

# Alarming plant dieback in the Outeniquas

## Is this an indication of global warming?

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Engelseberg in the Doring River Wilderness Area. All over the flatter areas with silty-clay soils, there were scattered dead plants. No mortality at all was observed on the rocky and sandy soils. Photos: Adam West.

**W**ith enhanced global warming predicted to have major impacts on our flora and fauna, environmentalists are on the lookout for any signs of our flora responding to climate change. So it was with alarm that Nick Helme reported mass mortality on the north slopes of the Cradocksberg in July 2008. Further investigation by Di and Bill Turner showed that the dead patches extended from George to Engelseberg (near Robinson Pass) and in some areas were quite bad. In

September CapeNature responded and called a team together to investigate these mortalities, including managers, field rangers, ecologists, plant physiologists and hydrogeologists.

Four hypotheses were proposed to explain these observations. Firstly, **drought**, as autumn 2008 had experienced well below average rainfall. Secondly, **water abstraction**, as the municipality of Oudtshoorn are planning to pump water out of the Peninsula aquifer and have drilled a borehole into the rocks deep underground at Blossom. The other two hypotheses were an outbreak of some **disease** (such as *Phytophthora* Root Rot Fungus, a major problem in Australia, or Gummosis Fungus which kills large numbers of *Hakea sericea* in the Outeniquas) or **waterlogging** (December 2007 was the wettest month in 21 years).

The team met at Doring River\* to investigate. From the start some strange happenings were noted. Firstly, the mix of species that were dying were those that are supposed to cope with drought. Wetland species were not affected. Secondly, areas on deep sands were not affected at all – all the deaths were confined to the soils that were silty and clayey. This suggested immediately that lack of water was not the problem (thus eliminating both the water extraction and drought hypotheses).

LEFT: A comparison of two sides of a drainage ditch that pointed us towards the waterlogging hypothesis. Upslope (top) showed signs of prolonged ground wetting and a very high plant mortality. Downslope (bottom) showed no sign of soil flooding and healthy, flowering plants.

Photos: Adam West.

Also, in extensive areas only odd individuals had died, whereas in a few very much smaller, localized areas almost every single plant species (apart from some sundews *Drosera*) had been killed. It was these areas that were most instructive. They were all abnormally wet and showed signs of having been wet for a very long time: wet algae and lichen were abundant and there were signs of iron accumulation.

The dieback was in areas where water had accumulated due to slope differences, and areas outside the wetland that had stayed wet for longer than usual. A few dead plants we dug up showed no signs of disease, but also abnormally few lateral roots, suggesting that the roots had drowned due to prolonged waterlogging. The clincher was a ditch across the slope where all the woody plants upslope on the wet soils had died and below which, in the un-flooded area, the plants were not only healthy but in full flower.

Of course, the matter was not cut and dried. A minority of the dieback patches did not fit the explanation. In these patches the wetlands had dried out for some reason, but they were very localized patches, and confined to the wetlands.

Also of concern was the dieback of the rare endemic Doring River pincushion *Leucospermum hamatum*, which seems especially sensitive to flooding. In some areas about half the plants had died, and many of the survivors were bright red, suggestive of severe stress. No other species were affected in these areas and in drier areas (steeper and sandier soils) the pincushions were happy. Although

no action is recommended, monitoring of this unusual Doring River species should be continued.

More detailed investigations of the rainfall suggest that a cycle of dry years resulted in dry land plants invading wetlands following the 1999 fire at Doring River. With the exceptionally heavy rains of 2006 and 2007, the wetlands reclaimed their range. But even some plants outside of the wetlands that may be hundreds of years old could not cope, like kolkol *Brunia noduliflora* and geelbos *Leucadendron salignum*. A problem is that we don't know exactly when the plants died: did they die after the heavy summer rains or during the dry

autumn? Knowing this would have allowed us to rank species in terms of susceptibility to flooding, and helped to predict when it might occur again. Although it seems that no more plants are dying, monitoring is required to make sure. Also, we visited only one of the sites – it is not impossible that elsewhere other explanations may be needed.

So is this climate change? Models for the Outeniquas do predict increased precipitation in summer. But we don't know. Only in 20 years will we be able to look back and decide. At this stage it is safer to claim that the plants responded markedly to the exceptional weather conditions. Whether these weather conditions are indicative of climate changes to come only time will tell. But it is only by documenting the responses of plants to these extreme events that we will get a clear idea of what might happen as our climate changes. Then we will be better able to conserve our flora in a changing future. 🌱

\*The Doring River Wilderness Area forms part of the Outeniqua Nature Reserve and is managed by CapeNature ([www.capenature.co.za](http://www.capenature.co.za)).

BELOW: The rare and endemic Doring River pincushion *Leucospermum hamatum* showing stress by exhibiting unusually red leaves.

BELOW RIGHT: A healthy, flowering plant. This rare species is one of two pincushion species pollinated by rodents. Photos: AnneLise Schutte-Vlok.

EXTREME RIGHT: The wetland communities of *Erica quadrangularis* and *Leucadendron eucalyptifolium* looked very healthy, and were not affected by the event. Photos: Adam West.



ABOVE: Severe patch of dieback along a drainage line – mainly of *Protea neriifolia* and *Cliffortia stricta*, with only wetland graminoids surviving.

Please report instances of unusual die-offs or species expansion to your local CapeNature office or contact Dr E. Baard at Scientific Services in Jonkershoek (tel: 021 866 8000, email: [ebaard@capenature.co.za](mailto:ebaard@capenature.co.za)).

