Ecological infrastructure
Case study 4

Careful farming practices and infrastructure planning and development must dovetail with keeping water catchments healthy to avoid costly damage caused by flooding.

Washed away

HEIDELBERG, WESTERN CAPE

Losing healthy catchments upriver can have devastating flooding consequences for built infrastructure further downstream.

UNEP gef SANBI Biodiversity for Life
South African National Biodiversity Institute

In the span of just a few years (2003–2006) the Overberg town of Heidelberg in the Western Cape had to spend R20 million on repairing its sewage plant after three severe storms washed away a sewage pipeline which straddled the Duiwenhoks River. This resulted in raw sewage leaking into the river.

This was just one location at the epicentre of high risk areas in a province which has had to fork out billions of rands to repair damage caused by flooding in recent years.

It started in March 2003 when a fierce storm swept in along the Cape South Coast and rumbled steadily eastwards over the course of the following five days. Gale-force winds along the coast and torrential downpours battered across 800 km of countryside, pounding towns, farmlands, roads and mountain passes.

The damage associated with the storm was extensive. According to Stellenbosch University's Research Alliance for Disaster and Risk Reduction (RADAR), R15.6 million worth of roads were damaged in the Eden District Municipality, 500 families were evacuated in the Boland town of Montagu, the local electrical grid was shut down in Kannaland, farm infrastructure was destroyed, and thousands of head of livestock died.

But just 18 months after the Heidelberg sewage treatment plant and pipeline were repaired, shortly before Christmas in December 2004, they were struck again when the same river burst its banks when a cut-off low pressure system made landfall. Again, the sewage pipe was torn apart, with raw sewage leaking into the Duiwenhoks River. Following those repairs, the plant and pipeline were damaged in 2006 when yet more storms tore through the region.

According to RADAR's annual review for the Western Cape in 2010, severe storms hit the province every year from 2003 until 2008, costing the province R2.5 billion (at 2005 values).

The R20 million repair and redevelopment bill for the Heidelberg sewage pipe was a huge financial burden, particularly for a smaller municipality like the Hessequa, in whose jurisdiction Heidelberg falls.

Climate change is already at the forefront of many municipalities' concerns.

'In 2007 the average annual household income for the municipality was R39 079,' writes RADAR's disaster risk researcher Jan de Waal, 'which is significantly lower than many other local municipalities such as Drakenstein and Stellenbosch which exceeds R200 000 per year.'

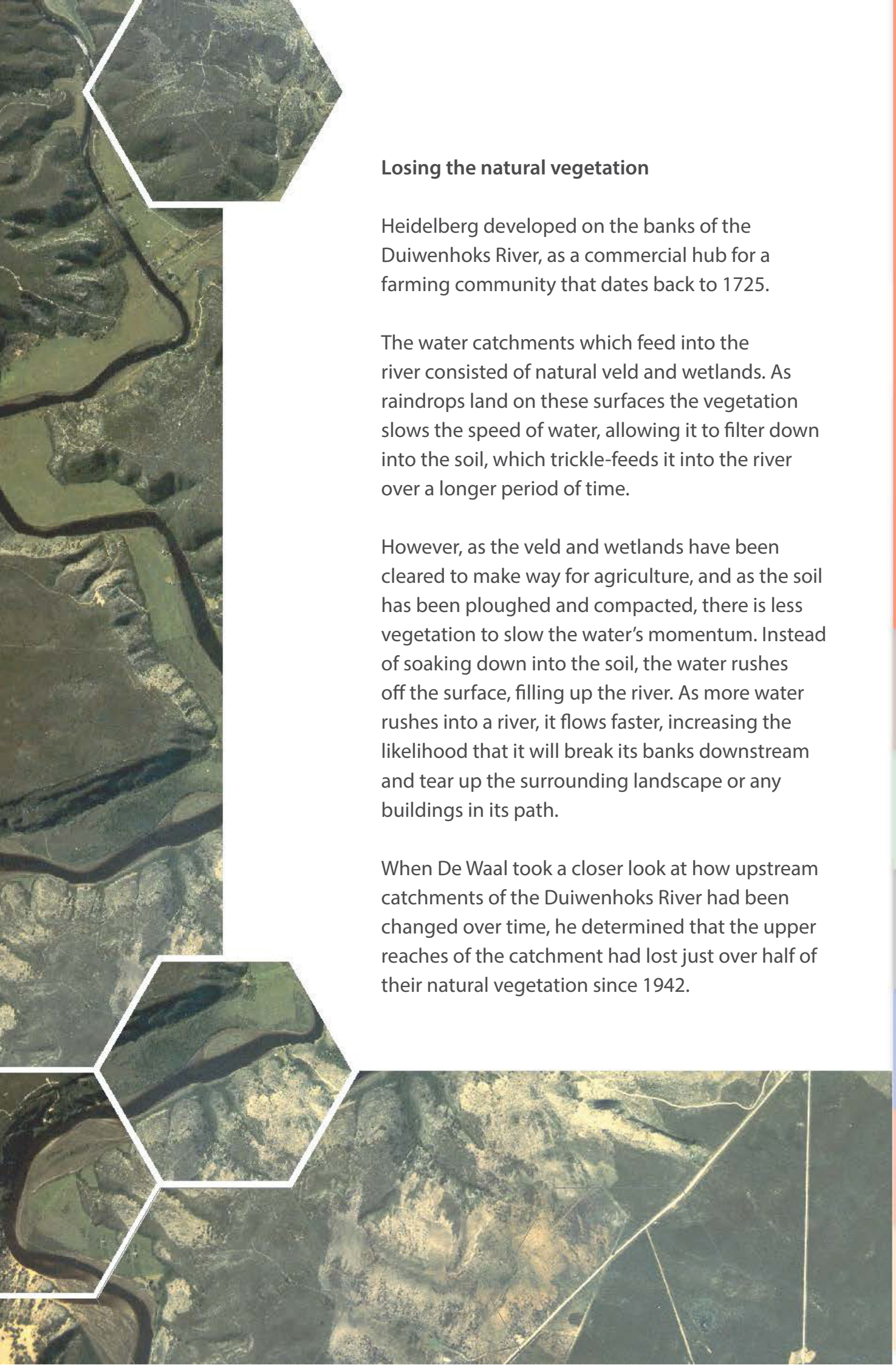
Climate change is already at the forefront of many municipalities' concerns, since it is expected to bring more frequent, severe storms in some areas and with it the potential for this kind of infrastructural damage. Indeed, De Waal's analysis of weather records from here, some of which date back to 1920, shows that the frequency and intensity of these kinds of storms are definitely on the increase in some parts of the Western Cape.

But the RADAR team also demonstrates that agricultural land use changes along the river catchments upstream of Heidelberg, and poorly planned infrastructure and development in the town have played into how severely these storm events translate into damaging floods.

Carving away the catchments

Photographs of the December 2004 floods that hit Heidelberg show municipal chalets along the banks of the Duiwenhoks River that are up to their eaves in water. While heavy storms are a natural feature of this region's weather, the magnitude of floods is affected by farming activities as well as urban growth and development.

2003–2008
the cost of severe storms in the Western Cape



Losing the natural vegetation

Heidelberg developed on the banks of the Duiwenhoks River, as a commercial hub for a farming community that dates back to 1725.

The water catchments which feed into the river consisted of natural veld and wetlands. As raindrops land on these surfaces the vegetation slows the speed of water, allowing it to filter down into the soil, which trickle-feeds it into the river over a longer period of time.

However, as the veld and wetlands have been cleared to make way for agriculture, and as the soil has been ploughed and compacted, there is less vegetation to slow the water's momentum. Instead of soaking down into the soil, the water rushes off the surface, filling up the river. As more water rushes into a river, it flows faster, increasing the likelihood that it will break its banks downstream and tear up the surrounding landscape or any buildings in its path.

When De Waal took a closer look at how upstream catchments of the Duiwenhoks River had been changed over time, he determined that the upper reaches of the catchment had lost just over half of their natural vegetation since 1942.

Canalising the river

The Duiwenhoks River has been canalised through the town itself, meaning river engineers have replaced its natural course with a hard cement shell.

So when the river swells after a heavy storm, the canal is prone to flash flooding. Should this overtop the sides of the channel, the force of the water gouges away large chunks of pavements, roads and other hard surfaces.

De Waal writes that 'flood control structures (have resulted) in a compromised ability to reduce flood peaks'.

'We need to shift our thinking, from a situation where we are "waiting" for disaster, to one where we are reducing disaster risk through development action.'

Where we place our infrastructure

If infrastructure (e.g. roads, buildings, sewage plants) is built in flood-prone areas without careful attention to risk management, the consequences can be costly and dangerous, as seen in the case of the damaged sewage pipe.

Now that we understand the link between healthy river catchments and infrastructure, and how climate change may worsen the kinds of storms that naturally occur in this area, we can make better decisions about how to manage these landscapes. Doing so can significantly reduce the drain on the municipal coffers as these communities are left mopping up the damage following flood events.

'We need to shift our thinking,' suggests RADAR director Dr Ailsa Holloway, 'from a situation where we are "waiting" for disaster, to one where we are reducing disaster risk through development action.'

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