Spotlight on a global biodiversity hotspot – Namibia's Sperrgebiet

Antje Burke
EnviroScience
PO Box 1722
Oranjemund, Namibia
antje.burke@enviro-science.info

After many years of botanical exploring in the enigmatic Diamond Area – the "Sperrgebiet" on the west coast of the southern African continent – Antje Burke gives an account of this hotspots natural riches and plans for the future.

Diamonds, succulents that come in all forms, sizes, shapes and colours, grandiose landscapes and deserted ghost towns come to mind when I think of the "Sperrgebiet". Locked up for nearly a century to public access, the Sperrgebiet is today one of Namibia's last wilderness areas and a natural asset which is appreciated by only few.

Diamonds have been the areas blessing and curse. Discovered nearly one hundred years ago, at the time the area was quickly pegged by mining companies and all public access restricted to this vast stretch of desert, some 100 by 250 km in extent. Although mining concentrates on deposits along the coast and on ancient terraces along the Orange River, Namibia's southern border, a vast buffer zone to protect the industry from diamond smugglers has remained in place for nearly a century. Even today, diamond smuggling is a threat and is costing diamond companies millions of dollars every year. Mining has no doubt left some irrecoverable scars, largely along the southern coast, but is otherwise confined to localised areas. Yet, without the diamond riches and the associated security restrictions, this wilderness area would not exist in its present form. Livestock farming would have altered this diverse succulent shrubland as elsewhere in the Succulent Karoo Biome and its succulent riches may have been plundered by unscrupulous collectors.

Not equalled by comparable areas elsewhere, southern Africa's Succulent Karoo Biome is one of the world's top 25 biodiversity hotspots – and the only one in an arid region. Remarkable plant diversity and a very high level of endemism – plants and animals restricted to this area – have contributed to the biome's world class conservation value. Much attention has been paid to this area recently and conservation planning studies are underway to ensure that part of its magnificent natural riches are preserved for future generations. Biome-wide, the "Succulent Karoo Ecosystem Plan", an initiative supported by the Critical Ecosystem Partnership Fund, Conservation International and with tremendous local support, has developed a long-term strategy for conservation and sustainable land use in the entire Succulent Karoo Biome. Spanning across over 2000 km on the south-western part of the African continent, geographic priority areas within the Succulent Karoo had to be assigned. For many reasons, the Sperrgebiet, the very northern tip of the Succulent Karoo Biome, is one such priority area.

Near natural conditions, vistas unimpeded by settlements, roads and power lines and scenic landscapes may already have been enough to make the Sperrgebiet a prime candidate for a wilderness and conservation area. Add to this the tremendous diversity of arid-adapted plant and animal life and it becomes a biodiversity hotspot of global importance.

Scientists still puzzle over the reasons for the tremendous diversity in the Succulent Karoo Biome. In geological time frames a rather recent phenomenon, fluctuating climatic conditions during the ice ages and a great diversity of habitats and soil conditions on a local scale – sometimes within the space of tens of centimetres – are believed to have fostered the development of many new species within the main group of succulents, the midday flowers (Mesembryanthemaceae). With well over 1600 species recognised today, these are comparable in diversity to the cactus family (Cactaceae) in the New World. Coupled with a shift to a drier climate in southern Africa some ten to five million years ago, morphological features that helped to withstand water stress developed rapidly in some species and many found different solutions to common environmental problems. One of these solutions is wide-band tracheids – water pipes of plants – which are more robust than more primitive tracheids and manage to keep the plants upright, even when they are under drought stress and the water pressure in their cells is low. Another solution is the reduction in leaf surface area, a very obvious adaptation to reduce water loss. Small, perfectly round or cylindrical leaves are therefore favoured by many species. Their mode of seed dispersal is also very sophisticated – a mastermind of nature to perfectly time seed release. The more advanced midday flowers are in evolution, the more intricate are their seed capsules. Midday flowers have in common that they retain their seeds on the plant and do not disperse them immediately once they are ripe. The more primitive ones have capsules that disintegrate within a year or so, capsules of more advanced species have many compartments with several layers of covering and hinging structures to aid seed dispersal. Within a capsule there are expanding keels, covering membranes, closing bodies and valves – the terminology alone indicates the sophisticated mechanism. All these respond to changes in humidity and the mechanical impact of raindrops in different ways. As a result air, humidity and the force of raindrops have to be exactly right to induce the plant to release its seeds. Furthermore, not even trusting this sophisticated mechanism, only a few seeds are dispersed at one time. The remainder is kept for the next season, just in case the conditions were

still not entirely right to ensure successful germination and survival, or too many hungry animals are around that may relish the tender, juicy new plants.

Almost all midday flowers occur in southern Africa, with the exception of few genera such as sour figs (*Carpobrotus*) and ice plants (*Mesembryanthemum*) which have also made it to the Mediterranean and the west coasts of Australia, North America and South America. Since many are popular garden plants in drier areas, some sour fig species (for example the South African *Carpobrotus edulis*), have now also spread from their initial homes in gardens – for example in California.

Plant diversity in the Sperrgebiet is not only restricted to midday flowers or mesembs, as the Mesembryanthemaceae are called locally, but there are also other interesting groups of desert plants. Our current tally is some 1050 species of flowering plants and ferns, which is nearly a quarter of the plant diversity of the entire country, yet on only three percent of Namibia's land surface. A good 17 percent of these plants are restricted to Namibia, many to the Sperrgebiet only. This is a good reflection of Succulent Karoo plant diversity and level of endemism, but certainly unrivalled anywhere else in Namibia. Besides the mesembs, other diverse groups of plants are daisies (Asteraceae), lilies (Liliaceae in the broader sense), grasses (Poaceae) and the foxglove family (Scrophulariaceae). While there is nothing unusual about the prevalence of these families, as their diversity mirrors that of their contribution to the world's flora, worth mentioning is the diversity of three other largely succulent families. milkweeds (Euphorbiaceae), stonecrops (Crassulaceae) and bean capers (Zygophyllaceae).

The Sperrgebiet's position in a transitional area between winter and summer rainfall has likely contributed to this diversity. Here typical winter and summer rain adapted plants are present and add different species to the pool. Despite a remarkable plant cover in some areas, rainfall (expressed as long-term annual average) only ranges from about 20 mm at the coast to 60 mm near the eastern boundary. Although little on average, rains can fall almost any time of the year. Unlike desert areas to the north and east, rains are thus more evenly spread over the year and more likely to happen at least once a year. Added to this is the influence of fog linked to the cold Benguela Current offshore, which brings life-sustaining moisture to almost the entire area, except the very north-east corner. In terms of moisture supply, conditions in the Sperrgebiet are therefore more benign than in other parts of the Namib Desert. Whereas this may provide more acceptable conditions to plants and animals regarding water supply, another climatic factor may quite heavily counteract these mellow conditions. Strong, almost continuous, southerly winds have to be endured along the coastal areas, and their effect can be felt far inland. Hot, dusty easterly bergwinds, often racing down the escarpment in powerful busts, prevail in winter. Wind is almost always and everywhere present.

Plants and animals had to adapt to these desiccating conditions and have evolved numerous innovative means to escape the onslaught of the wind. Some succulents remain entirely underground and only their leaf tips emerge at the surface to catch some sunlight, keeping their metabolism going. Others catch sand grains with a sticky substance on their leaf and stem surfaces. This provides an effective shield against damage from sand storms and the partially sealed surface reduces water loss through transpiration. Larger animals such as antelopes (e.g. springbok and gemsbok) which are plentiful in this area, have extensive home ranges and simply migrate to where the environmental conditions are favourable, and food and water are found. Smaller animals such as desert snails (*Trigonephrus* sp.) and the quaint desert rain frog (*Breviceps macrops*) emerge from their hide-out underground only for a short time in winter when it is moist, cool and the winds are calmer than usual.

People eager to obtain the precious, sparkling stones, which in the early days were found on the surface in the most wind-swept valleys, did not fare much better. A host of now abandoned ghost towns along the coast bear witness to the harsh conditions people had to endure. Colonial mining in the early twentieth century left a legacy of these activities in the form of gradually disintegrating narrow-gauge railway lines, mining ghost towns. implements and scoured valleys with heaps of sorted gravel which, bar of the impact of wind, have been preserved almost unchanged in this arid climate.

And today? Diamond mining is continuing in some areas, but as resources on land are being depleted, mining activities are gradually moving offshore. In the meantime plans are on the table to proclaim the Sperrgebiet as a national park and with this close the gap in what would become one of Africa's largest continuous conservation areas, and one that would span across three countries. It will link the Namibia-South African Ai-Ais-Richtersveld Transfrontier Conservation Area in the south with Namibia's protected area network to the north and will stretch into Angola, where there is another transfrontier park in the making. This would place almost the entire Namib Desert under some form of protection.

The impending proclamation of the Sperrgebiet as a national park opens up a variety of options regarding future land use. The long-term vision is to gradually open up the area to let people appreciate the natural beauty of this national asset. Yet at present there are many obstacles to such developments. Not only the Diamond Act hinders all public access, but there are also well-justified fears about environmental impacts associated with tourism in such a fragile wilderness area and threats to some of the rarest of the succulents, imposed by illegal collectors. All planned activities are thus calling for carefully and well developed plans with adequate resources for implementation to utilise this piece of desert in a manner that does not degrade its long-term natural value. Once lost, through rash and imprudent decisions that would allow

activities that are not sustainable in the long-term, this enigmatic wilderness area would be gone forever.

On a more positive note, over the past few years several planning initiatives have been completed, with support of international donors such as DANIDA and Conservation International's Global Conservation Fund. Although not all intricate planning and administrative issues have yet been resolved, thoughts from a wide range of stakeholders, scientists and conservation planners have been amalgamated in the current plans for conservation and the development of a multi-use protected area that receives support from the people in Namibia as well as abroad. If these are implemented, Namibia may be in a position to demonstrate to the world that conservation and mining do not always need to be at loggerheads.

Photos are by the author.

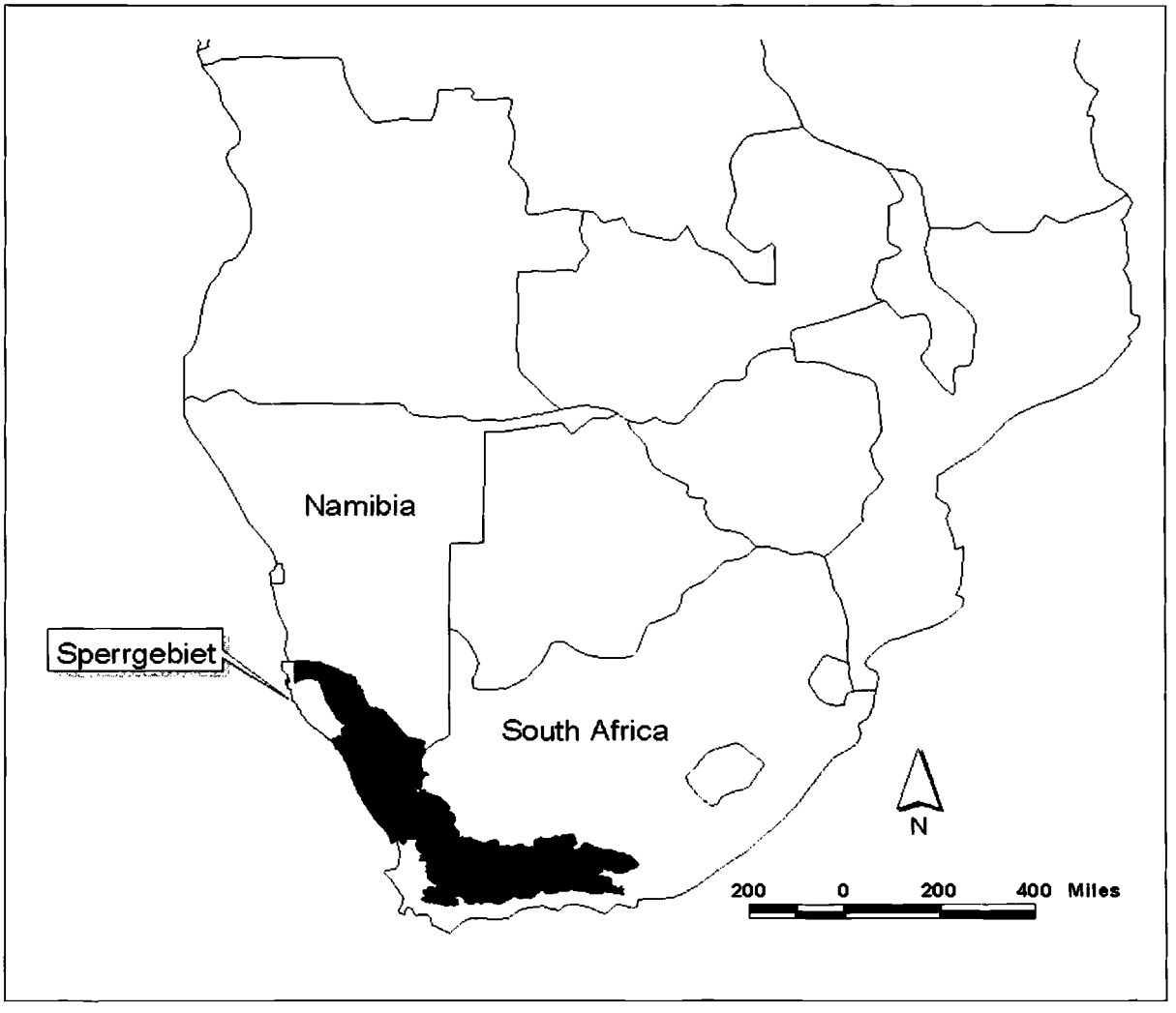

Figure 1. Position of the Sperrgebiet (gray) in the Succulent Karoo Biome planning domain (black).

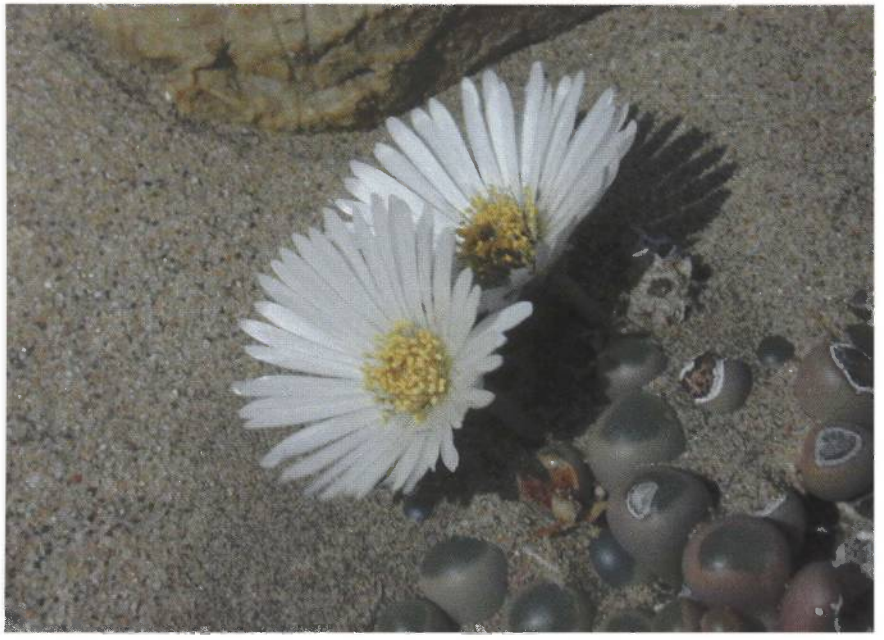

Figure 2 and 3. Upper and lower left. The window plant, *Fenestraria rhopalophylla*, hides underground. Only the tip of the leaves appear and almost resemble pebbles. No wonder this Sperrgebiet endemic is easily overlooked when not in bloom.

Figure 4. Upper right. A typical mesemb capsule, such as the one of *Cheiridopsis ebracteata*, is very woody and tightly locks the precious seeds inside until conditions are right for germination.

Figure 5. Upper left. A perfect rock garden presents itself in the Obib valley , one of the plant diversity hotspots within the Sperrgebiet, here *Cheiridopsis robusta* flowering profusely. (A.& J. Burke)

Figure 6. Lower left. Witness of long-gone hopes and sufferings, graves at the mining ghost town Pomona bask in the last few rays of sun for the day.

Figure 7. Above. Largely unspoilt beaches characterise the northern coastal section, such as to be the south of Bogenfels.