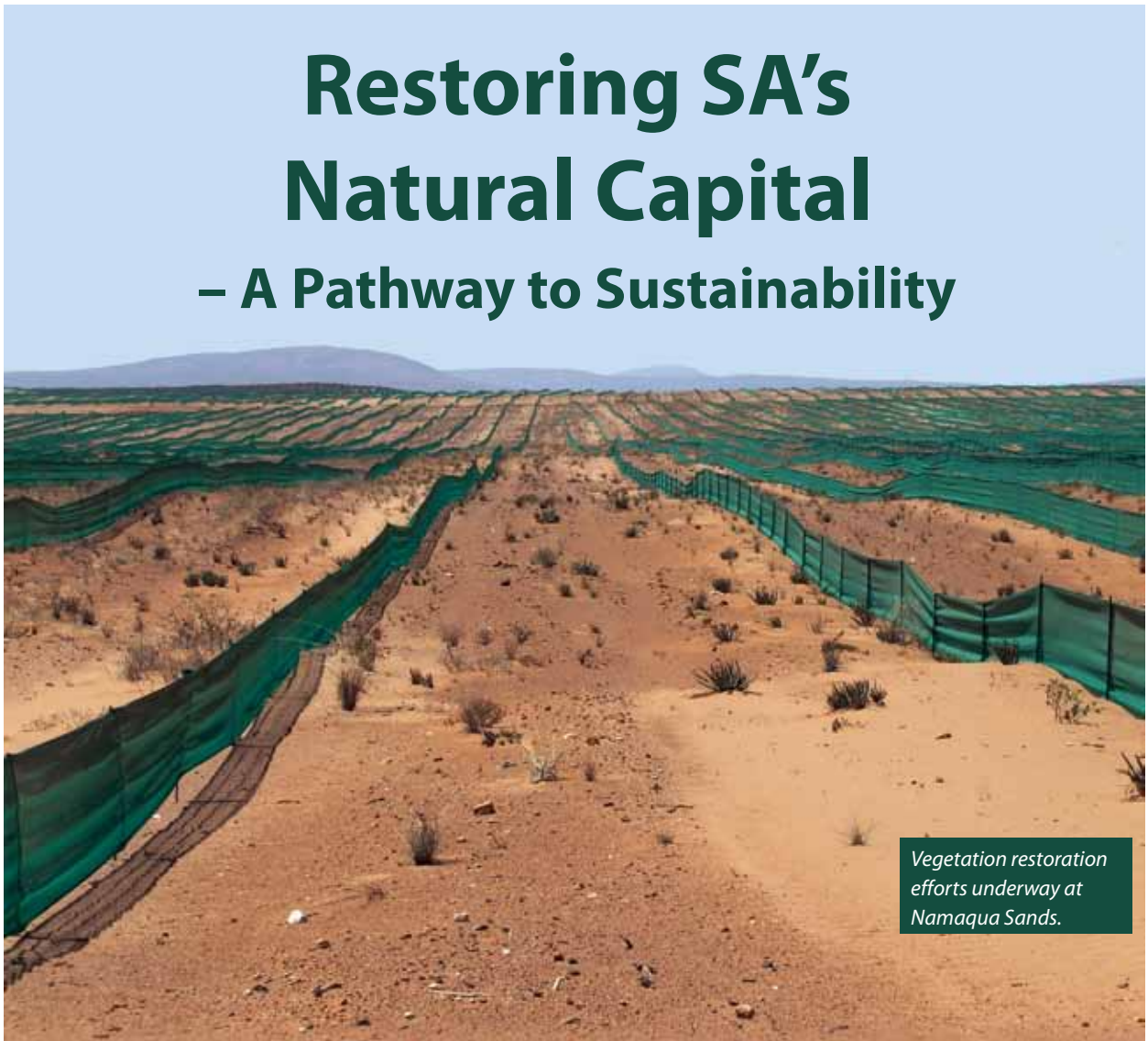


# Restoring SA's Natural Capital – A Pathway to Sustainability



*Vegetation restoration efforts underway at Namaqua Sands.*

***The first phase of a five-year project initiated by the Water Research Commission (WRC) to investigate the value of ecosystem restoration projects in South Africa is nearing completion.***

***Article by Leandri van der Elst and James Blignaut.***

Marco Paauw

Natural capital is an economic metaphor for the stock of physical and biological natural resources. These resources comprise renewable natural capital, non-renewable natural capital, replenishable natural capital, and cultivated natural capital.

Once the capital stock has been depleted it is no longer possible to produce stream flows; i.e. ecosystem services, which are invaluable and essential

for life on Earth for all species. It is from this point of view that natural and social scientists begin investigating the restoration of natural capital and the impact thereof on ecosystem services and the change in human well-being.

The science and theory behind restoration have been widely researched, and it has been implemented to some extent by various industries. For example, mines have to restore the environment to a

certain level before a closure certificate can be obtained, relieving the mining company of its financial and statutory obligation toward the government, society and the land.

The problem arises in the fact that the implementation is not done by the same people or institutions undertaking the research. Implementation is therefore not always informed or even properly measured. While restoring natural

capital is important, restoration to improve future use and improve the benefits such as soil quality and water flow are almost more important.

It is not good enough for example, to clear an area of invasive alien plants or to replant a mined area just for the sake of doing it. The restoration effort has to improve the degraded environment to such a degree that the natural capital can be used for sustainable living and development thereafter. The link between restoration and human well-being is therefore very important. The value of the restoration and the underlying process, as well as the economic justification thereof, is linked to the benefits such restoration has for people.

**EVALUATING RESTORATION EFFORTS**

It is from this vantage point that the WRC decided to commission a research project in 2008 to investigate restoration's economic linkages. The main focus of this research project therefore is to determine whether restoration, in fact, yields the desired results and improves the socio-economic value and agricultural potential of restored land. ASSET Research was commissioned to conduct the research over a five-year period.

The organisation has pulled together researchers, students and collaborators from various institutions to conduct the research. The first phase included seven MSc students and one PhD student working on four study areas. The second phase, which will start in 2010, involves a further six students and four study areas. The research team consists of Prof James Blignaut, Prof Martin de Wit, Prof Karen Elser, Prof Sue Milton and Dr David le Maitre.

The students are from various disciplines, including ecology, hydrology and economics, and represent various tertiary institutions. This ensures that the results will have a multidisciplinary, multi-institutional focus. The study areas are: Beaufort West, Namaqua Sands, Oudtshoort-Calitzdorp and Agulhas.

**“While restoring natural capital is important, restoration to improve future use and improve the benefits such as soil quality and water flow are almost more important.”**

The project research is being undertaken on existing restoration projects with the assistance of the people and institutions involved. It is thus rooted in reality ensuring it is relevant and current. Apart from the WRC, other collaborators include the Department of Water & Environmental Affairs, Flower Valley, Exxaro, Western Cape Department of Agriculture, Centre of Excellence for Invasion Biology and the Ostrich Business Chamber.

**BEAUFORT WEST**

The Northern Cape and some parts of the Western Cape (including Beaufort West) have become densely invaded by *Prosopis* species, a fast-growing, drought-tolerant legume tree originating from South America, which was introduced to the country to provide fodder for domestic stock. Unfortunately,

this species has turned out to be a very aggressive invader, disturbing and displacing the natural grasslands.

It has become particularly dense in areas with deep alluvial soils, which serve as important groundwater supply to farmers, livestock and rural settlements. In essence, this plant ‘steals’ water from people and the natural landscape.

The research question for this site is whether alien clearing restored socio-ecological value through improved groundwater yield and grazing recovery. In the hydrology component, methods such as groundwater recharge estimation, monitoring of groundwater levels, rain gauging and measuring soil moisture and species composition will be used to analyse the impact restoration. Aerial photo analysis, grazing value measurement, as well as measurement and sampling of ecosystem features will be used to evaluate the ecological impacts of restoration.

**NAMAQUA SANDS**

Surface mining (as undertaken at Namaqua Sands) is expanding in the arid, winter rainfall areas of South Africa. Although economically important, it is



*Mining accommodation at Namaqua Sands.*

Marco Pauw

having detrimental effects on biologically diverse environments where plant growth is restricted by aridity, wind and salinised, nutrient-poor soils.

The research question at this site is to what extent restoration has restored grazing value and other land-use options on a coastal mineral sands mine. For the ecology and hydrology components vegetation cover and species richness as well as grazing capacity, hydrological effects (such as infiltration, groundwater recharge and groundwater quality), and ecosystem functioning will be measured.

### OUDTSHOORN-CALITZDORP

The Klein Karoo between Oudtshoorn and Calitzdorp has been the centre of the ostrich industry for 150 years. Ostriches, when kept in natural veldt

at the high densities needed to make ostrich farming viable, destroy vegetation and trample the soil surface, leading to accelerated runoff and erosion. Because of their restless behaviour, continual foraging, dustbathing and nesting activities, the keeping of ostrich at high densities damages the veldt even when the birds are supplied supplementary feeds.

This part of the Klein Karoo is particularly rich in endemic plants, particularly succulents, and is a priority area for conservation under the Succulent Karoo Ecosystem Programme (SKEP). The research question for this site is how restoration can enhance the social-ecological acceptability of ostrich farming.

Vegetation field sampling, vegetation cover and species richness, veldt

condition and grazing capacity, and quantitative soil surface assessments will be used to measure the hydrological and ecological impacts of restoration.

### AGULHAS

Lastly, the Agulhas plain has been recognised as an area with high plant diversity and vegetation type variability, partly due to the array of soils which range from deep, acidic sands to skeletal soils on limestone to moderately fertile soils on shale. However, the area has been subjected to a series of land-uses ranging from extensive grazing to wheat cropping and, more recently, the establishment of vineyards in addition to the long-standing tradition of ornamental wildflower harvesting for the florist trade.



Sue Milton

*An erosion control site outside Oudtshoorn in the Klein Karoo.*



Sue Milton

*Hand-dug pits, each able to trap 20 ℓ of water, reduces loss of water and nutrient from the landscape and facilitates vegetation recovery on a site outside Oudtshoorn.*

There are a few conservation areas, notably De Hoop-Potberg, and more are in the process of being established as either conservancies or contractual parks. The specific research question for this site is whether the socio-ecological value of fynbos restoration for the flower and related industries outweigh its costs. GIS modelling will be used to determine the effects of restoration on water availability and efficiency.

The research conducted during the course of this study is expected to shed more light on restoration efforts' impact on the environment and people across various ecosystems and restoration methods. Part of the study is also to develop a systems model from the information gathered during the site-specific research. This model can then be used in future to evaluate and guide



Mirjam Gaertner

*Seed collection at the Agulhas study site.*

restoration efforts. In turn, this could be used to reduce the gap between research and implementation and

improve the results of restoration for the environment as well as rural and sustainable development. 