

Water use and sustainable development of commercial forestry in South Africa

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INTRODUCTION

Commercial forestry is an economic force in the South African economy, generating income and employment for many people. For example, in 1999, the industry's net exports totaled to the value of R3.3 billion, it employed some 75 thousand people directly and about half a million indirectly in the forest products based industries, and some 2.1 million people were dependent on commercial forestry for their survival (Based on data from the Forest Owners Association, 2000). The long term economic prospects of the industry are assessed to be excellent as the annual wood demand facing the industry is expected to double by 2005 from the current consumption of 19 cubic meters. There are also strong income incentives for downstream wood processing industries to integrate backwards so as to plant more to earn more. Furthermore, being a world leader in the pulp and paper technology, South Africa has a strategic competitive advantage which she can harness to her advantage (Kaplan et.al, 1995). However, this contemplated success depends almost entirely on the use of water --- a very scarce resource in South Africa.

This paper makes an attempt to study the economic and social issues which impact the sustainability of commercial forestry in relation to the new water law which calls for more efficient and equitable water use in the country. This new law is passed after the democratic transition in the country; and, it now being enforced. The major objective of this paper is to highlight that water is the most important input for the growth of commercial forestry industry and the compliance with the new water law would entail pricing of water—this would finally impact the competitiveness and profits of the industry. The discussion in this paper is arranged as follows. In section 2, the definition of sustainability in the South African context and its possible implications for the commercial forestry are explored. In section 3, water and its pivotal role in the growth of commercial forestry is established. In section 4, a new policy framework for promoting efficient and equitable water use which is now in place is discussed and problems in its operationalization are highlighted. The possible impacts on the industry are highlighted in section 5. This is followed by the summary and conclusions in the last section 6.

Sustainability and Water Use

The issue of sustainability has become a world wide concern. There are different definitions of sustainability used in the literature. The most commonly used one is by the World Commission on Environment and Development (WCED):

In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in the harmony and enhance both current and future potential to human needs and aspirations (WCED, 1987, p. 76).

In the context of forestry in South Africa, the definition of sustainability is as broad as defined by WECD. The White Paper on Forestry reads:

The new forestry policy of South Africa is defined as one that deals with the scope of relationships between people and forest resources. It includes the use and husbandry of wood; fruits and other products that come from trees (non-timber forest products), wildlife, environment, aesthetic and cultural values of forests and woodlands (Ministry of Water Affairs and Forestry, 1996, p.5).... “The overall goal of government is to promote a thriving forest sector, to be utilized for the lasting benefits of the nation, and developed and managed to protect the environment. This goal will be pursued by wide participation in formulating and implementing policy and plans for forestry, which will be developed to facilitate the role of people in communities, the private sector, and the government (Ministry of Water Affairs and Forestry, 1996, p. 21).

Before the democratic transition, the commercial forestry was primarily run by the profit-maximizing principle. In practice, this got translated into maximization of timber yield by growing fast maturing trees such as *eucalyptus* and *pinus*, which were imported from Australia and California respectively.

The plantation of exotic species began sometimes in the late 1900 in the cape Region. The earliest plantation established goes as far back as 1876. There was very little afforestation until about 1902, with the real impetus to commercial forestry beginning only after the Anglo-Boer war of 1902. After the First World War, the government used plantations as an policy instrument to give employment to white soldiers. The afforestation leapfrogged in 1970s and later by 1999 some 1.5 million hectares are under exotic species. All this happened as previous governments allowed to use the water as a free resource to the commercial forestry. The spillover of this was the reduced streamflow leading to lesser amounts of water available to downstream users plus the reduced quality of water due to soil pollution.

The new democratic government empowered the individuals by assigning the right to better environment and passing a new water law that takes away the private property rights to water. And, the task of water management is vested in the government as trustee of people. In other words, the commercial forestry can no longer treat water/rainfall as a public or free good. The opportunity cost of water is very high and the principle of sustainability entails that it be used to maximize social welfare, rather than the profits of the commercial forestry.

Water Use in Commercial Forestry

South Africa is a semi-arid country with a mean annual rainfall of only 475 mm (Department of Water Affairs, 1986). The coastal areas in particular receive more rainfall

than the rest of the country. Some 87 percent receive more than 800 mm per annum, while 29 percent receive more than 1000 per annum (Le Maitre et.al, 1997). The natural vegetation in most of these areas comprises low, seasonally dormant grassland or shrubs (Dye, 2000 p. 100). This natural vegetation is now replaced by the exotic species of *pinus*, *eucalyptus*, and *wattle*.

Water has been implicated as being the most important contributory factor restricting the growth and development of commercial forestry in South Africa. The substantial dependence of exotic species on both ground water and surface run-off or rain affords them with their rapid maturity rate. Of the total water use by the commercial forestry, 80 percent comes from surface run-off and the rest 20 percent from ground water. Of the total utilizable average annual rainfall, some 8 percent is used by commercial forestry (Department of Environmental Affairs and Tourism, 1997, p. 39). In essence, water is the main contributing factor to the limitations of tree growth and the availability of it has been recognized as the main factor influencing the growth of commercial plantations in South Africa (Schonau and Grey, 1987; Dye 2000).

The plantation of exotic species began in 1876 near Worcester in Cape; and , farmers started complaining about the decreased run-off from these forests as early as 1915 (Van der Zel, 1995). This marked the early signal for regulation of water use in the forestry. However, other events dominated the scene and finally the two committees were formed to investigate plantation and water use in 1966. Finally, government passed an amendment of the Forestry Act (No 72 of 1968) whereby government was empowered to restrict new plantations where the national water resources required protection. The ultimate outcome of these committees was the formation of Afforestation Permit System (APS). The APS was a regulatory mechanism to allow plantation in selected areas only. The criterion on which the permits were issued demanded that the mean annual run-off from a catchment should not be lower than the specified minimum (varying from place to place). By 1995, some 4300 afforestation permits were approved , covering roughly 1 million hectares. However, only 46 percent of the permit areas were planted.

The APS in actual sense did not stop or slow down the process of plantation, rather it promoted plantations in catchments and provided incentives to plant the remotest rural areas. What APS was able to achieve was that it did not permit plantation in riparian zones, and that it demanded removal of exotic species outside the the officially allowed plantation. What it could not control was the unequal allocation of water between forestry and other alternatives.

The research in the past 6 decades indicate that the impacts of forest plantations on annual catchment water yields are very high, reducing streamflow by 200-500 mm (Dye, 2000, p, 102). The streamflow reduction depends upon various factors including rotation, site, slope or topography, and species. The studies in 1986 estimated that the commercial forestry consumed about 1.2 billion cubic meters of water that would otherwise entered rivers and stream or could be available to downstream users. This volume was roughly equal to the 30% of the urban and industrial water use, and about the one-tenth of water use in irrigated agriculture (Ministry of Water Affairs and Forestry, 1996, 15). Today. the

streamflow reduction from commercial forests in South Africa is estimated to be to the tune of 1.4 billion cubic meters per annum from an area of 1.44 million hectares of plantation; that is, 972.2 cubic meters per hectare per annum; or, 7-8% of the total water that is being utilizable (Anonymous, 1998, p. 7).

The new constitution of 1996 has now paved the way for a new approach to water management. The National Water Act (NWA) has been passed; this requires sustainable management of forestry in relation to water resources and other concerns. This views water as a national resource and requires an integrated approach to water management. As per the new water law, all streamflow reduction activities, including commercial forestry, will be regulated and charged. The Ministry of Water Affairs and Forestry has declared the forestry as streamflow reducing activity (SFRA).

A New Water Policy Framework

The new constitution has brought a revolutionary change in the water management in the country. The National Water Act (NWA) states that the national government is the public trustee of the country's water resources. And, water resources are treated as a national asset to be utilized in the best interests of all citizens in sustainable manner to guarantee the needs of the future generations. At the same time, needs of individual, including water, are guaranteed through the constitutional right to a safe, healthy environment. The government is therefore asked to play the role of custodian of water resources and water users. The slogan of the Department of Water Affairs and Forestry (DWAF) is: *Some for all, forever, together*. In brief, both efficient and equitable use of water is the theme of the new law.

The DWAF has identified 11 broad categories of uses of water; the streamflow reduction is one that relates to commercial forestry. Other activities such as dryland agriculture would be added to this list soon. The management of the water is guided by some 27 basic principles (See Appendix, Table 1). The new law thus requires authorization from government for water use (Principle 19). The authorized water use is recognized in three categories: (1) the existing lawful water users; (2) the generally authorized users; and, (3) the licensed users. The existing lawful use means any lawful use of water, authorized by or under any law, which took place at any time during the period from 1 October 1996 to 31 September 1998. The streamflow reduction activity falls under this category. The general authorization demands no license and intention is allow low-risk water use of small or insignificant impacts on a water resource to take place without a license. The general authorizations are valid for 3 to 5 years and will be reviewed from time to time. The licensed use gives entitlement to water use and could be given for a period of 5 years or less. A license can be issued for a maximum of 40 years. The DWAF has decided that it would call for compulsory licenses, initially for in the stressed resources where there may be problems experienced from over-utilization and competing water uses. Both existing and generally authorized users may be asked for license if situation reflects a situation of stress. Commercial forestry is thus lawful user of water and does not warrant a compulsory license at this time.

There are two important policy issues at this time. One, should commercial forestry be asked to compensate the downstream users in the water cycle or in other words should

pay a charge towards streamflow reduction. Consequent to this policy being accepted, the obvious question would be: Will it promote water conservation and efficient water use?. Two, should industry be charged for deteriorating the water quality?

In principle, the industry can be asked to pay for all of the above. Currently, three types of charges are suggested: catchment management charge, streamflow reduction charge or rainfall tax, water quality or pollution charge. The commercial forestry industry concurs with the first but challenges the second and third. The debate is not resolved yet; and, it is not clear whether a streamflow reduction charge or water interception levy would promote water conservation or not as the industry has no control on rainfall as such¹. Whether a water charge on streamflow reduction would induce the forest industry to reduce forest plantations and release more water downstream users, is another issue that will need further investigation. The new law thus takes away the private property rights to the water. The bottom line is that the industry will now have to meet, at least in part, the cost of scarce water resource. How will this materialize will depend upon the willingness of the commercial forestry industry and public at large, and the enforcement cost of the law. Pricing water is a step in right direction in the eyes of economists. However, the idea of rainfall tax has been put on hold for the next 40 years or in other words the existing plantations will not pay for the water interception levy. Regarding water quality charge, industry has now to pay a water quality management charge as part of the overall water resource management charge(FOA, 2000b, p.7). This is a flat charge, not linked to the level of pollution; therefore, it is not expected to curtail the water pollution a great deal.

Possible Impacts on the Commercial Forestry

The enforcement of new law would require that the downstream users be compensated and this would entail payment for the streamflow reduction. Two possible impacts of such a policy are : (1) reduction in the profits of the commercial forestry; (2) movement of commercial plantation on agricultural lands. The magnitude of second impact will depend upon the magnitude of streamflow reduction charge. It is difficult to say that what level of charge would induce the movement of plantations to agricultural lands. The other possible response is that the commercial forestry industry could intensify some other water conservation measures in downstream areas.

Summary and Conclusions

In this paper, I have stressed that under the new law of water in South Africa, the commercial forestry is no longer a sacrosanct and it cannot simply follow a path of mere profit maximization without taking into account the water use for which it does not pay. Since no one has the private property rights to water in South Africa, and water is the limiting factor for the growth of exotic species planted, commercial forestry will have to invent some ways to compensate those who lose in the natural water cycle by planting exotic trees. Currently, the commercial forestry is not paying for streamflow reduction and it is put on hold for the next 40 years. However, it is paying a flat charge for catchment management and a charge for, not linked with the level of water quality, for deteriorating the water quality.

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Table 1. Principles of Water Management, South Africa**Principle 1**

The water law shall be subject to and consistent with the Constitution in all matters including the determination of the public interest and the rights and obligations of all parties, public and private, with regards to water. While taking cognizance of existing uses, the water law will actively promote the values enshrined in the Bill of Rights.

Principle 2

All water, wherever it occurs in the water cycle, is a resource common to all, the use of which shall be subject to national control. All water shall have a consistent status in law, irrespective of where it occurs.

Principle 3

There shall be no ownership of water but only a right (for environmental and basic human needs) or an authorization for its use. Any authorization to use water in terms of the water law shall not be in perpetuity.

Principle 4

The location of the water resource in relation to land shall not in itself confer preferential rights to usage. The riparian principle shall not apply.

THE WATER CYCLE**Principle 5**

In a relatively arid country such as South Africa, it is necessary to recognize the unity of the water cycle and the interdependence of its elements, where evaporation, clouds and rainfall are linked to groundwater, rivers, lakes, wetlands and the sea, and where the basic hydrological unit is the catchment.

Principle 6

The variable, uneven and unpredictable distribution of water in the water cycle should be acknowledged.

WATER RESOURCE MANAGEMENT PRIORITIES**Principle 7**

The objective of managing the quantity, quality and reliability of the Nation's water resources is to achieve optimum, long term, environmentally sustainable social and economic benefit for society from their use.

Principle 8

The water required to ensure that all people have access to sufficient water shall be reserved.

Principle 9

The quantity, quality and reliability of water required to maintain the ecological functions on which humans depend shall be reserved so that the human use of water does not individually or cumulatively compromise the long term sustainability of aquatic and associated ecosystems.

Principle 10

The water required to meet the basic human needs referred to in Principle 8 and the needs of the environment shall be identified as "The Reserve" and shall enjoy priority of use by right. The use of water for all other purposes shall be subject to authorization.

Principle 11

International water resources, specifically shared river systems, shall be managed in a manner that optimizes the benefits for all parties in a spirit of mutual co-operation. Allocations agreed for downstream countries shall be respected.

WATER RESOURCE MANAGEMENT APPROACHES

Principle 12

The national Government is the custodian of the Nation's water resources, as an indivisible national asset. Guided by its duty to promote the public trust, the National Government has ultimate responsibility for, and authority over, water resource management, the equitable allocation and usage of water and the transfer of water between catchments and international water matters.

Principle 13

As custodian of the Nation's water resources, the National Government shall ensure that the development, apportionment, management and use of those resources is carried out using the criteria of public interest, sustainability, equity and efficiency of use in a manner which reflects its public trust obligations and the value of water to society while ensuring that basic domestic needs, the requirements of environment and international obligations are met.

Principle 14

Water resources shall be developed, apportioned and managed in such a manner as to enable all user sectors to gain equitable access to the desired quantity, quality and reliability of water. Conservation and other measures to manage demand shall be actively promoted as a preferred option to achieve these objectives.

Principle 15

Water quality and quantity are interdependent and shall be managed in an integrated manner, which is consistent with broader environmental management approaches.

Principle 16

Water quality management options shall include the use of economic incentives and penalties to reduce pollution; and the possibility of irretrievable environmental degradation as a result of pollution shall be prevented.

Principle 17

Water resource development and supply activities shall be managed in a manner which is consistent with the broader national approaches to environmental management.

Principle 18

Since many land uses have a significant impact upon the water cycle, the regulation of land use shall, where appropriate, be used as an instrument to manage water resources within the broader integrated framework of land use management.

Principle 19

Any authorization to use water shall be given in a timely fashion and in a manner which is clear, secure and predictable in respect of the assurance of availability, extent and duration of use. The purpose for which the water may be used shall not arbitrarily be restricted.

Principle 20

The conditions upon which authorization is granted to use water shall take into consideration the investment made by the user in developing infrastructure to be able to use the water.

Principle 21

The development and management of water resources shall be carried out in a manner, which limits to an acceptable minimum the danger to life and property due to natural or manmade disasters.

WATER INSTITUTIONS

Principle 22

The institutional framework for water management shall as far as possible be simple, pragmatic and understandable. It shall be self-driven and minimize the necessity for State intervention. Administrative decisions shall be subject to appeal.

Principle 23

Responsibility for the development, apportionment and management of available water resources shall, where possible and appropriate, be delegated to a catchment or regional level in such a manner as to enable interested parties to participate.

Principle 24

Beneficiaries of the water management system shall contribute to the cost of its establishment and maintenance on an equitable basis.

WATER SERVICES**Principle 25**

The right of all citizens to have access to basic water services (the provision of potable water supply and the removal and disposal of human excreta and wastewater) necessary to afford them a healthy environment on an equitable and economically and environmentally sustainable basis shall be supported.

Principle 26

Water services shall be regulated in a manner, which is consistent with and supportive of the aims and approaches of the broader local government framework.

Principle 27

While the provision of water services is an activity distinct from the development and management of water resources, water services shall be provided in a manner consistent with the goals of water resource management.

Principle 28

Where water services are provided in a monopoly situation, the interests of the individual consumer and the wider public must be protected and the broad goals of public policy promoted.

Source: Department of Water Affairs and Forestry, White Paper on a National Water Policy for South Africa, 1996.

Endnotes

ⁱ However, some studies in the Western countries have shown that the forests can increase the local precipitation up to 5% of the rainfall in a region (Rezende, 1978, p. 71).