by a Board, with a role of seeking agreement on water related matters among the various stakeholders. At the local level, Water User Associations (WUAs) are to be created. They are expected to help communities to find the financial and human resources needed to more effectively carry out water-related activities. WUAs are supposed to represent the people and ensure, for instance, that they have a voice in the allocation process.

There is a promise of decentralization. However, DWAF will provide the overall umbrella of water management decisions. Furthermore, until the effective creation of CMAs, DWAF will continue to play the major role in these foregoing (re)-allocations.

DWAF has deployed a lot of effort to organize the process of registration of all water users. After this stage, decisions regarding allocations (authorization or licenses, depending on the importance of water use) have to be made. It is almost certain that economic considerations will be of crucial importance and DWAF could be subject to pressures from very well organized economic lobbies (mines, industry, commercial farmers) or from the government itself, hard-pressed to show economic results.

HOW TO ALLOCATE?

The challenge now is how to translate these principles into practice; what mechanisms and tools are necessary?

Essentially, this boils down to trying to achieve a balance between allocations for equity and productive purposes while ensuring overall sustainable use of the water resource, as illustrated in figure 5.

Equity in allocation means that all users should have a fair access to the water needed for their activity. Sustainability can be understood to be the capacity of a system to endure. Efficient and beneficial use of water for the society must include optimal economic as well as social gain for the people.

In determining efficient and beneficial use, will considerations of economic efficiency dominate over social and equity principles? What kind of efficiency is beneficial? Once allocations are made will they be fixed? Or are there provisions that allow for adjustments and evolution over time (e.g. demographic change, changes in patterns of consumption and demand; indeed, the sustainability limits could also evolve, in relation to water quality objectives for instance)? Are the mechanisms envisaged for monitoring and enforcement of agreements adequate? Are the means of redress available in the event of non-respect of agreements (quantity and quality) accessible to less advantaged water users?

According to the law, a pricing strategy is expected to, gradually, play an important role with four objectives: social equity (redressing imbalances of the past); ecological sustainability; financial sustainability (obtaining full cost recovery) and economic efficiency (encouraging conservation of water and shifting from low to high value uses). (Wallgren 2000).

Three different policies of water allocation are envisaged for the future (Wallgren 2000) namely direct control (by the State), water markets or public partnership (in a decentralized manner in the CMA). At this stage, decisions are still underway regarding the actual nature of the allocation approach.

THE SMALL SCALE IRRIGATION SECTOR

Coming back to the agricultural use of water by small holders, a key question related to the allocation process is whether this sector will be considered as contributing to efficient and beneficial use of water. The following sections will highlight what some of the related problems are likely to be.

1) **Indeed this sector is already confronted with some real difficulties:**

Under-utilization

As part of the current process of registration, DWAF has observed that, quite often, the existing water "rights" are not fully utilized. For instance, in the case of the Arabie Olifants Scheme (around 2 200 ha scattered in 14 schemes regrouping about 1600 farmers) only 30% to 50% of the initial allocation of water is used (de Lange,personal communication, 2000). There are a number of possible reasons for this situation of under-performance.

On one hand, State withdrawal was very sudden. On the other hand, the available management capacity of farmer organizations may not always be able to provide the same levels of technical expertise and support services as in the past; the infrastructure may also not be commensurate with small-scale farmer management. As a result, the operation and maintenance of the schemes would suffer, ultimately affecting production and the utilization of the available resources and infrastructure. In contrast, commercial farmers are generally more successful in upgrading and modernizing their irrigation systems even to deal with reduced availability of water. For them, making better use of water usually translates into higher returns, and thanks to the past and present state support, they are able to adapt their behavior very rapidly.

Low productivity

Given this scenario, it is possible that, in the minds of decision-makers, small-scale agriculture is not seen to be making beneficial use of water. The results of a recent DWAF exercise in Kwazulu Natal (DWAF 2000) to compute water productivity for different uses and support services illustrates this, and are shown in table 1.

Inability to pay for water

The principle of a water charge, expected to be paid by farmers as well as other users, in order to finance the functioning of the CMA may be difficult to apply to the small-scale sector for a while.

Difficult mobilization of farmers as WUAs

The farmers of the small-scale irrigated schemes, which were often constructed by the government, are struggling to get organized (Wester et al. 2002). They run the risk of being marginalized during the process of registration or during discussions within the new CMA structures.

2) Numerous other considerations are imperative, but often neglected

a) **All the externalities** must be taken into consideration (pollution, health impacts especially where people drink polluted water). Furthermore, environmental impacts have to be addressed in the long term. For example the impact of mining activities on the groundwater is often neglected. Jansen (2000) has shown that their impact on the catchment could be more severe after closure than during mining, extending over periods from tens to hundreds of years.

b) **Social aspects** like food security, malnutrition reduction, and job creation are crucial. Social impact questions such as 'do the people of the basin really receive benefits?' must be put on the table. **Historical considerations** are unavoidable since it is necessary to redress past inequities.

c) A principle, now widely accepted, is to work in a **basin perspective** when we talk about water productivity. For instance water can be ill-utilized at the farm level but re-utilized by other users downstream. Hence, the global water productivity can be quite good whereas local productivity is weak.

   Similarly the spatial arrangements of water users in the basin are also crucial. For instance heavily polluting point sources of pollution will have greater overall impacts on water quality if they are located in the upper reaches rather than towards the tail of a basin (Murray Rust 2001)

Indubitably, new sets of considerations have to be put on the table (figure 6) in order to achieve a balanced choice during the process of allocation.

CMA CREATION PROCESS IN THE OLIFANTS BASIN

The creation of the CMA in the Olifants basin is underway, with special attention from DWAF as it is one of the pilot agencies in the country. DWAF envisages a period of 5 to 7 years for that process. Whatever be the time period, what is imperative is that efforts to promote a real public involvement must not be jeopardized. As already stated, the CMA must be seen as a means of simultaneously meeting the objectives of equity and productivity of water at the basin level.

The main water users such as the mining and industrial sectors, water suppliers for the cities, and commercial farmers are well organized and are ready to be registered. On the other hand the rural poor have difficulties to mobilize themselves. A study carried out by the International Water Management Institute (IWMI) in the Steelport sub-basin of the Olifants (Stimie et al. 2001) showed that rural communities are unaware of the CMA process, despite efforts made by DWAF to commission consultants for that task.

IWMI was commissioned in 2000 by DWAF to follow-up on the consultation process of the CMA. It was found, in short, that public participation requires more efforts than just forums organized by consultants, and that the latter as well as some DWAF officials see the CMA as a technical process, although it should be considered as a political one (Wester et al, 2002).

In theory, the "emerging farmers sector" in the Olifants basin is expected to grow (BKS 2000), thanks to different political initiatives (National Department of Agriculture, NDA 2001). But in practice, direct negotiations are already underway between the mines and farmers (with the assistance of the Northern Province Department of Agriculture and Environment) for the purchase of temporary irrigation water allocation for mining use. But in these discussions the small-scale farming community (representing around 1600 farmers) does not play a really authentic role (Kamara 2001) and there is a risk that the pressure of economically active groups will determine the future orientation of principles and practices.

CONCLUSION

This paper attempted to highlight a foreseeable gap between a generous theory and a difficult practice in applying the principles of the progressive South African water law. While economics will undoubtedly play a major role in the allocation of water rights, one also needs to take cognizance of the notion of equity in the sharing of water at every stage. Indeed, equity must also guarantee social and economical sustainability as poor people are afforded the opportunity to take off and improve their livelihoods thanks to a new access to water.

There is a need to further investigate the links between access to water and socio-economic benefits (for the society) of small-scale water resource development. Especially if there is a political commitment to really support this sector, one should do so with an open mindset and a long-term vision. Fortunately DWAF seems to be deploying tremendous efforts to reach the “marginal” water users. It seeks to encourage and ensure their involvement in the process of decentralization of water management as they often represent the majority but had no voice in the past. More importantly, water is also seen as a means to alleviate poverty by providing an opportunity to support productive activities.

The results of research initiated by IWMI and its partners on valuing water in all its aspects, taking into consideration the different uses and users of water in a basin, should provide a basis for making scientifically sound and socially just decisions in regard to water allocation and water use.

REFERENCES

BKS. 2000. Proposal for the establishment of a Catchment Management Agency for the Olifants water management area. Department of Water Affairs. First Draft.

DWAF. 1991. Water resources planning of the Olifants river basin – Study of the development potential and management of the water resources. Report by Theron Prinsloo Grimsehl & Pullen.

DWAF. 2000. Strategic Environmental Assessment for Water Use – Mhlathuze Catchment, KZN. Report by I. Steyl, D.B. Versfeld and P.J. Nelson

Jansen, H.. 2000. Environmental management programs as a tool for effective catchment management in Southern Africa. 1st WARFSA/Waternet Symposium, Mozambique.

Kamara, A.I. 2001. Minutes of the meeting on a business plan for the rehabilitation and upgrading of irrigation infrastructure at the Arabie Olifants Scheme. 19 June 2001

Mail and Guardian. 2000. A river dammed and destroyed. 13 October 2000.

Midgley, D.C., Pitman W.V. and Middletton B.. 1994. Surface Water Resources of South Africa 1990. Water Research Commission, Pretoria.

Molden, D. 2000. Irrigation and Water Resources Program. Presentation to the IWMI Board of Governors. International Water Management Institute, Colombo, Sri Lanka.

Murray-Rust, D.H. 2001. Integrated water management for agriculture, Summary of discussion on 21 June 2001. Africa Regional Office, International Water Management Institute, Pretoria, South Africa.

National Department of Agriculture. 2001. Revitalizing South Africa’s agricultural crop water use sector for local economic development: Policy and strategy document. Draft.

National Microbial Water Quality Monitoring Programme. 2000. On the identification and Prioritisation of Areas in South Africa with a Potentially High Health Risk Due to Faecally Polluted Surface Water. www-dwaf.pwv.gov.za/iwqs/microbio/prioritisefin2.htm

Stimie, C., Richters E., Thompson H.; Perret S.; Matete M.; Abdallah K.; Kau J.; Mullibana E.. 2001. Hydro-institutional mapping in the Steelport river basin, South Africa. Working Paper 17, Colombo, Sri Lanka.

Thompson, H., Stimie C.M., Richters E., Perret S.. 2001. Policies, legislation and organizations related to water in South Africa with special reference to the Olifants River Basin. IWMI Working Paper 18. International Water Management Institute, Colombo, Sri Lanka.

Turton. A. R. 1999. Water Demand Management: A case study from South Africa. MEWREW Occasional Paper No. 4. Presented to the Water Issues Study Group, School of Oriental and African Studies (SOAS).

Wester, P., Merrey D.J. and de Lange M. Boundaries of consent: Stakeholder representation in river basin management in Mexico and South Africa. (forthcoming, 2002)

Wallgren, O. 2000. Water Allocation in the Olifants river Basin, South Africa: An evaluation of policy options. MSc Thesis. University of Waterloo, Canada.

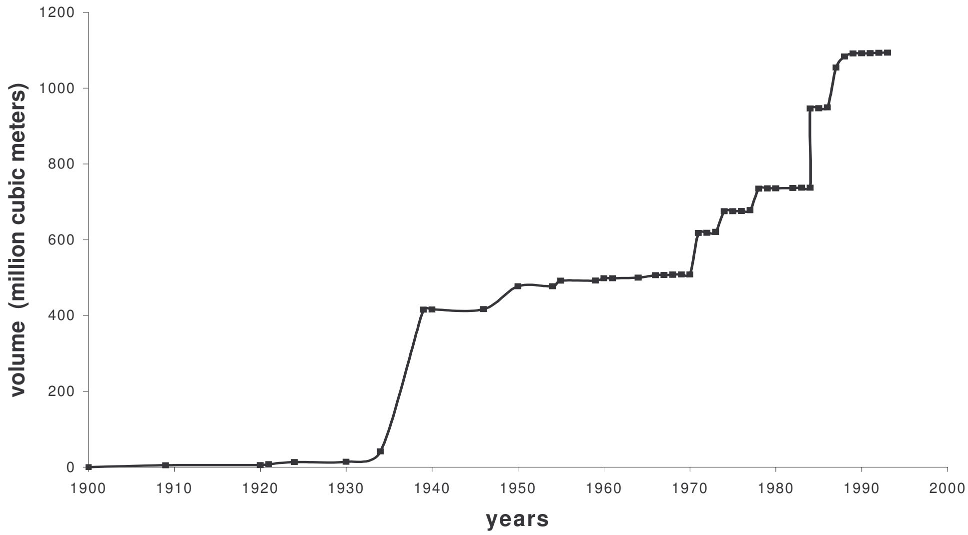

Figure 1: Development of water resources in the Olifants basin (*adapted from Midgley et al, 1994*)

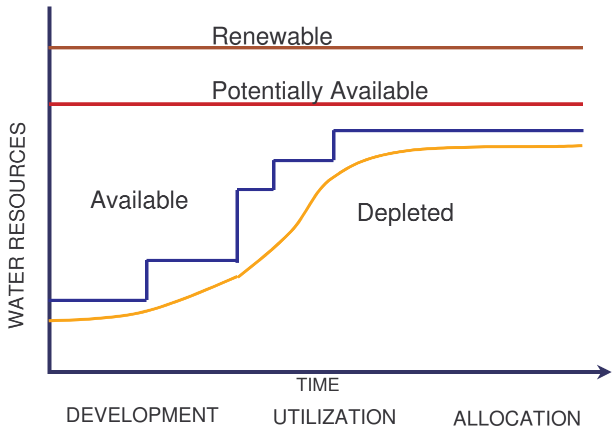
Renewable
Potentially Available
Available
Depleted
WATER RESOURCES
TIME
DEVELOPMENT
UTILIZATION
ALLOCATION

Figure 2: Phases of development of a basin (*after Molden, 2000*)

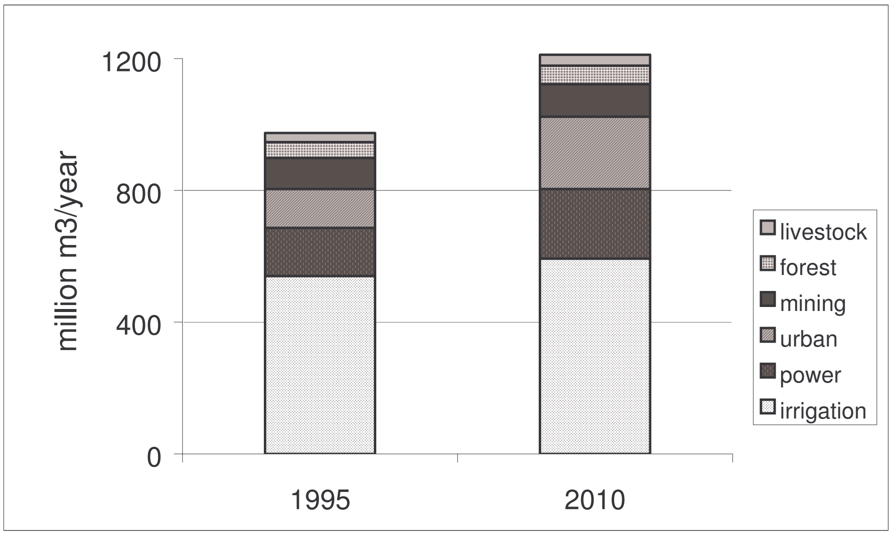

Figure 3: Water demand by sector (*source: BKS, 2000)*

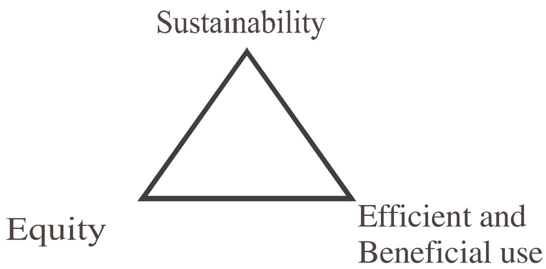

Figure 4: A triangle of constraints

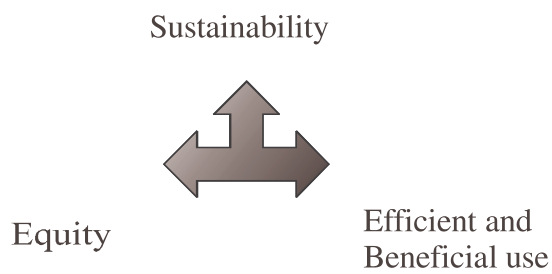

Figure 5: Balancing the needs of equity, efficiency and sustainability

Table 1: Productivity of water for different uses

	Rands/m3
Paper/pulp industry	84
Mining	106
Citrus	2.78
Irrigated Sugar small growers	0.65

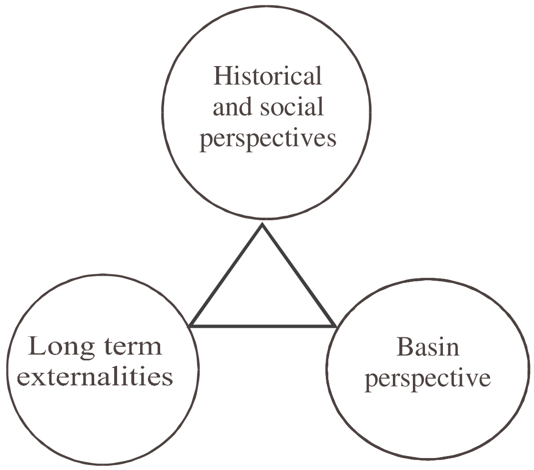

Figure 6: Supplementary forces expected to influence the triangle of constraints