



Communication and Marketing Department  
Isebe loThungelwano neNtengiso  
Kommunikasie en Bemerkingsdepartement

Private Bag X3, Rondebosch 7701, South Africa  
Welgelegen House, Chapel Road Extension, Rosebank, Cape Town  
Tel: +27 (0) 21 650 5427/5428/5674 Fax: +27 (0) 21 650 5628

[www.uct.ac.za](http://www.uct.ac.za)

17 May 2023

## A red flag for ecosystem health: Study finds metal contamination in caracals blood



A UCT study has found that Cape Town's caracals are exposed to multiple metal pollutants through their prey.

Photo: Louis Jones

A new study by researchers at the University of Cape Town's (UCT) Institute for Communities and Wildlife in Africa (iCWild) has revealed that caracals are exposed to multiple metal pollutants, including heavy metals and metalloids.

The study found that most metals were not present at toxic levels in caracals, except for arsenic and chromium. "Notably, increased levels of many toxicants found were linked to

higher use of human-transformed areas. As a result, caracals selecting to hunt closer to the urban edge, cultivated vineyards and roads have generally higher levels of metals, such as aluminium, arsenic and lead," the researchers said.

The paper is titled "A heavy burden: Metal exposure across the land-ocean continuum in an adaptable carnivore". In the study, the researchers tested for exposure to 11 well-studied metals: aluminium, arsenic, cadmium, chromium, cobalt, copper, mercury, manganese, lead, selenium and zinc.

They wanted to understand how caracals were becoming exposed to these metals – through diet, use of certain land areas, and demography. To do this, individual caracals were caught using cage traps, sedated and blood samples were taken by a qualified veterinarian. Dead caracals, mostly killed in vehicle collisions, were opportunistically sampled too.

The researchers' most interesting and unexpected discovery was that caracals hunting within or nearby aquatic areas (the coast and wetlands), with a diet rich in aquatic-adapted prey, were more exposed to harmful metals like arsenic, mercury, and selenium. Therefore, they said, seabirds and waterbirds like Cape cormorants, gulls, Egyptian geese, and yellow-billed ducks, all preferred caracal prey species, are likely a significant route by which metals are transferred from aquatic to terrestrial food webs.

"Chemical pollution is a growing global concern. Cities and rapidly developing countries are disproportionately affected because of the high industrial and human activity levels. Among these environmental chemical pollutants, metals (metallic chemical elements) are some of the most toxic and well-studied," said Dr Gabriella Leighton, a postdoctoral fellow at Rhodes University and lead author of the paper, which was published in the journal [\*Environmental Pollution\*](#).

Leighton said heavy metals like mercury, arsenic, and lead could be highly toxic to humans and animals, even if exposed to small amounts. "Most metals are naturally occurring in the Earth's crust; however, certain human activities increase the quantity and rate that metals are released into the environment. Major sources of metal pollution include coal power plants, mines, agricultural activities, and waste disposal sites," she said.

According to Leighton, animals and people are generally exposed to harmful metals through food and water intake. "Over time, these metals accumulate in bodily fluids and tissues through bioaccumulation. Pollutants can then move up the food chain and increase their concentration through biomagnification; as a result, animals higher up the food chain, especially top predators like caracals, are exposed to greater concentrations of pollutants than those lower down. Eventually, this build-up of metals and other pollutants in the body becomes sufficiently high that it is toxic. This often leads to negative health effects like reduced reproductive success, cancer and in acute cases, even death," she said.

The new findings have repercussions for both wildlife and human health in Cape Town, said Leighton. "Our environment, especially water systems, is likely more polluted than we expect. The effect of co-exposure to multiple pollutants is unknown, but unlikely to be benign."

Dr Jacqueline Bishop, the study's co-author and senior lecturer in conservation ecology and genetics at UCT, said laboratory studies demonstrated serious health implications of exposure to metals like mercury, arsenic and lead in both humans and wildlife. These metals, she said, interfere with the reproductive and immune health of wildlife, ultimately

with fitness repercussions for individuals, and can translate to population decline and ultimately to local extinction.

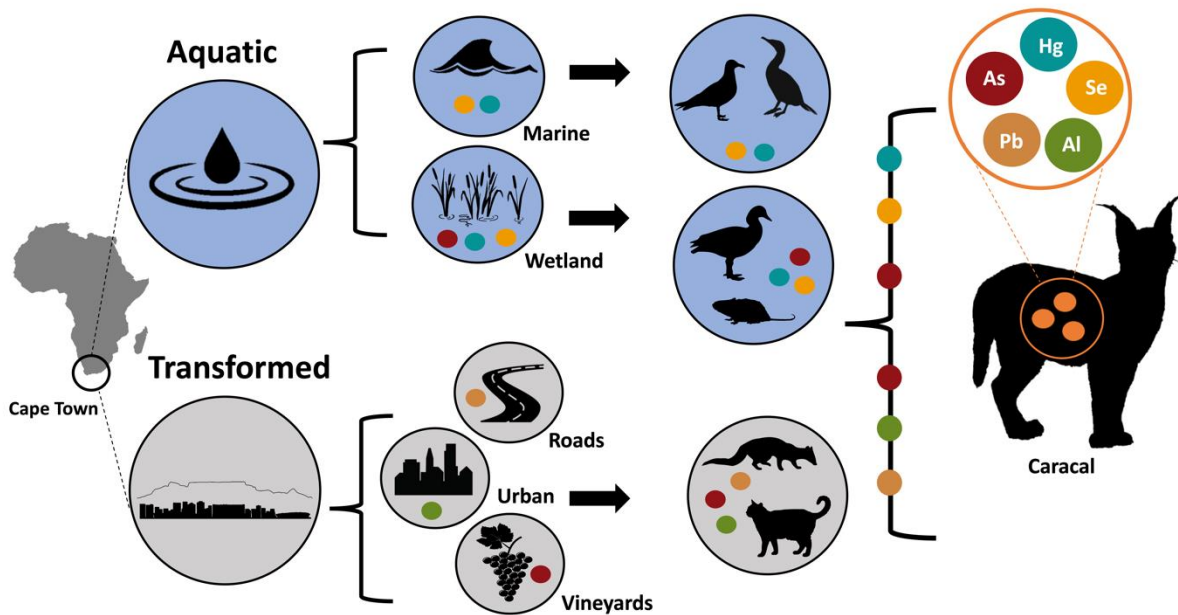


Diagram showing potential pathways of metal pollutant exposure in Cape Town caracals. Hg = mercury, As = arsenic, Se = selenium, Pb = lead, Al = aluminium.

“The urban edges of Cape Town might therefore represent a toxic ecological trap for wildlife. Abundant, attractive resources draw animals in to feed closer to developed areas. However, these areas with rich pickings also have higher levels of pollutants and other urban threats, like roads, domestic dogs, and novel pathogens,” said Bishop.

Bishop added: “Natural areas that may seem more removed from the city, such as wetlands or coastal areas, are also risky. Aquatic environments generally act as sinks, accumulating a range of pollutants. Likely sources of metal contamination include coal combustion, emissions from domestic fuel burning, natural fires and untreated city wastewater. This may have implications for the health of other mammalian predators in the area, including Cape clawless otters and Cape fur seals, as well as human health implications for local fishing communities and wider seafood consumers. This is concerning, and the City of Cape Town needs to do more to assess and mitigate this issue.”

To improve the city’s health, Bishop said the first step is properly monitoring the issue – knowing how big the problem is and identifying where problem sources lie. “In Cape Town, this monitoring needs to be focused on the urban edge, waste management, water treatments, roads, and agricultural areas.”

“It is crucial to develop a robust local, provincial, and national pollutant monitoring programme using a variety of good indicator species (sensitive species that can reflect environmental conditions), including small and medium-sized carnivores and aquatic birds,” said Bishop.

“Other strategies include cleaning up our wetlands and freshwater systems, placing stricter regulations on fuel-burning emissions, treating and disposing of city wastewater, and using agricultural products like pesticides. Taking these necessary steps will greatly improve both animal and human health.”

***ENDS***

***Issued by: UCT Communication and Marketing Department***

**Ridovhona Mbulaheni**

Media Liaison Assistant  
Communication and Marketing Department  
University of Cape Town  
Rondebosch  
Tel: (021) 650 2333  
Cell: (064) 905 3807  
Email: [ridovhona.mbulaheni@uct.ac.za](mailto:ridovhona.mbulaheni@uct.ac.za)  
Website: [www.uct.ac.za](http://www.uct.ac.za)