

– VIEWPOINT –

**THE BASIS FOR SUSTAINABLE BUSINESS IN THE
KAROO:
BRINGING ECOLOGICAL AND ECONOMIC ISSUES
TOGETHER**

Sue J. Milton & W. Richard J. Dean

1. INTRODUCTION

Travelers between Windhoek or Gauteng and Cape Town often perceive the Karoo as a ‘desert’, a badland characterized by heat, dust, overgrazing and marginalized people. This was not the way in which earlier inhabitants viewed its economic and cultural role. The area supported hunter-gatherers for about one million years (Deacon & Deacon, 2003; Smith, 1999), nomadic herders for 2000 years (Penn, 1987; Smith, 1999) and has supported settled ranching for 250 years (Beinart, 2003). It was once considered the economic heart of the country (Shaw, 1875), but the combination of past over-exploitation of grazing that caused land degradation (Talbot, 1961; Dean & Macdonald, 1994; Hoffman & Ashwell, 2001), and current national policies that invest preferentially in the geographical areas with the highest potential for economic growth, have led the current economic slump in the region (Nel & Hill, 2008). However, despite the current local and global economic gloom, the real basis for Karoo business, the natural capital of the region, survives more or less intact. The concept of natural capital embraces all natural resources and ecosystem services that have benefits for people (Aronson, Milton & Bignaut, 2007).

In this paper we will describe the richness of Karoo natural capital, the business opportunities that it provides and the ways in which Karoo business depends on it, the negative feedbacks (threats) to natural capital caused by business development, and the need for sustainability services to be supplied by the public and private sectors.

2. KAROO NATURAL CAPITAL AND ITS ECONOMIC SIGNIFICANCE

The Karoo natural capital upon which all biological, cultural and economic activity depends is water. Figure 1 illustrates how Karoo businesses depend largely upon the agricultural, tourism, mining and manufacturing sectors. Mining and manufacturing need large quantities of water as well as support from the agricultural industry (food, vegetation restoration), whereas agriculture and tourism depend both directly upon water (irrigation, laundry) and indirectly upon water through benefits derived from biodiversity (landscape, indigenous plants and animals), which in turn depend on water. Differences in the availability and spatial distribution of this limiting resource in the Succulent and Nama Karoo biomes largely determine the directions that development can take in these regions.

Basis for Karoo business

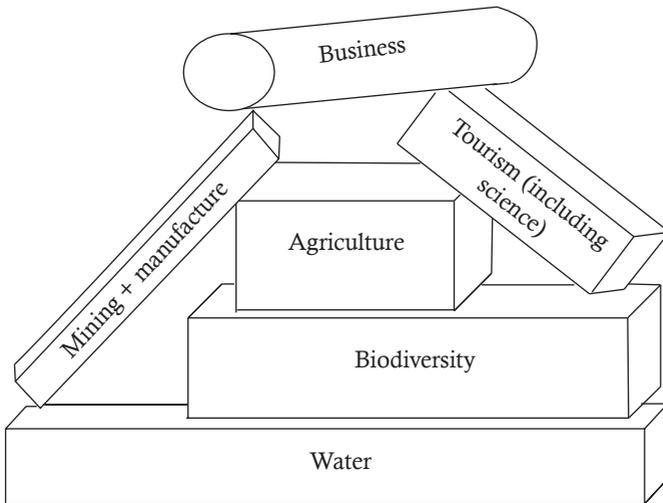


Figure 1: Illustration of how Karoo business depends directly and indirectly upon water and biodiversity

The folded topography in the Little Karoo comprises narrow valleys and high mountains. The mountains receive rainfall from coastal air that cools as it is forced to higher altitudes, and water from the mountain tops seeps through the rock to deliver a fairly constant flow of high quality water via springs and mountain

streams to the valleys. This mountain water and valley bottom accumulations of soil enable the Tanqua Karoo and the Little Karoo to support thriving deciduous fruit, olive and vegetable seed industries despite the hot arid conditions in the valley bottoms. Because of their dependence on mountain ecosystems for water, the intermountain valley businesses (agriculture and tourism) are particularly vulnerable to mismanagement of fynbos vegetation in the mountains where fires that are too hot or too frequent can result in floods, droughts and reduced water quality. In contrast with the folded belt of the Succulent Karoo, northern Namaqualand, the Richterveld and the Nama Karoo are largely dependent upon ground water. Topography is largely flat and soil shallow, factors that limit potential for arable agriculture. Major threats to availability of the ground water that supports agriculture and tourism are declining quality, caused by rapid extraction, climate change that predicts a reduction of winter rainfall in northern and western Namaqualand, and by groundwater contamination through activities such as mining.

The Succulent Karoo is a global biodiversity hotspot, meaning that it has more kinds of plants and animals for its size than any other arid area. Of the 5000 plant species in the region, almost half are restricted to the Succulent Karoo and many of them are succulents – or plant species adapted to store their own water supply in leaves or stems for use in the dry summer. They include vygies (*Aizoaceae*), daisies (*Asteraceae*), aloes (*Liliaceae*), plakkies (*Crassulaceae*), geraniums (*Geraniaceae*), melkbos (*Euphorbiaceae*), kambroo and halfmens (*Asclepiadaceae*) and others. One third of the world's 10 000 succulent plant species are found here (Cowling & Hilton-Taylor, 1999)! There are also some unusual animals: eight of 12 kinds of frogs, 30/94 reptiles and 20/232 birds are also unique to the Succulent Karoo. The number of insects, spiders and scorpions species in the region is less well known, but many, especially the bees, are special to the region (Vernon, 1999). The Nama Karoo with 2200 plant species is less rich and less unique (450 unique to the region) because many of the plant species are shared with the adjacent Succulent Karoo, grassland and savanna.

The significance of the plants and their associated animals to the economy of the Karoo may not be immediately evident to city dwellers, but they are the basis of many Karoo businesses including livestock and game ranching, eco-tourism, science tourism, plant breeding and horticulture, and medicinal bioprospecting, as well as having direct non-commercial use value to local users. The valley bottom grazing in Namaqualand is made up of succulents and soft winter-growing annual plants that fatten livestock in winter. Many die in the dry summer as the valleys become hot and dry, storing seeds in the soil for their

reappearance in the following winter. The more drought-resistant forage plants are on higher rocky ground, so that large ranches or a nomadic lifestyle are needed for livestock to remain in good condition year round.

The spectacular quiver tree and brilliant spring flower carpets are icons of Namaqualand, appearing in artworks, on calendars and screen-savers. Strange dwarf succulents restricted to quartz patches in Namaqualand and the Little Karoo, charismatically called *bokkloukies*, *bababoudjies*, *gansmis*, are popular with succulent collectors and a few small businesses specialize in their propagation. Some plants have made major contributions to horticulture and breeding has resulted in a wealth of popular varieties sold worldwide (*Sparaxis*, *Freesia*, *Lachenalia*, *Gazania*, and the ubiquitous window-box geranium). Plant species, once used by the indigenous people as medicine, are currently being explored as sources of new drugs for treating conditions as diverse as obesity (*Hoodia*), alcoholism (*Sceletium*) and cancer (*Sutherlandia*) (van Wyk & Gericke, 2000). At village level many plants have direct use value. *Acacia* wood and small dry bushes are collected as fuel for cooking and heating. The traditional *matjieshuise* are constructed from mats woven from river reeds. Circular wind shelters (*skerms*) used for cooking are made by uprooting and stacking common, shallow-rooted succulents to form a thick wall.

3. AGRICULTURE, TOURISM, MINING: OPPORTUNITIES AND THREATS

Agriculture, tourism and mining are the basis for business in both the Succulent and Nama Karoo, and have potential to develop the region; but malpractice in any of these sectors will destroy both mainstream business and subsistence economies.

In the Namaqualand Succulent Karoo tourism and mining compete with and interact with traditional herding. The way the land is managed for livestock production influences the tourist experience. Over-grazing strips away the vegetation and causes unsightly erosion, but patchy grazing maintains an abundance of annual plants in the rangeland whose flowers paint the landscape with brilliant splashes of colour in spring. Surface mining for diamonds, heavy metals, gypsum and marble destroy the vegetation that supports both livestock and tourism. The law requires that the vegetation be restored, and techniques are now available for putting back all the cover and at least half the plant species that were removed, so that a mined landscape can serve a grazing, and possibly a tourism function once again. If mining companies fail to comply with legislation, the business potential of the region will be permanently 'undermined'. Similarly,

if either the herders or the '4 by 4' explorers in the Richterveld National Park scar the landscape with their activities, the losers will include subsistence farmers, tourism business and the National Parks.

Science and science tourism in the Hantam Karoo faces a similar dilemma but on a smaller scale. Large areas are needed for observatories and telescope arrays, as well as associated accommodation – however, any development needs to consider the local environment and minimise destruction of the special flora of the area. In the Little Karoo, where ostrich farming has been the economic mainstay for two centuries, the negative impact of this industry on ecosystem services is now being felt in other sectors. Grazing has been depleted in valley bottoms, the soil-holding lichen crust stripped away, gullies are forming and soil eroded from the foothills is clogging the rivers and favouring invasions of giant reed, *Sesbania* and saltbush. Changed farming practices, such as removal of breeding ostrich from natural veld and maintaining them on sown pasture are one of the solutions favoured by the industry. In combination with restoration of damaged veld this solution should generate new opportunities for tourism.

Nama Karoo landscapes are spectacular in a bleak and dramatic way. There is plenty of '*niks*' (nothingness) affording wide viewsheds for the crowd-weary traveller and hunter. Opportunities for game- and guestfarms abound. Dinosaur bones, engraved stone artefacts, corbelled houses and early colonial sheep kraals make this an exciting hunting ground for the science and cultural tourist. However, the early settlers also scarred the landscape. The rocky plains are less vulnerable to erosion than the valleys of the succulent Karoo, but the deep alluvial soils along the courses of dry riverbeds were vulnerable. These were the only places that the first European settlers could grow subsistence crops, but damming of these moody rivers, and ploughing of their banks led to silted and broken dams and deep erosion of the silty floodplains. Loss of riparian vegetation and deep soil, and hunting by farm dogs together drove at least one specialised animal, the Riverine rabbit, to the point of extinction (Duthie, Skinner & Robinson, 1989; Collins, Ahlman, Mathee, Taylor, Keith & Van Jaarsveld, 2003). Restoration of the riparian areas will be needed to protect this species and its habitat. The far more extensive problem is the selective grazing of the vegetation, which on these rocky landscapes has done little to reduce cover, but much to change species composition, converting a once opulent rangeland to one dominated by poisonous and spiny plants.

Apart from its grazing resources, the Nama Karoo hides a rich reserve of uranium that accumulated in ancient rivers that may once have flowed from the Richterveld to Rietbron. The mining of this non-renewable capital would lead to short-term mining booms in towns near the ore body and would generate new employment opportunities and skills training. However, risks might include

radioactive contamination of ground water and dust, and localised loss of grazing land. Like all mining-related development the benefits are short-lived – perhaps a matter of decades – before the economy must once again rely on sustainable use of renewable natural resources such as grazing land.

4. ECOLOGICAL AND ECONOMIC ROLE OF A SUSTAINABILITY SERVICE INDUSTRY

In this section we propose that business sustainability can be improved by access to specialist services provided by the state and by private enterprise.

Integrated planning is the first step in achieving sustainable development. Integrated planning for rural areas goes beyond the boundaries of urban planning (housing, schools, hospitals) to include such issues as biodiversity corridors (Cowling, Pressey, Lombard, Desmet & Ellis, 1999), traditional transhumance routes, sites of scientific, palaeoecological or cultural significance, solid and liquid waste disposal and recycling, disaster management, subsistence resources (such as woodlots, food gardens) and many other issues. For example, priority areas and corridors for biodiversity conservation need to be identified, demarcated and secured before they are irreversibly transformed by mining or urban development. Town development in the Karoo is water limited and planning for expansions needs to be done with this in mind. Although most Karoo development planning can be done at provincial or municipal level, planning around human population growth and scenarios for providing acceptable education, welfare and health facilities needs to be at national level. Planning of this kind must include strategies for curbing the exponential rate of human population growth whether rural or urban. This is an important issue if quality of life for all is to improve and development in arid Karoo areas is to be truly sustainable. Similarly, exurban development imposes high costs on local municipalities in terms of service provision, and prior zoning rather than ad hoc decisions should determine limits for town sprawl. Integration of the skills of many experts is required to minimise the negative ecological and social impacts of unplanned urban expansion in rural areas.

Environmental impact assessment, planning and management interventions in towns, on game ranches, communal land, mines or tourism developments, often require specialised knowledge or skills. Government agricultural and conservation extension services are at present undersupplied in the Karoo. Extension officers advise farmers on numbers and types of livestock, game or crops appropriate for various farming units, inform them about legislation relating to water use, road making and alien vegetation control, advise on erosion control and restoration, and ensure that environmental and agricultural

resources legislation is understood and complied with. Although these roles are partly served by LandCare, The Department of Agriculture, Cape Nature and other government agencies such as DWAF's Working for Water and Working for Woodlands programmes, private enterprise is now supplying many sustainability services in rural areas.

Well informed and ethical environmental consultants can potentially make major contributions to ameliorating the negative impacts of development. The past ten years has seen the growth of other sustainability service businesses such as erosion control, alien vegetation clearing, indigenous seed production and veld restoration, waste water treatment, composting, recycling, indigenous landscaping, and a growth in the demand for books on these topics (Coetzee, 2005; Esler, Milton & Dean, 2006). Many opportunities exist for the development for example of energy-efficient homes, solar alternatives to use of wood and electricity, composting toilets – all technologies that will contribute to making development of towns in arid area more sustainable.

The sustainability service sector has great potential for providing employment and offers opportunities for micro-enterprise development. Examples of the potential for this business model are the newly trained ecological restoration crews now operating independently on sand mines on the Namaqualand coast (Van Eeden, Lubke & Haarhoff, 2007; Carrick & Kruger, 2007). However, to ensure rapid growth of sustainability service micro-enterprises, it is essential that Karoo towns ensure that children receive basic welfare, health services and education. Safety, security, social welfare, and human resource development are all an essential part of ensuring that Karoo business is ecologically and economically sustainable.

5. TOWARDS SUSTAINABLE DEVELOPMENT

In brief, the Karoo has potential for agriculture, tourism and mining, but development has water and biodiversity costs. Destruction of the Karoo's natural capital will kill off businesses and reduce future options, leaving damaged landscapes and destitute people.

Sustainability requires:

- Integrated spatial planning and zoning
- Social and environmental sustainability services
- Environmental awareness at all levels

REFERENCES

- ARONSON, J., MILTON, S.J. & BIGNAUT, J.N. (EDS).
2007. *Restoring natural capital : science, business, and practice*. Covalo, USA: Island Press.
- BEINART, W.
2003. *The rise of conservation in South Africa – settlers, livestock and the environment 1770-1950*. Oxford: Oxford University Press.
- CARRICK, P.J. & KRUGER, R.
2007. Restoring degraded landscapes in lowland Namaqualand: lessons from the mining experience and from regional ecological dynamics. *Journal of Arid Environments*, 70:767-781
- COETZEE, K.
2005. *Caring for natural rangelands*. Pietermaritzburg: University of KwaZulu-Natal Press.
- COLLINS, K., AHLMAN, V., MATTHEE, C., TAYLOR, P., KEITH, M. & VAN JAARVELD, A.
2003. *Bunolagus monticularis*. In: IUCN, 2006 *IUCN Red List of Threatened Species*.
- COWLING, R.M. & HILTON-TAYLOR, C.
1999. Plant biogeography, endemism and diversity. In: Dean, W.R.J. & Milton, S.J. (eds). *The Karoo, ecological patterns and processes*. Cambridge: Cambridge University Press. pp 42-56.
- COWLING, R.M., PRESSEY, R.L., LOMBARD, A.T., DESMET, P.G. & ELLIS, A.G.
1999. From representation to persistence: requirements for a sustainable system of conservation areas in the species-rich mediterranean-climate desert of southern Africa. *Diversity and Distributions*, 5:51-71
- DEACON, H.J. & DEACON, J.
2003. *Human beginnings in South Africa*. Cape Town: David Philip.
- DEAN, W.R.J. & MACDONALD, I.A.W.
1994. Historical changes in stocking rates of domestic livestock as a measure of semi-arid and arid rangeland degradation in the Cape Province, South Africa. *Journal of Arid Environments*, 26:281-298.
- DUTHIE A.G., SKINNER J.D. & ROBINSON T. J.
1989. The distribution and status of the riverine rabbit, *Bunolagus monticularis*. *South Africa Biological Conservation*, 47:195-202.

- ESLER, K.J., MILTON, S.J. & DEAN, W.R.J.
2006. *Karoo Veld - ecology and management*. Pretoria: Briza Press.
- HOFFMAN, M.T. & ASHWELL, A.
2001. *Land degradation in South Africa*. Cape Town: University of Cape Town Press
- NEL, E. & HILL, T.
2008. Marginalisation and demographic change in the semi-arid Karoo, South Africa. *Journal of Arid Environments*, 72: 2264-2274.
- PENN, N.G.
1987. The frontier in the Western Cape, 1700-1740. In: Parkington, J. & Hall, M. (eds). *Papers in the Prehistory of the Western Cape, South Africa*. Oxford: BAR International Series. pp 462-503.
- SHAW, J.
1875. On the changes going on in the vegetation of S.A. through the introduction of the Merino sheep. *Journal of the Linnean Society*, 14: 202-208.
- SMITH, A.B.
1999. Hunters and herders in the karoo landscape. In: Dean, W.R.J. & Milton, S.J. (eds). *The Karoo, ecological patterns and processes*. Cambridge: Cambridge University Press. pp 243-246.
- TALBOT, W.J.
1961. Land utilization in the arid regions of southern Africa. Part I. South Africa. In: Stamp, L.D. (ed). *A history of land use in arid regions. Arid Zones Research, 17*. Paris: UNESCO. pp 299-338.
- VAN EEDEN, J.D., LUBKE, R.A. & HAARHOFF, P.
2007. Return of natural, social, and financial capital to the hole left by mining. In: Aronson, J., Milton, S.J. & Blignaut, J. N. (eds). *Restoring natural capital: science, business, and practice*. Covalo, USA: Island Press. pp 198-208.
- VAN WYK, B.E. & GERICKE, N.
2000. *People's plants*. Pretoria: Briza Press.
- VERNON, C.J.
1999. Biogeography, endemism and diversity of animals in the karoo. In: Dean, W.R.J. & Milton, S.J. (eds). *The Karoo, ecological patterns and processes*. Cambridge: Cambridge University Press. pp 57-78.