

# Determining a charge for the clearing of invasive alien plant species (IAPs) to augment water supply in South Africa

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## Abstract

South Africa is running out of water supply options. One option, however, is to control invasive alien plant species (IAPs) within water catchment areas and in riparian zones. The National Water Act and subsequent documentation provide a guide for the use of economic instruments to manage invasive alien plant species at a national, but also at a water management area level. This paper determines the method and level of such an invasive alien plant control charge as part of the water resource management charge.

**Keywords:** natural capital, invasive alien plants, water runoff, water pricing, water charges

## Introduction

Natural resources are increasingly becoming the limiting factor to development as eloquently articulated by Daly, quoted by Aronson et al. (2006):

*'More and more, the complementary factor in short supply (limiting factor) is remaining natural capital, not manmade capital as it used to be. For example, populations of fish, not fishing boats, limit fish catch worldwide. Economic logic says to invest in the limiting factor. That logic has not changed, but the identity of the limiting factor has.'*

In South Africa, an arid developing country, water is indeed becoming the limiting factor to development (Scholes, 2001). The question therefore arises: given the supply constraints, what can be done to augment the water supply in the best possible manner? Historically, water resource managers met rising water demands through the establishment of a complex system of engineering supply-side solutions, but this is no longer viable due to the limited number of rivers that can still be exploited in this way and the rising marginal cost of this option (Smakhtin et al., 2001).

Government, as trustee and custodian of the nation's water resources (DWAF, 1998), is responsible for the protection, development and management of the resource in an equitable and sustainable manner for the benefit of all people. To be able to effect this objective, the National Water Act makes provision for the use of economic incentives for water management. The Act states that *'the Minister . . . may establish a pricing strategy for charges for any water use'* (Clause 56) (DWAF, 1998). While increases in water tariffs are usually viewed as a market-based demand-side intervention, water tariffs could also be used to pay for the delivery of an environmental good and service (Pagiolo et al., 2002).

It has been indicated (Cullis et al., 2007; Görgens and Van Wilgen, 2004; Van Wilgen et al., 2001) that invasive alien plant species (IAPs) lead to an undesirable reduction of streamflow

and water yield. A charge aimed at preventing and eventually controlling invasive alien plant species will therefore render both an ecosystem service (increased water flow to augment the Ecological Reserve) and water as utilisable resources. The specific question addressed in this paper is therefore: What should be the structure, size and distribution of a charge to eradicate IAPs over a 25-year cycle? This question will be investigated by focusing on a water-augmentation scheme linked to the removal of IAPs in riverine and mountain catchment areas (watersheds), which are the areas in which IAPs have the most profound impact of water resources.

To investigate this problem, the study will first provide an overview on the relative scarcity of water in South Africa followed by a discussion on the impact of IAPs on streamflow reduction. Consideration will then be given to the size and distribution of a payment system required for the removal of IAPs from mountain catchment areas and riparian zones, followed by a discussion and some concluding remarks.

## Water in South Africa

### Current situation and future prospects

South Africa has an average precipitation of approximately 500 mm/a, well below the world average of about 860 mm/a (DWAF, 2002). Rainfall has also become increasingly more erratic during the latter part of the previous century with 1998 and 1999 being the 4<sup>th</sup> and 5<sup>th</sup> wettest years recorded over the period 1921–1999. Additionally, both the frequency and intensity of the swings between dry and wet years are increasing. This implies that water resource and supply management is becoming more difficult, and hence more important. To make matters worse, South Africa is poorly endowed in groundwater because most of the country is underlain by hard rock formations that do not contain any major groundwater aquifers (DWAF, 2002). It is therefore not surprising that South Africa has been classified as a country with chronic water scarcity (Ashton, 2002).

The demand for water in South Africa is dominated by the agricultural sector (about 60%), as indicated in (DWAF, 2004).

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