

facing climate challenges

A new project to help Boulders' penguins cope with extreme climatic events



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When considering climate change, we typically think of the temperature increase as being a gradual occurrence. But while it may seem slow at present (there has been an average increase of 1.2 °C across South Africa since the 1960s), the change is being accompanied by more frequent and noticeable escalations in extreme events: heatwaves, floods, wildfires, droughts, storms, wave surges and high winds. The increasing frequency and severity of extreme climatic events have already had immediate and dramatic impacts on both humans and biodiversity and it is essential to prepare now for such disasters.

The monitoring of African Penguins has revealed alarming and ongoing declines in penguin numbers in almost all colonies. Today there are only 13 000 breeding pairs left of the one million-plus pairs that were present along the South African coast in the 1920s. A major driver of these declines has been the plummeting numbers of sardines and anchovies, the penguin's main prey species, in turn

An African Penguin and its chicks in an exposed nest pant to cool down on a hot day.

worsened by factors such as overfishing and climate change-driven variations in ocean temperatures and currents. Penguins now need to swim further to find a meal and less food is available to them during their critical breeding period. As a result, fewer chicks survive and those that do fledge are in poorer condition.

The impacts of extreme climatic events on penguins are more direct. High air temperatures cause physiological stress and although the cool ocean provides respite, penguins need to remain on land while they are moulting and nesting. Before the 1900s, penguins nested in well-insulated guano burrows, but overharvesting of that resource has forced the birds to nest in less effective vegetation, sand or in the open. Beyond a heat threshold, nesting adults are compelled to abandon their nests to enter the water to cool off. Unattended eggs and chicks quickly fall prey to predators such as gulls or suffer from heat exposure. Increasing storm surges and unseasonal cold snaps pose additional problems as nests flood and eggs and chicks succumb to the cold.

A new project, led by SANCCOB and SANParks, is preparing a disaster response plan to cope with the impacts of extreme climatic events on African Penguins at Boulders Beach, Cape Town. This has been made possible thanks to funding from WWF's Wildlife Adaptation Innovation Fund.

A key component of the project is ongoing monitoring of nests, so abandonment can be detected as early as possible and thus trigger an emergency rescue of eggs and chicks. These eggs and chicks are transported to SANCCOB's facilities, hand-reared and released back into the wild in due course. An on-site weather station will be installed to monitor real-time ambient weather conditions associated with such events, and ultimately

regional weather forecasts will be used to prepare for them in advance.

Temperature and humidity will be monitored at a range of nest sites (burrows, artificial nest boxes, under natural vegetation and in the open). Comparing these results with weather station data will provide insight into the insulation and protection offered by the various types of nests against different extreme events. This will inform nest rehabilitation and the types of artificial nests supplied for the birds.

The project is one of the first such climate change adaptation initiatives globally. Its first year (2021) will see the project's set-up and pilot, with subsequent years expanding the scope, quantity and quality of data and providing guidance for management at Boulders and other penguin colonies and for other shore-breeding birds. While lower fish stocks remain a challenge, reducing the impact of extreme climatic events will help pave the way for the penguin's recovery.

WENDY FODEN, NICOLA VAN WILGEN AND KATTA LUDYNIA

You can help...

We're installing probe sensors at nests to track temperature and humidity conditions and thereby provide the emergency trigger for the disaster-risk response strategy. These sensors also inform the buffering performance of different nest sites and types. To avoid disturbing the birds, we've chosen sensors that can transmit data remotely, but because they're expensive (R3600 each) we have far fewer than we need. If you'd like to sponsor a probe, please contact project leaders Katta Ludynia (katta@sanccob.co.za) or Nicola van Wilgen (nicola.vanWilgen@sanparks.org).

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Mite infestation in birds

Knemidokoptes mites are little-known parasites of bird skin, usually found on the legs or face. As they burrow through the skin, feeding on skin cells and feather bases, they cause symptoms ranging from skin lesions and pox-like growths to bill abnormalities and feather loss. Relatively little is known about these mites and the birds they target. They are known to infect a wide range of cage birds, but among wild birds they appear to be rather host-specific. They mainly seem to attack passerines, with more than 20 species reported to be affected.

In southern Africa, *Knemidokoptes* mites are particularly common on the legs of Cape Wagtails, where infestation typically manifests as pox-like lesions. The earliest records of these abnormalities in Cape Wagtails date back to before the 1950s. Severe infestations can result in the loss of toes or even entire legs. Evidence that this might affect the wagtails' survival comes from the infestation rate on Dassen Island (42 per cent) being more than twice that on the adjacent mainland (Goulding et al. 2012. *Ostrich* 83: 85–89), which suggests that infected birds are more likely to survive on the largely predator-free island. A study of migrant warblers on Hispaniola in the West Indies also found that infected birds were in poorer condition and were less likely to return the following year than healthy individuals (Latta 2003. *Auk* 120: 730–743).

The Black Sparrowhawk is one of the few raptor species recorded to be infested by *Knemidokoptes* mites in the



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wild, with records from throughout its range in South Africa. Mainly the head and neck are affected, resulting in baldness in some individuals. The long-running study of Black Sparrowhawks on the Cape Peninsula shows that the incidence of mites varies considerably on a yearly basis, with as many as five per cent of birds affected in some years and none in others (Van Velden et al. 2017. *Auk* 134: 498–508). There is no clear association with colour morph, but males are more likely to show symptoms than females. By comparing the breeding performance of the same birds before and after they were infected, it was shown that mites reduced by more than 75 per cent the number of chicks fledged by pairs with at least one affected adult. If captured, infected sparrowhawks can be treated and, given time, grow healthy new feathers.

It is unclear why only a few species are particularly prone to be targeted by the mites. Communal roosting by Cape Wagtails could aid transmission among individuals, but other sociable species don't show any symptoms. Black Sparrowhawks may be infected by feeding on Rock Doves, which often suffer from mite infestations. This



above A Cape Wagtail with pox-like lesions on its legs and toes caused by *Knemidokoptes* mites. Both hind toes have been lost.

top An immature Black Sparrowhawk with severe feather loss on its head and neck as a result of *Knemidokoptes* mites.

would explain the tendency for more urban sparrowhawks to be affected than birds in rural areas. However, urban Peregrine Falcons rely even more heavily on Rock Doves, yet there have been no records of them suffering from mite infestations.

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