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The late Holocene human ecology of the Namib Desert

The Namib Desert environment is for the most part so dry that it supports little permanent vegetation, other than sparse thornscrub and scattered trees lining dry river courses. Artesian springs are found at widely separated intervals, and are usually brackish, while runoff from occasional rainfall lies briefly in open rocky pools, or disappears beneath the sand of ephemeral rivers. Sometimes this water is accessible in shallow, hand-dug wells known colloquially as *gorra*, the most basic essential of life in the Namib before the arrival, in colonial times, of the borehole and wind-pump. In these conditions, it is relatively easy to predict the location of Holocene archaeological sites, especially those dating to within the last 5000 years, during which human responses to the aridity of the Namib developed certain distinctive features.

Early archaeological investigations located many sites, including important concentrations of rock art and extensive surface accumulations of stone artefacts (Fock 1959; Mason 1954). These observations defined in broad terms a Later Stone Age cultural sequence consistent with that of the southern African region, characterised by highly developed microlithic assemblages which persisted until the colonial era among the last surviving hunter-gatherer communities (Mitchell 2002). It is only with more detailed recent research that the Namib has begun to shed new light on the regional sequence and the nature of human adaptation to the desert environment. Microlithic assemblages from rock-shelter excavations in the Namib are mainly related to lightweight hunting equipment such as the bow and composite arrow, with some evidence of leatherwork and other crafts (Richter 1984; Wendt 1972). Evidence of food remains indicates a primary dependence on animals such as hares, small antelope and tortoise, as well as seasonally available plant foods

including various corms, tubers and melons, which in some areas formed the main staple (Wadley 1979, 1984). Hunter-gatherer subsistence in the Namib was essentially centripetal to reliable water sources and so, too, was the land-use pattern of the nomadic pastoral economy that rose to dominate the desert and its fringes during the last two millennia.

Responses to increasing aridity

Although the Namib has been explored archaeologically over most of its extent, the main focus of research has been the Brandberg, a large granitic inselberg with a significantly higher concentration of sites than any other part of the desert (Fig. 9.1). Excavations in the Hungorob Ravine, where the most detailed investigations have been carried out on the Brandberg, show that intensive and repeated occupation of the higher elevations only began about 5000 years ago (Kinahan 1984, 2001a). Sedimentological analyses reveal that the beginning of this period coincided with the onset of increasingly arid conditions. For example, the basal deposits in the rock-shelters consisted mainly of hydrolysed granite, derived from the weathering of the rock-shelter walls, indicating moister climatic conditions than exist today, whereas the more recent deposits are predominantly aeolian, as is consistent with the dry conditions that now prevail in this area (Kinahan 1984). Although rock-shelter sites near reliable water were used in the early Holocene (cf. Deacon and Lancaster 1988), later Holocene settlement is clearly tethered to highly localised water sources.

Interestingly, the remains of animals hunted in the Hungorob, and the contents of the rock art at the same sites, have essentially no species in common. Osteological material is particularly well preserved in the dry conditions of the Brandberg rock-shelters. The presence of leather objects, as well as human hair and plant material in the basal deposits, indicates that the representation of faunal remains would be relatively complete. In the deposits, the proceeds of hunting very closely reflect the relative abundance of the most common species, rock dassie (*Procavia capensis*), klipspringer (*Oreotragus oreotragus*), and Jameson's red rock rabbit (*Pronolagus randensis*). Bone fragments from larger species that do not occur in the higher parts of



Figure 9.1
Falls rock-shelter, upper Hungorob Ravine,
central Namib Desert
photograph by John Kinahan

the mountain were evidently carried up as useful raw materials for artefacts such as awls and hide scrapers.

The rock art, on the other hand, is mainly devoted to human figures, but it includes a wide variety of animals, with medium and large antelope of the desert plains and dry river valleys clearly predominant among these. Springbok (*Antidorcas marsupialis*), oryx (*Oryx gazelle*), eland (*Taurotragus oryx*), greater kudu (*Tragelaphus strepsiceros*), and red hartebeest (*Alcelaphus buselaphus*) figure prominently, alongside giraffe (*Giraffa camelopardalis*), zebra (*Equus* spp.), elephant (*Loxodonta africana*) and rhinoceros (*Diceros bicornis*). Felines, reptiles and domestic animals are numerically unimportant. Clearly, the rock art is not a compendium of local fauna.

Detailed examination of the Hungorob paintings (Fig. 9.2) (Kinahan 2001a) shows that the same general explanatory approach used in other parts of southern Africa (Lewis-Williams 1982; Lewis-Williams and Dowson 1989) can be applied here. The rock art belongs to a regional cognitive tradition in which the metaphorical potency of certain animals was harnessed for the purposes of ritual healing. By extrapolating from the ethnography of healing among southern African hunter-gatherer communities, it is possible to arrive at a more comprehensive explanation for the remarkable number of rock paintings in the Brandberg and their apparent concentration at particular sites. The ethnographic work of Lee (1979) and Barnard (1992) among Kalahari hunters shows that ritual healing is greatly intensified when resources are strained, as in the Brandberg during the months before the summer rains, or in times of sustained drought.

Such observations suggest that sites in the upper Brandberg, where water and shelter were found in convenient proximity, would have served as aggregation areas for otherwise dispersed groups of hunter-gatherers. The increase of ritual activity during aggregation would have resulted in the accumulation of rock art at these sites. Thus, despite the different array of species in the faunal remains and the rock art, the sites form part of the same human response. If it is assumed that with the onset of summer rains the hunter-gatherers would have dispersed beyond the Brandberg to follow the game across the plains of the Namib, the resources of the mountain would have been left to recover.

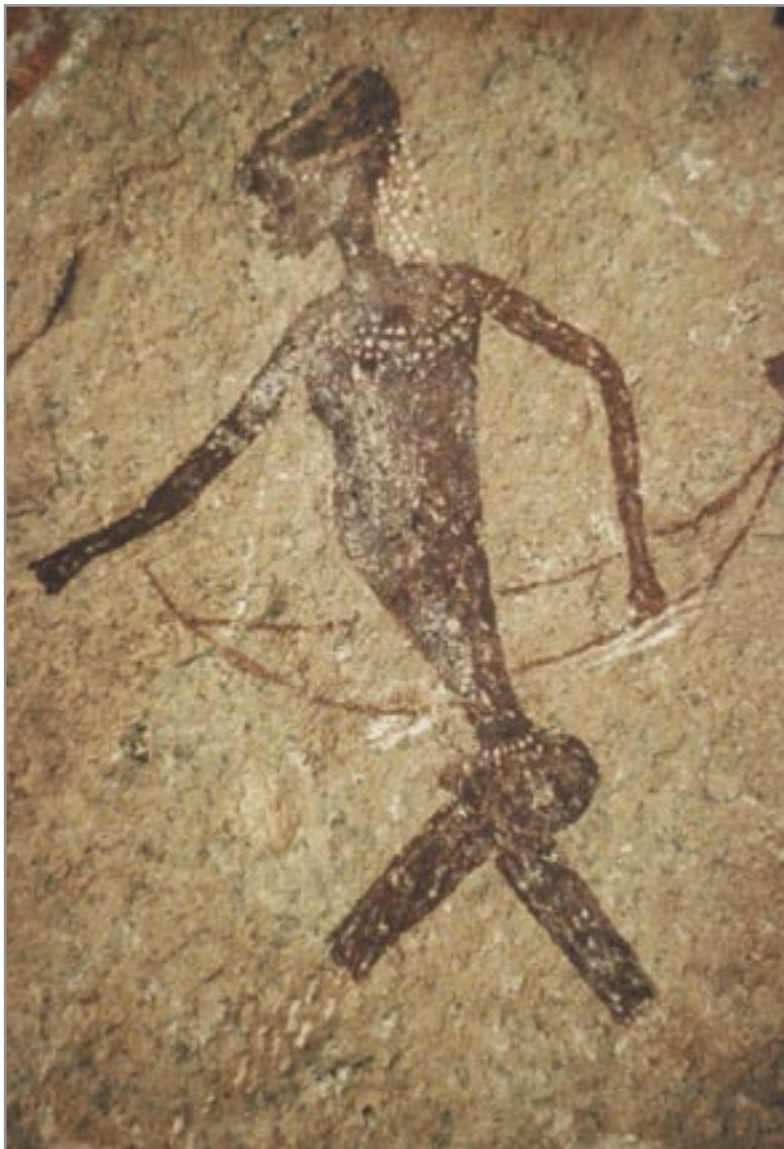


Figure 9.2
Polychrome painting of male figure, possibly a shaman, in the frieze at Snake Rock, Hungorob Ravine, central Namib Desert

These figures are late in the superposition sequence and show men streaked and stippled with perspiration, emphasising their ritual potency.

photograph by John Kinahan

Unrelieved human pressure on the small and widely scattered waterholes and springs that dot the upper Brandberg would have had significant ecological consequences, even for species such as the rock dassie which is remarkably resilient under heavy predation. The other principal mammal prey species, klipspringer and Jameson's red rock rabbit, would also have been affected. If these pressures were combined with heavy utilisation of fuel wood, localised clearing of vegetation and intensive gathering of plant foods, parts of the upper Brandberg environment would have been placed under considerable stress for several months at a time. These periods of stress would be magnified accordingly by a delay in the onset of summer rains. Successive years of intensive human pressure might therefore have served as the chronic precursors of environmental change, albeit confined to localised parts of the mountain.

Because of its rather erratic rainfall pattern, the Namib could not support a regular pattern of hunter-gatherer subsistence. For this reason, it is important to note that sites of aggregation do not delineate a continuous zone of seasonal occupation. Instead, the sites represent key resource locations (cf. Illius and O'Connor 1999) providing reliable water and other requirements within a wider area where such resources are only available on an ephemeral and generally unpredictable basis. The fundamental importance of these ecological constraints is such that late Holocene hunter-gatherer settlement in the Namib Desert is best understood as an equilibrial, or density-dependent, system rather than one of seasonal mobility (cf. Parkington 1981), which implies a form of density independence.

An important, and yet to be explored, implication of the density-dependence model is that a significant component of the vegetation surrounding key resource archaeological sites might be anthropogenic in both species composition and physiognomy. The effects of sustained human disturbance in arid environments are not well known at the appropriate spatial and temporal scales, but it is reasonable to postulate that the sites would have functioned as nodes of disturbance in a complex vegetation mosaic. Vegetation studies in the Namib Desert do not presently address the human element (e.g. Craven and Craven 2000), other than as an agent of degradation (Barnard 1998). There is as yet no clear understanding of the manner in which

disturbance would be propagated from key resource sites, or the historical persistence of this phenomenon.

Pastoral adaptations and ecological consequences

Conventionally, nomadic pastoralism is thought to have been introduced to the Namib by the immigration of an ethnically distinct people, bringing with them a new subsistence technology (Smith 1992). This view accords well with the notion that pastoralism represents an alien land-use system that has generally negative ecological consequences (cf. Mortimore 1998). Available evidence from the Namib suggests that apart from the acquisition of domestic stock from the vanguard of agricultural expansion into the region, pastoralism was probably a local development (Kinahan 1996a).

Pastoralism in the Namib was as much tethered to reliable waterholes as that of earlier hunter-gatherer settlement, but there were important differences. While hunter-gatherers used the most reliable waterholes as periodic dry season aggregation points, the pastoral strategy was the reverse, with isolated encampments of dispersed domestic groups and their herds. Moreover, whereas hunter-gatherer groups evidently dispersed over the Namib after summer rain, pastoralists exploited the ephemeral summer pastures from large aggregation camps situated near strategic but often rather weak springs. In contrast to the dry season sites that pastoral households occupied year after year, the pastoral aggregation sites were subject to the vagaries of the rain and its rather patchy distribution over the desert.

The introduction of pottery and domestic sheep in the first millennium AD represents the start of a fundamental change to pastoralism in the subsistence economy of the Namib. The prolific rock art of the region shows that this shift was associated with important social changes. Of these, the most significant was the rise of specialist shamans, depicted in the final episode of the rock art, as part of a complex florescence of polychrome paintings, including male figures engaged in ritual activity. Evidently, the shamans formed the nucleus of the nascent pastoral economy (Kinahan 2001a), although there is also evidence from the rock art sites for a continued existence of shamanic rainmaking as late as the seventeenth century (Kinahan 1999).

Evidence for a local development of pastoralism includes a high degree of continuity in stone artefact assemblages predating and postdating the adoption of pastoralism (Kinahan 1984; corroborated by Albrecht et al. 2001, and Richter 1984). There is also a demonstrable seriation of ceramic styles showing that the most recent precolonial forms of pastoralist pottery are derived from the earliest examples of introduced ware (Kinahan 2001). The early pottery and a range of other items such as marine shell attest to the existence of exchange networks in the Namib and the adjacent interior. It is likely that the pottery was introduced and rapidly disseminated through such networks, as is suggested by evidence from other parts of Namibia (Kinahan 1986).

The source of pastoralist pottery in the Namib is not clear, but there is a strong possibility that it does not have the same origin as the livestock. Indeed, the rapid local evolution of pottery style supports this view, as does the fact that the pottery is associated with the exploitation of wild plant foods rather than the processing of livestock products. One of the main uses of pottery was the preparation of meal and possibly beer from grass seed, gathered from the underground caches of harvester ants (*Messor tropicorum*) in the Namib interior. At the coast, pottery was used in the processing of melons from the !nara (*Acanthosicyos horrida*). The dried flesh of the melon and its large oily seeds may be stored for extended periods and thus provided a degree of food security in the dry months of the year. The association of pottery with the intensified exploitation of plants endemic to the Namib rather than with the technology of herding strongly supports the argument for a local development of the pastoral economy. It certainly casts doubt on the notion of a functional link between pottery and livestock as the archaeological signature of pastoralists migrating into the Namib from elsewhere (cf. Smith 1992).

Some effects of pastoralism are visible in the vegetation of the Brandberg half a century after the mountain was abandoned. One of these is the occurrence of the weed *Tribulus terrestris* in the upper Brandberg, where it is largely confined to the sites of dry season homestead and grazing areas. The plant is unpalatable to livestock, and elsewhere in Namibia it is a common pioneer of livestock enclosures that have been denuded of grass. Its thorny seeds are widely distributed in the hair and hooves of small stock and it is probably by this mechanism that the plant was established on the mountain. Although

sandgrouse, (*Pterocles* spp.) and rock pigeon (*Columba guinea*) eat the green seeds of *Tribulus terrestris* and may have helped in its dispersal, only livestock could have produced the particular distribution that is visible today.

Another vegetation feature that is probably of anthropogenic origin is the tobacco plant (*Nicotiana africana*). It is remarkable that while smoking pipes are commonly found on Namib pastoral settlements dating to within the last three centuries, there is apparently no earlier evidence of smoking. Equally interesting is the fact that although the plant is relatively uncommon, it is almost always found in the near vicinity of old pastoral settlements. This raises the possibility that the plant is not indigenous, as argued by Merxmuller and Büttler (1975). It is probably an early cultivar of the domestic American species, introduced overland via Angola (see Ozanne 1969), and maintained as a small crop. Evidently, the plant failed to establish itself as successfully in the wild as its close relative, *Nicotiana glauca*, which is now classed as an invasive alien plant (Barnard 1998:170).

On the summer pastures, livestock impact was evidently limited by the scarcity of water, not grazing: the animals can only reach pastures that are within range of water. Dry season pastoralism, on the other hand, is 'pasture limited' because the water will outlast the available pasture. This meant that for part of their annual grazing cycle, the herds would have existed in a density-independent relationship to the available pasture (that is, below apparent carrying capacity). The scarcity of water-points is such that the vast extent of grazing on the Namib plains was far beyond the reach of domestic stock, and their effect on these pastures was therefore negligible. This contrast between the dry season grazing regime, controlled by density-dependent relations, and the summer pastures where grazing pressure was limited by water, indicates a dual strategy, closely mimicking the dynamics of the desert environment (see Illius and O'Connor 1999). As key resource areas, the dry season pastures were vulnerable to degradation but awareness of the risks attached to overstocking probably ensured the use of conservative grazing strategies.

A good example of pastoral strategy in the Namib is the widespread use of stockposts. The archaeological evidence shows that aggregation sites, where ten or more households may have lived for several months after the summer rains, seldom have large stock enclosures. It seems that most

livestock were kept at scattered stockposts several kilometres away from the encampment. This means that large aggregation sites often contain little evidence of pastoralism in the form of livestock bone. Fortunately, however, the formal layout of the sites, often consisting of complex stone features, provides more reliable diagnostic evidence of pastoral community organisation (Kinahan 1996b, 2001a).

Historical documents relating to early contact between Namib pastoralists and Europeans corroborate these observations, indicating that ships were made to wait several days until livestock could be brought to the coast from stockposts in the desert interior (Kinahan 2001a). An example of one such stockpost, dating to the early eighteenth century, has been documented, with trade goods and the spoor of livestock well-preserved in hardened mud (Kinahan et al. 1991). Links between coastal trading sites and stockposts more than 100 kilometres inland are suggested by the distribution of particular style combinations in pastoral pottery (Kinahan 2001a), and by the distribution of trade goods acquired in the barter of livestock at the coast (Jill Kinahan 2000).

The combined impacts of colonial expansion and the *Rinderpest* epidemic (Schneider 1994) left few remnants of nomadic pastoralism in Namibia, and all that remains today are the OvaHimba communities in the dry north-western parts of the country. The OvaHimba are mixed pastoralists, relying mainly on cattle which are moved between permanent dry season homesteads (*ozonganda*) and temporary *ozohambo* on distant pastures used during the rainy season. In this respect, the OvaHimba practise a similar dual strategy to that observed in the Namib. OvaHimba *ozonganda* exhibit marked patch degradation after several decades of occupation, and although these scars do recover, they retain diagnostic traces of vegetation disturbance (Kinahan 2001b), as predicted in the Namib. In contrast, *ozohambo* sites show little sign of such impacts.

A key feature of OvaHimba pastoralism is the practice of livestock exchange as a risk-management strategy (Bollig 1997). Intersecting networks of exchange partners, based on matriclan affinities, effectively spread livestock holdings over large distances. Such exchanges are not limited to livestock, since they provide a framework of relationships for the movement of food, clothing and other items such as crafts. The wider distribution of material culture

among the OvaHimba is rather suggestive of the archaeological evidence such as pottery and trade beads in the Namib, thus illustrating the pervasive ecological dimension of the material record.

Conclusions

The archaeology of late Holocene hunter-gatherer and pastoralist settlement in the Namib is known from a large number of sites and numerous detailed surveys. The results of these investigations have clear implications for related studies in other parts of southern Africa, and perhaps elsewhere. Conventional models for the introduction of pastoralism by a process of migration and ethnic succession are not supported by the data from the Namib, where the evidence is of long-term continuity and local development in response to the arrival of ceramics and livestock. This evidence does not exclude migration, which is a well-developed trait in all pastoral societies, and there is no need to consider the migration and local development hypotheses as mutually exclusive. However, the difficulty with the migration hypothesis is that it lacks observable consequences in the late Holocene of the Namib Desert, and therefore is not adequately tested against the archaeological record. The local development hypothesis, on the other hand, agrees with the archaeological data and current anthropological theory (Kinahan 1995).

One advantage of the extensive field survey approach adopted in the Namib is that it allows even small, otherwise insignificant finds to be incorporated within a general model of settlement and land use. This means that minor occurrences, such as pottery associated with melon patches or grass seed caches, contribute meaningful evidence to a site distribution pattern that conforms to the ecological characteristics of the Namib. In contrast, the conventional focus on single sites (for example Smith and Jacobson 1995; Albrecht et al. 2001) does not accommodate the broader range of subsistence-related activities and fails in these examples to provide an adequate basis for the modelling of ecological strategies. Moreover, single site studies are highly vulnerable to dating anomalies arising from insecure associations (Kinahan 1996a).

The reconstruction of both hunter-gatherer and nomadic pastoralist land-use strategies in the Namib draws the focus of archaeological investigation

to wider issues than that of sequence and dating, and cultural historical questions of migration and ethnic identity. The archaeological record in the Namib provides a unique time-series record of human responses to a highly unpredictable environment. This record shows that the human ecological response cannot be described in terms of the conventional seasonality models that are generally applied to hunter-gatherer and pastoralist systems throughout the southern African sub-continent. Instead, there is clear evidence that human ecological responses were subject to a combination of density-dependent and density-independent dynamics. A better understanding of these relationships could lead to important new insights into long-term consequences of ecological disturbance in arid environments.