Sentinels of ocean health:

monitoring marine predators in the Namibian Islands' Marine Protected Area

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Adays in the small harbour town Safely out of the reach of land predators of Lüderitz in southern Namibia will such as brown hyenas and jackals, they tell you that the wind blows there like provide safe breeding habitats and nowhere else. In fact, the prevailing roosting grounds for a number of seabird southerly winds there are so strong, that species, many of which are considered Lüderitz holds the distinction of being in threatened or endangered. An array of the centre of the strongest area (or cell) bays also offers breeding habitat for of "upwelling" on our planet. Upwelling marine mammals such as Heaviside's is the process during which the strong dolphins and southern right whales. wind, together with the Benguela Current, moves cold, nutrient-rich water unique and delicate ecosystem is from the deep ocean to the surface. This being threatened in a number of ways,

life, from tiny plankton to

number of species that are endemic to Namibian marine food web, the sardine. the Benguela region, i.e. species that are found nowhere else in the world.

rocky shores, reefs and kelp beds, the

nybody who has spent a few a number of islands, islets and rocks.

"nutrient pump" provides mainly through the effects of human the basis for a highly activities. Threats include habitat loss and modification, oil pollution and, marine ecosystem that following overexploitation in the 1960s and 1970s, a lack of the favourite and highly nutritious food of many marine

In an attempt to halt the ecosystem's degradation, the Namibian Islands' Marine Protected Area (NIMPA), covering about 1 million ha

of coastal waters along a 400 km stretch ecosystem, and to assess whether the are concerns that these techniques of coast. One of the NIMPA's three main objectives is to protect the breeding sites and key foraging areas of a number of threatened species, and it is therefore no surprise that the design to determine the shape and size of the NIMPA was largely based on research done in Namibia on the foraging ecology of globally endangered African penguins and bank cormorants, as well as locally critically endangered Cape gannets. The Ministry of Fisheries and Marine Resources (MFMR) is responsible for managing the NIMPA and for implementing relevant monitoring programmes to track the population trends of these and other flagship species, to investigate the effects of environmental change and

other conservation actions are actually expensive task.

have played a key role in the country's and underwater noise. economy since the discovery of the first the seashore. However, as land deposits marine sediments are developed, marine

implementation of the NIMPA and could negatively affect marine habitats (including species of commercial and/or successful in halting the observed conservation importance), for example degradation. An arduous and sometimes from increased water turbidity, sediment movement, displacement of forage prey Enter the diamond industry. Diamonds species, entanglement in anchor spreads

The Namibian Diamond Corporation diamond near Lüderitz in 1908. Until (Namdeb) operates in nine mining about ten years ago, the vast majority of license areas that border and/or overlap diamonds were mined on land and on with the NIMPA. In order to contribute to and extend the monitoring efforts of diamonds are being exhausted, and as undertaken by MFMR to areas that new techniques to extract diamonds from might be affected by present and future diamond extraction activities south of diamond production is increasing, Lüderitz, Namdeb has agreed to fund a and it is expected that in future up to two-year project to collect baseline data 95% of diamonds from Namibia will on several flagship species in the NIMPA disturbance on the health of the marine originate from the ocean floor. There and to subsequently monitor the effect of these new mining technologies on these, in order to plan and implement mitigation measures if necessary. Logistic support for the project is provided by MFMR and the funds made available by Namdeb are administered by the Namibia Nature Foundation (NNF).

The project kicked off earlier this year and consists of three elements. It focuses on four species that were selected because of their conservation status, their ecology and distribution which make them useful indicators for monitoring any direct or indirect impacts that could be posed by diamond mining activities. The first element forms part of a longterm study that was initiated in 2005. It looks at the foraging ecology of African penguins at Halifax and Possession islands. It involves deploying small









GPS data loggers on breeding African dives to find food. This information in the project therefore investigates the penguins that are retrieved after one turn provides important insights on foraging trip, i.e. after about two days. The data logger regularly records the position of the foraging penguin, as well as how often and how deep the penguin themselves and their chicks, and how tabs on the secret lives of Namibia's

key foraging areas and habitats used by using camera traps and time-lapse breeding penguins, indicates how hard the birds have to work to find food for and potentially a fantastic tool to keep

mining activities could affect these areas and foraging efficiency.

During March this year, an intensive and successful three-week field season at Halifax Island produced reams of valuable data. Preliminary analysis suggests that the Halifax Island penguins had to work harder during the late summer of 2016 than in most other years where foraging ecology had been monitored at this island, with penguins travelling an average of 52 km in search of food before returning to the island to feed the chick(s), roughly 10 km further than in most previous years.

Monitoring the breeding success of African penguins, Cape gannets and bank cormorants has been tricky at islands that are remote and therefore seldom monitored or at breeding sites where the birds are particularly prone to disturbance. The second element of viability of monitoring breeding success photography, a non-invasive technique

seabirds. The biggest challenge here is to find a setup that can cope with sticky, corrosive sea spray, abrasive sandstorms (and sometimes flying gravel), and large amounts of dust-like guano, a mixture of sand and bird excrement, that gets into the most dust-proof camera housing and excels at coating camera lenses. Should this technique prove to be successful, camera traps will be deployed at a larger scale at key breeding sites.

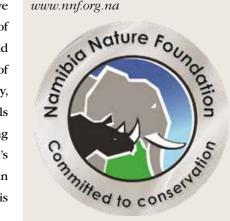
Southern right whales, long absent from Namibia's coast after being extensively hunted, are slowly making a comeback, and calves have been recorded since the mid-1990s southern Namibia. Aerial surveys of these charismatic whales have been conducted since 1999; the third element of this project is a continuation of that programme and will help to record the numbers of southern right whales (including the number of calves born) in southern Namibia. It will also allow the of ocean health" will assist in halting mapping of coastal habitat use by the ecosystem degradation along Namibia's whales and to identify key calving areas. Just like fingerprints, the number and arrangement of callosities (prominent unique marine environment.

calcified skin patches) on the head of a right whale form a unique pattern, which allows the identification of individual whales that can then be monitored over time. This element of the project is also not without its challenges as it depends on the availability of a suitable plane, complete with a window that can be opened to take usable photos of individual whales. Moreover, clear and calm weather conditions are a must something that is not that common in the world's strongest upwelling cell.

This partnership between Namdeb, the African Penguin Conservation Project, Namibia Nature Foundation and the Ministry of Fisheries and Marine Resources contributes to the effective monitoring and conservation effort of the NIMPA's fragile biodiversity and habitats, and in particular to that of threatened marine predators. Hopefully, what will be learned from our "sentinels coast so that future generations can enjoy (and sustainably profit from) this

The Namibia Nature Foundation (NNF) is one of the largest nongovernmental organisations (NGO) targeting conservation and sustainable development in Namibia. The primary aims of the NNF are to promote sustainable development, the conservation of biological diversity and natural ecosystems, and the wise and ethical use of natural resources for the benefit of all Namibians, both present and future. We work closely with the African Penguin Project in supporting Penguin and Sea-bird conservation.

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