From pastoralism to tourism: The historical impact of changing land use practices in Namaqualand

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Abstract

We use the concept of ecological revolutions to explain the environmental history of Namaqualand, from the advent of pastoralism 2000 years BP, to colonial settlement in the 18th century and finally to the recent trend of de-agrarianization from the middle of the 20th century. Early traveller’s records and census data are used to assess changes in the human population of the region and how this affected wildlife and agricultural practices. Pre-colonial indigenous hunter-gatherer (Bushmen) and pastoralist (Khoekhoen) populations in Namaqualand consisted of probably no more than a few thousand individuals. Over the next three centuries, the general population rose steadily to more than 65,000 people but has fallen in recent years. Wildlife appears not to have been abundant in Namaqualand’s pre-colonial landscapes and large springbok ‘treks’ were probably a rare event. The number of domestic livestock in Namaqualand peaked in 1957 largely as a result of an increase in the number of sheep which have fallen steadily since this time. Crop production was absent from Namaqualand’s pre-colonial landscapes but increased to cover nearly 30,000 ha in the early 1970s. The area under cultivation has declined by nearly two thirds since this time largely as a result of the large-scale abandonment of wheat farming in marginal environments. We touch on differences between the communal areas and private farms, particularly in terms of their human populations and agricultural impact on the land. Repeat landscape photographs support our main findings which suggest that both rocky, upland habitats and rivers have not been transformed substantially by land use practices in Namaqualand. Instead, sandy pediments have borne the brunt of human impacts in the region. Finally, we highlight the beginning of a new ecological revolution in Namaqualand due to changes in the global and national political economy.

Keywords: Degradation; Environmental history; Human impact; Population; Repeat photography

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1. Introduction

The natural ecosystems that we see around us today are as much a product of human intervention over the last few millennia and particularly over the last few hundred years, as they are of their evolutionary and climatic histories. Namaqualand is an exceptionally diverse semi-desert (Desmet, 2007) with one of the longest records of grazing by domesticated livestock in southern Africa (Webley, 2007). The region has been subject to widespread land expropriation by colonial settlers as well as intensive mining interests during the last two hundred years. This paper presents a broad overview of the environmental history of Namaqualand, focusing on the winter rainfall area between the Olifants and Orange Rivers.

A number of palaeoecological studies suggest that vegetation change has occurred in the region during the last several millennia (Cowling et al., 1999; Abell and Plug, 2000; Meadows and Baxter, 2001; Bond et al., 2003). While archaeological (Webley, 2007) and historical research (Penn, 1995a) provides some insight, the impact of different land use practices carried out by different user groups over time is not well described. Acocks (1953, 1979) is unusually taciturn about the human impacts on the region’s biota. He suggests that the proportion of succulents in Namaqualand’s coastal region is higher today than it was in the past and that there has been an associated decline in the grasses and non-succulent shrubs over the last 250 years. His assessment disagrees, in some respects, with a recent study of pollen chronology in the mud belt adjacent to the Namaqualand coast (Gray et al., 2000) which shows that while there has been a decrease in grasses and typical riverine vegetation there has been an associated increase in Asteraceae pollen over the last 3000 years. However, it is unclear whether change was caused by climatic or anthropogenic disturbance.

Hoffman et al. (2003) describe some of the impacts of heavy grazing on plants and insects in Namaqualand but say very little about how the number of people and their land use practices have changed over time in the region. A recent study (Benjaminsen et al., 2006) charts the impact of stocking rates in two communal areas and uses repeat aerial and ground photos of fence-lines between a communal area and a private farm to explore the dynamics of different grazing regimes on vegetation. Several, relatively isolated studies on the impact of heavy grazing on soils (Allsopp, 1999), plants (Todd and Hoffman, 1999), insects (Seymour and Dean, 1999) and small mammals (Joubert and Ryan, 1999) have also been published, but no general account of how land use practices have changed in the wider Namaqualand region has been produced.

In spite of this dearth of studies dedicated to the area’s environmental history, the landscape has undoubtedly changed in response to several distinct phases of human intervention (Jacobs, 2002). One way of untangling this complex history is to interpret such phases in terms of ‘ecological revolutions’. Merchant (1997) defines these as ‘major transformations in human relations with non-human nature’ that arise due to changes in the relationship between society’s mode of production and its ecology, as well as between society’s mode of production and reproduction. With this in mind, we use archaeological and historical evidence, census data and repeat landscape photography to describe the environmental history of the region over the last two millennia. We hypothesise that three distinct ecological revolutions have occurred in the region:

1) The pastoral ecological revolution that took place as a result of the introduction of domestic livestock and pastoral societies into the area approximately 2000 years ago
and which, prior to this time was occupied by people with predominantly hunter-gatherer lifestyles.

2) The *colonial ecological revolution* which in Namaqualand first made itself felt through the rapid spread of smallpox from the Cape Colony after its outbreak there in 1713, decimating pastoral societies. From about 1750 and for the next two and half centuries colonial settlers appropriated most of the land for commercial livestock farming and mining, confining the original inhabitants to increasingly small communal reserves resulting in the formation of two distinct social, economic and ecological outcomes.

3) The *post-agrarian ecological revolution*, includes the decline in commercial agriculture in the region, particularly cultivation, during the second half of the 20th century and the more recent transformation of the South African social economy after 1994. This latter influence has been accompanied by an end to agricultural subsidies, a major focus on land reform in the region and the expansion of conservation areas such as the Richtersveld and Namaqua National Parks.

Of course, these are not separate categories but overlap to some extent. Also, we are not able in this short paper to give more than a glimpse of the socio-economic and political context in which the natural and human ecology has changed. In fact we can only guess at the transformation which accompanied the pastoral ecological revolution, and make broad suppositions based on travellers’ records and historical census data that show how the number of people, wildlife, domesticated livestock populations and crop cultivation have changed as a result of the colonial ecological revolution. The evidence we present is primarily concerned with the gradual environmental, socio-economic and political transformation which has accompanied the end of the colonial period and where we find ourselves now: at the beginning of the post-agrarian ecological revolution. Much of the best evidence for this change is derived from repeat landscape photographs.

2. Human populations

Evidence in both the archaeological (Webley, 2007) and historical (Penn, 1995a) record suggests that immediately prior to colonial contact in the 17th century, human populations in Namaqualand (south of the arterial oasis of the Orange River), whether hunter-gatherer or pastoralist in their lifestyles, ranged widely within and beyond the area of our study, probably never exceeding a few thousand individuals at any one time. In 1661, early travellers to the region encountered a large Namaqua encampment of some 700 people and 4000 cattle and 3000 sheep in the vicinity of Van Rhynsdorp near the Olifants River (Penn, 1995b). During Olaf Bergh’s first journey in 1682, his camp near present-day Garies was visited by over 200 curious Namaqua men and women (Mossop, 1931). Simon van der Stel’s expedition, to the vicinity of present day Springbok in 1685, encountered eight or nine relatively small groups of Namaqua pastoralists on the western slopes of the central Kamiesberg and scattered groups of Bushmen hunter-gatherers along the way (Waterhouse, 1932; Valentyn, 1971). Nearly 100 years later, in 1779, a radical change was recorded by Robert Gordon who observed that “…this entire [Namaqua] nation consisted of about four hundred men and women, as well as children” (Raper and Boucher, 1988).

Certainly the smallpox epidemics of 1713 and episodically thereafter (e.g. in 1755 and 1767) had a devastating impact on Khoekhoen populations in Namaqualand and helped to weaken the pastoral economy of the Namaquas to a point where it would never recover
Mossop, 1947; Marais, 1968; Elphick, 1985; Raper and Boucher, 1988). Although no evidence has emerged as yet, it is possible that smallpox impacted on Namaqua populations long before the period of physical contact, as happened across the New World in advance of colonial incursions (Crosby, 1986, 1994; Merchant, 1989; Kay, 1994; Beinart and Coates, 1995; Diamond, 1998; Richards, 2003). The 18th century smallpox epidemics in southern Africa resulted in a demographic hiatus consistent with the onset of colonial ecological revolutions worldwide, wherein Namaqua populations and their herds were drastically reduced, creating a frontier ‘wilderness’ ripe for colonial settlement (Barrow, 1801; Mossop, 1947).

Although Europeans had visited the southern portions of Namaqualand in the first decade of colonial occupation of the Cape, and continued to do so throughout the first half of the 18th century, to explore, hunt and raid cattle, the region was only settled by European farmers in about 1750 when the first loan farms were established (Penn, 1995a, b). When Robert Gordon travelled in the region in 1779 he reported that there were only nineteen European stock farms between the Groen River and present day Springbok (Raper and Boucher, 1988). However, with the influx of additional trekboers and runaway slaves, population numbers increased rapidly and by the early 1800s Khoekhoen pastoralists appealed to the church to protect their traditional grazing lands from being occupied and possessed by colonial farmers. Formal church protection led ultimately to the creation of the six Coloured rural reserves in Namaqualand (Hoffman et al., 2007; Webley, 2007), and provided some measure of security for the original inhabitants of the region. However, consistent with colonial ecological revolutions in other parts of the New World, it did not prevent the settlement and possession of most of the rest of the district by colonial farmers and mining interests during the 19th century.

The first census statistics for the newly created Namaqualand District give a total population of 10,071 in 1865. At the start of Union in 1910, the population of Namaqualand had swollen to more than 20,000 people, two-thirds of whom were classified as rural (Fig. 1). By 1970, and with the development of the mining industry, this number had more than tripled to about 56,000 people, less than 50% of which were now considered rural. Significant urbanization occurred in the region over the next twenty years and by 1991, only about 9% of the 62,536 people in Namaqualand were classified as rural. This number is less than half of the rural population that was present in the district in 1911 suggesting a general depopulation of the rural parts of Namaqualand over the last 100 years. More recently, there has been a decline in the total population of Namaqualand as people have sought employment opportunities in the bigger urban centres to the south (e.g. Vredendal, Cape Town), and east (e.g. Upington, Kimberley), outside the district.

These statistics for the magisterial district as a whole do not reflect the many changes in the population of the communal areas of Namaqualand and, indeed, the complex dynamics of each small, rural village in the region in relation to the surrounding socio-political environment. For example, data for the village of Paulshoek, in the Leliefontein communal area, show a five-fold increase in the number of households between 1960 and 1997 (Rohde et al., 2003). This was the result of the creation of ‘service villages’ by the apartheid government that encouraged sedentarization of communal stock farmers, who had previously practiced a limited form of transhumance between stock-posts. It was also the result of the enclosure of Bushmanland by white farmers as part of the Department of Agriculture’s subsidised farm planning campaigns in the 1960s and the shift at this time to the commercial exploitation of Dorper mutton sheep, which required less farm labour.
Herders no longer needed on these farms retreated to the Coloured Reserves and the number of households grew accordingly (Rohde et al., 2003). This increase in rural village populations, coupled with the enclosure of the communal areas by neighbouring white farmers, placed additional pressure on the natural resources of the communal areas. Significant impacts, as revealed in the differences across fence-lines between communal areas and private farms (see Hoffman et al., 2003) reflect these divergent socio-political and land use histories. Such demographic shifts reflect global trends associated with marginal environments and peripheral social economies. The coincidence of urbanization, declining dependence on agricultural production and an expanded regional economy associated with modernization and economic liberalization are symptomatic of the post-agrarian ecological revolution (Bryceson, 1997).

3. Wildlife

During the pastoral ecological era, Namaqualand’s landscapes supported a large diversity of animals as noted by early travellers (Skead, 1980) and as recorded in present
day place names (Acoks, 1979; Dean and Milton, 2003). A long list of small (e.g. duiker) and large ungulates (e.g. gemsbok, eland) as well as megaherbivores (such as elephant, black rhinoceros and hippopotamus) and predators (e.g. lion, hyena) recorded for the region reflects this diversity (Skead, 1980). What is more difficult to determine, however, is the density of animals, as well as the extent of fluctuations in their populations, that would have occurred in Namaqualand prior to colonial settlement at the Cape.

It is tempting to imagine that the pastoral and early colonial Namaqualand in the 17th and 18th centuries was “full of animals” (Raper and Boucher, 1988) as Robert Gordon noted at a site immediately west of the Augrabies Falls on the 15th October 1779. Here he saw “...all at one glance through a semi-circle: twelve giraffes, about fifty elephants, 5 rhinoceros, a flock of 20 ostriches, a herd of 13 kudu, and one great herd of zebra” as well as “...hippopotamus in the river below, swimming and playing together” (Cullinan, 1992). However, this was “the most beautiful and singular sight...” in all his journeys (Cullinan, 1992) and reflected conditions along the verdant Orange River and not the relatively sterile hinterland to the south-west. In addition, this particular region of the Orange River described by Gordon was a ‘no-man’s land’ between warring Khoekhoen and Bushmen groups (Penn, 1995a). Such a buffer zone might have created a refuge for wild animals as has been documented for pre-colonial environments in the western United States of America (Kay, 1994).

When travelling through the winter rainfall part of Namaqualand a few weeks earlier in August 1779, Gordon had lamented that game was very scarce although several records of elephant and large antelope are present in his journal, particularly in the vicinity of major rivers (e.g. the Buffels River) (Raper and Boucher, 1988). Although this relative scarcity of animals in Namaqualand was recorded by Gordon, it probably cannot be attributed to their earlier extermination by white hunters since it accords well with the account of Simon van der Stel’s journey (Valentyn, 1971) through Namaqualand in 1685, before any major impact on animal populations by settlers could have occurred. In the relatively detailed journal of this trip, as far as present-day Springbok, it is astonishing that, apart from the “many wild horses” (zebra or possibly quagga) seen just west of the Knysvlake on the sandy coastal plain on 25 September 1685, there is no further reference to wildlife during the next three months. The same is true for the accounts of Rhenius’ trip in 1724 and Brink’s journey in 1761, who describes the coastal platform between the Olfants River and Groen River as being devoid “…of much big game, except along the coast where a fair number of elephants still find subsistence” (Mossop, 1947). While settler farmers and hunters before them had clearly had a big impact on the wildlife of Namaqualand (as lamented by Barrow (1801)), it is unlikely that Namaqualand supported the same diversity and abundance of resident populations of ungulates commonly described for the eastern parts of southern Africa at the time.

If resident wildlife populations in Namaqualand were relatively small, could the region have been subject to an episodic influx of large numbers of animals from time to time as recorded in the ‘springbok treks’ in the eastern part of the Cape colony during the 19th century? Roche’s (2004) detailed historical synthesis of this phenomenon suggests that, while there are records for the occurrence of ‘trekbokke’ along the ecotone between Namaqualand and Bushmanland, as well as on the Bokkeveld escarpment to the south-east of Namaqualand, they are rare for areas west and north of the Kamiesberg itself. Apart from the civil commissioner, W.J. Scully’s, somewhat fanciful recollection of a springbok trek to the sea in Namaqualand (Liversidge, 1978), there are no other records of
migratory springbok in the winter rainfall region. Also, in Roche’s (2004) maps of the sightings of springbok migrations during the 19th century there is no record for sites west of the Kamiesberg. Further research, particularly of local Namaqualand newspapers of the time, might prove otherwise, but it seems unlikely that the winter rainfall part of this region was subject to the same incidence of episodic springbok irruptions as was recorded in the eastern Karoo during the 19th century.

If wildlife populations were sparse during the pastoral and early colonial period, many species became rare or entirely eradicated during the colonial phase. Today, conservation initiatives in the form of private game reserves and the planned re-introduction of rhinos in the Namaqua National Park are significant insofar as they reflect a reverse trend to that of the last three hundred years. The impetus for such conservation initiatives has as much to do with the potential economic opportunities of the mass tourist market as of promoting biodiversity and sustainable land-use.

4. Livestock

Although it is difficult to tell from the early traveller’s records precisely how many animals Khoekhoen pastoralists held in pre-colonial times, it does not appear that numbers were particularly high since pastoral production was based on the ability to migrate freely between various ecological zones according to both season and inter-annual climatic conditions (Webley, 2007). As mentioned above, Cruythoff and van Meerhoff’s 1661 expedition passed a Namaqua kraal near present day Van Rhynsdorp with about 4000 cattle and 3000 sheep (Penn, 1995b). Simon van der Stel’s expedition recorded a kraal in the middle reaches of the Kamiesberg as being “...well-provided with milch-cows but only tolerably with oxen and sheep.” (Valentyn, 1971). The end of the pastoral era and the beginning of the colonial ecological revolution was observed nearly 50 years later by Rhenius in 1724. He reported smallpox among the Namaqua population and observed few animals, noting the complaints of Khoi pastoralists who said that “for two successive years [the Dutch East India Company] had cleared them out of all their cattle” (Mossop, 1947). Carel Brink, who passed through Namaqualand in 1761, observed that the Namaqua lived in great poverty with few cattle and under constant harassment from “Bosjesmans who rob them of their stock” (Mossop, 1947). Forty years later, Barrow (1801) made a similar observation: “All those numerous tribes of Namaquas, possessed of vast herds of cattle, are, in the course of less than a century, dwindled away to four hordes, which are not very numerous, and in great measure are subservient to the Dutch peasantry, who dwell among them”. Sustained cattle raiding by both Oorlam commandos and colonists during the 18th century (Penn, 1995b) as well as internal warfare between San and Khoekhoen groups in Namaqualand (Mossop, 1947) delivered the final blow to a pastoral society weakened by repeated epidemics and the chaos occasioned by the newly-created colonial frontier. Whatever the exact number of animals herded by pre-colonial Namaqua pastoralists, it is likely that the 18,554 cattle, 65,517 goats and 99,188 sheep recorded in the district census records for 1865 represents a significant increase over pre-smallpox, Namaqua herds and an order of magnitude more animals than were present in the region during the hiatus of the 18th century. Reasonably reliable records for the magisterial district show a high number of cattle, relative to sheep and goats between the period from 1865 until the 1920s with a steady decline in cattle numbers since then (Fig. 2). In 1996, there were fewer cattle (7059 animals) in the magisterial district of Namaqualand than at any time since records
began (apart from brief periods during the droughts of the late 1890s and early 1980s).

This fact begs the as yet unanswered question as to whether this decline was the result of vegetation change due to overgrazing and/or climate change, or whether the gradual curtailment of annual transhumance circuits and the ‘expansion’ of regional livestock markets conspired to make cattle production unprofitable.

The 20th century is characterized by a large increase in the number of sheep in Namaqualand that peaked in 1957 following an extended period of unusually good rainfall and high market prices associated with the karukul industry at the time. Goat numbers have generally decreased since the 1930s although they also peaked briefly in 1957.
Stocking rates as measured in Large Stock Units (LSU) declined sharply after 1957 coinciding with the modernization of commercial agriculture.

Modernization and development in semi-arid areas such as Namaqualand took place during the second half of the 20th century, coinciding with what we have termed the post-agrarian ecological revolution. It involved the commercialization of livestock ranching on large privately-owned farms with the objective of stabilizing productive output through climatic cycles by controlling stock numbers and the careful management of veld vegetation (Benjaminsen et al., 2006; Rohde et al., 2006). Practical measures included the fencing of commercial farms into camps, the introduction of stock reduction schemes and state subsidies to white farmers and the enclosure of communal areas. In effect, this was the beginning of what is now a national (and global) concern with conserving biodiversity. During the last 50 years new opportunities in the regional economy have arisen alongside the globalization of agricultural markets resulting in a decline in the importance of commercial farming in marginal areas such as Namaqualand (Bryceson, 1997). The decline in livestock numbers has gone hand-in-hand with an increase in conservation initiatives: the contemporary post-agrarian landscape in Namaqualand is evident not only in the increased biodiversity and vegetation cover on commercial farms but also in the creation of the Richtersveld, the Namaqua National Park and the transfrontier conservation initiative between Namibia and South Africa, as well as in a variety of small nature reserves such as the Goegap Nature Reserve.

Total livestock numbers for the district do not convey the large differences in stocking densities that exist between the communal areas and privately-owned farms. In general, livestock numbers in the communal areas of South Africa are nearly twice those of the privately-owned farms (Hoffman and Ashwell, 2001) and the situation is the same for Namaqualand (Hoffman et al., 1999). A major difference between the two land tenure systems is that animal numbers fluctuate more widely from year to year in the communal areas. This is largely as a result of the replacement of perennial shrubs by annual and short-lived plants in the communal areas (Todd and Hoffman, 1999; Anderson and Hoffman, 2007) which renders animal populations more susceptible to the impacts of drought (Todd and Hoffman, 2000; Richardson et al., 2007). As described in relation to human populations, this disjunction in the landscape between private and communal land-use, and the effects of this on vegetation and livestock production typifies a divided colonial legacy. The structural constraints associated with centuries of marginalization consign the communal areas to a painfully slow adjustment to post-agrarian socio-economic and political landscape.

5. Cultivation

There is no history of cultivation in Namaqualand prior to the settlement of the area by European farmers, who probably first cropped the low-lying areas with deeper soils, particularly along water courses. For example, when Gordon arrived at a farm near Bitterfontein in 1779, he writes of the farmer who “was busy ploughing on his lower lands by the river” (Raper and Boucher, 1988). A few days journey further north brought him to the farm of Hermanus Engelbregt where both he and his traveling companion William Patterson painted the surrounding landscape, including the wheat fields which remain more-or-less the same size and shape to this day. Namaqua pastoralists adopted cultivation practices from the early 19th century as part of a more sedentary lifestyle
associated with the mission stations and the colonial ecological revolution. Within eight years of founding the mission station at Leliefontein, Rev. Barnabas Shaw’s Namaqua congregation of 400 people had planted between 300 and 400 acres of wheat, an area which more than doubled in size over the following 50 years along with the population (Shaw, 1841; Forbes, 1965). Pastoral transhumance patterns were adapted to the calendar of crop planting and harvesting although transhumance orbits were increasingly confined to smaller and smaller areas as a result of population pressure and political marginalization. At the same time peasant crop production by both trekboer and Namaqua farmers intensified and the number of ploughs in Namaqualand, for example quadrupled from 391 in 1889 to 1196 in 1904 (CCR, 1889, 1904).

Wheat has been the most widely grown crop in the winter rainfall region of Namaqualand, together with smaller amounts of oats, barley and rye (Fig. 3). The area used for the cultivation of these four crops peaked at 29,265 ha in 1971 but by the time the last agricultural census of the district was undertaken in 1988, it had declined by nearly two-thirds to 11,620 ha. In addition, many marginal lands were cultivated in the past for a few years or decades and have lain fallow since that time, suggesting that the total area of cultivated land since the early 19th century is several times higher than the area of land cultivated in any one year.

Yields are strongly linked to annual rainfall and while cultivation in the higher rainfall areas has continued relatively uninterrupted since the mid-18th century, it has declined significantly during the last 50 years across more marginal locations where it is no longer economically viable (Fig. 4). Many abandoned croplands situated away from the higher rainfall areas in the Kamiesberg massif are being invaded by early successional indigenous

![Diagram](image-url)

**Fig. 3.** The number of ha of land used for the cultivation of wheat, oats, barley and rye in the magisterial district of Namaqualand for the period 1865–1988 as well as the total ha cultivated for the four crops.
Fig. 4. Many marginal croplands in Namaqualand have lain fallow for decades and are now being invaded by a range of indigenous shrubs such as *Lebeckia sericea* seen in this photograph south of Kamieskroon which was first photographed on 5 August, 1967 by Frank Steiner and again on 7 August 2003 by the authors (No. 182). This image demonstrates the relative impact of agriculture on the sandy pediments which have been heavily transformed in Namaqualand and the rocky upland environments (as seen in the background of this image) which have been relatively untransformed despite centuries of grazing.
shrubs. Cultivation in the communal areas of Namaqualand has also declined significantly since the 1960s (Rohde et al., 2003). Improvements in transportation and the low cost of grains on the world market have rendered crop production in Namaqualand a highly risky, low-return enterprise. The rise and fall of crop production provides a measure of the impact of colonial ecological revolution on Namaqualand’s landscape. The contraction of cropping areas during the later half of the 20th century and the subsequent recovery of perennial vegetation cover across Namaqualand’s sandy lowland areas is further evidence of an ongoing post-agrarian ecological revolution.

6. The impact of different land use practices on Namaqualand

We know that the pastoral ecological revolution in other African drylands had lasting environmental impacts (Smith, 1992; Homewood and Rogers, 1987; Le Houérou, 1989; Sullivan and Rohde, 2002) and there is no reason to believe that the Namaqua pastoralists and their herds did not also alter the vegetation to some extent. It is equally clear that the initial phases of the colonial ecological revolution across the New World and in parts of southern Africa resulted in radical disruption to indigenous societies resulting in declines in both human and livestock populations and creating what early settlers would perceive as ‘empty wilderness’ (Crosby, 1986; Merchant, 1989; Cronon, 1997; Flannery, 2001). To what extent these processes had a significant effect on Namaqualand’s vegetation remains uncertain since traveller’s accounts throughout this period do not describe the vegetation in detail and refer rather coarsely to the abundance or scarcity of grass, shrubs and firewood in an area (Valentyn, 1971; Raper and Boucher, 1988). However, they do suggest that grass cover was relatively rare and patchily distributed, shrubs (including succulent shrubs), were ubiquitous throughout the region and occasional mass displays of flowers occurred from place to place. *Acacia karroo* was also widespread along the river courses at this time but not along the coastal plain (Valentyn, 1971). The region was also subject to severe droughts as reflected in the hardships endured by most early travellers in the region except for Simon van der Stel who entered Namaqualand during an exceptionally wet year following four years of drought (Valentyn, 1971).

A more quantitative assessment of environment change can be made from old photographs but these only record, at best, the last 130 years of land use impact and usually the last 50 years. We have taken more than 150 repeat photographs of landscapes in Namaqualand that are too numerous to publish here. We summarize our findings in terms of the three dominant landforms in the region: rocky uplands, sandy pediments and rivers.

Firstly, the rocky upland environments of Namaqualand have changed very little in cover in the last 100 years on both communal areas and private farms (Figs. 4–6). Steep rocky terrain is less affected by livestock grazing and appears better buffered from its impact (Anderson and Hoffman, 2007). Differences in composition are more difficult to determine from photographs but there is nothing to suggest that there has been a substantial shift in species over the last 100 years in these environments in either communal areas or on private farms. Taller, emergent shrubs, such as *Rhus undulata* appear to have either stayed the same or increased in both size and number, particularly where they occur on steep rocky slopes.

Secondly, and in contrast, we suggest that the sandy pediments in the region have been severely impacted by a range of land use practices including mining, cultivation, grazing
and settlement (Fig. 4). Much of this impact, however, occurred in the decades before the 1970s due to the cultivation of marginal lands for cereal production throughout the region and the heavy grazing impacts of livestock in the over-crowded communal areas. Where rainfall is higher, successional processes have started on abandoned fields with *Lebeckia sericea* and other, relatively short-lived shrubs, colonizing these landscapes. In the communal areas, however, where the sandy pediments are still relatively heavily grazed, they remain barren and dominated by unpalatable shrubs such as *Galenia africana* (Fig. 5).
The high stocking density which persists in the communal areas prevents any increase in palatable, productive shrubs, particularly leaf succulents, and maintains the annual and short-lived shrubby components in the flora (Anderson and Hoffman, 2007).

Fig. 6. Away from human settlements, river systems in Namaqualand are affected more by large-scale flood events than by human impacts and appear to be relatively unchanged over the last 50 years such as these matched photographs of the Buffels River suggests. It also confirms the relatively low level of impact on the rocky upland environments. The top image was taken by John Acocks on 23 September 1957 while the bottom image was taken by the authors on 25 November, 2004 (No. 303).
Thirdly, the rivers and small tributaries in Namaqualand have generally experienced an increase in the cover of *Acacia karroo* and *Tamarix usneoides* although this is not universally the case (Fig. 6). It is also not clear whether this is simply a recolonization of the area, following the clearing of these gallery thickets for firewood and charcoal in the 19th and first half of the 20th century, or whether rare destructive floods (e.g. the extensive 1925 flood) cleared much of the vegetation in the larger ephemeral rivers such as the Buffels River, and during the last 80 years has become re-vegetated (Rohde et al., 2005). In some areas, particularly in the south and east, the alien tree, *Prosopis* spp. has started to invade. It is also widespread along the Orange River where several other invaders now also occur (e.g. *Nicotiana tabacina*).

Grazing and cultivation have affected the cover and composition of Namaqualand’s landforms differently. The sandy pediments have borne the brunt of this impact. Cultivation has had a devastating impact on the biota of this landform. In addition, much of what appears to be degradation due to grazing was initially the result of cultivation. Many of Namaqualand’s agricultural landscapes today are a result of the slow recolonization of croplands by pioneer shrubs that are now utilized as (rather poor) grazing lands.

The repeat photos show that the landscapes of Namaqualand are today entering a period quite unlike anything which has preceded it. De-agrarianization is taking place within a new political order that is having a marked impact on land-use, vegetation change and the region’s social economy. The colonial ecological revolution is rapidly giving way to a period in which commercial agriculture, especially cereal cultivation (and to a lesser extent livestock), has rapidly declined due to national and global economic conditions, improved transport networks and the cessation of agricultural subsidies. Concurrently, conservation initiatives, many of them associated with the promotion of tourism, have gained momentum and large areas of agricultural land have been acquired as parks and conservancies. At the same time, a significant proportion of privately-owned, commercial sheep farms has been acquired by the state and redistributed as grazing commonage with the purpose of alleviating the crowded conditions in Namaqualand’s communal areas (May and Lahiff, 2007). Conservation policies are integral to these land reform initiatives, although the results in terms of grazing impacts are mixed (Lebert and Rohde, 2007). It is likely, however, that land reform will eventually have a significant part to play in eradicating the dual ecologies created by apartheid (Wisborg and Rohde, 2005).

The relationship between colonial society’s mode of production and its ecology was essentially extractive and concentrated within the agricultural and mining sectors, both of which have been decreasing as a source of employment and in terms of relative contributions to the Namaqualand’s gross domestic product (UNCTAD, 1998). In response, regional and national intitiatives to promote tourism feature prominently in the forward planning of Namaqualand’s economy. The area is famous for “the annual blossoming of the Namaqualand wild flowers in the Karoo Succulent Biome which transforms this semi-desert into a fairyland” (see http://www.namaquanp.com/nnp02_001.htm) but these spectacular events are confined to only a few weeks of the year. The promotion of tourism in the ‘off-season’ increasingly focusses on the unique features of Namaqualand’s history, ecology, landscape and remote wilderness experience, including mine museums and mine tours, 4 X 4 routes, mountain bike and hiking trails, community camp and rest-house facilities and several nature reserves. Society’s relationship to ecology in the post-agrarian ecological revolution is typified by the activities of
tourism, which are less directly extractive and more concerned with the commodification of ‘nature’ itself. It is true that tourism remains a minor component of Namaqualand’s economy but it is the fastest growing sector and the area attracting the most investment. The rapid demographic shift of the population to urban areas is highly significant, and while many urban migrants retain a foothold in the rural areas, the main sources of income for the population are gradually moving from agriculture and mining to service industries such as catering, accommodation and tourism in the major urban centres (UNCTAD, 1998). Taken as a whole, the demographic, socio-economic and land-use changes that signal the onset of the post-agrarian ecological revolution are becoming evident in the landscapes and ecosystems of Namaqualand as they begin to recover from two centuries of intensive colonial exploitation.

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References


