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27 February 2020

The sandprawn is a champion water filterer – UCT study

A study by three University of Cape Town (UCT) researchers has found that sandprawns, best known as bait for fishing, have the ability to filter coastal water, thus combatting eutrophication – one of the major water quality challenges in the natural world.

The new findings of Olivia Venter, Dr Deena Pillay and Kervin Prayag's research resulted in their paper, [Water filtration by burrowing sandprawns provides novel insights on endobenthic engineering and solutions for eutrophication](#), being published by the prestigious Nature Group's journal *Scientific Reports*.

"This is the first time that the significance of the connection between the burrowing of sandprawns and the filtering of water has been made clear. And since sandprawns can be found in great numbers across the world, they can be used as nature-based solutions to coastal eutrophication on a global scale and should be protected because of that," says Pillay, senior lecturer in UCT's Department of Biological Sciences.

"Eutrophication is a huge problem globally," she continues. "As human populations increase, a lot of the waste is going into the rivers and the sea. But before it reaches the sea, the waste passes into estuaries, which have become collection points of human nutrients.

"This waste can come from farms and gardens (such as fertilisers), informal settlements and untreated sewage from treatment facilities."

Eutrophication causes an overgrowth of algae that harms water quality, reduces oxygen, produces toxins, impacts marine life, and, ultimately, affects our food and human health.

"We discovered that the common sandprawn (*Callichirus kraussi*) that occurs in estuaries all along the southern African coast improves water quality by removing microscopic algae," says Venter, who researched the sandprawn for her master's degree in conservation biology, with Pillay as her supervisor. "This prevents eutrophication: the excess of algal growth in a water body."

With her engineering background Venter knew that the fact that sandprawns have such a big influence on the sediment meant that they were very likely to also have an indirect influence on the water quality above their burrows. To test this idea, Venter and Pillay developed an experimental setup of sediment – in which the prawns could burrow – and

water, containing microscopic marine algae called phytoplankton. They introduced sandprawns to the setup and then monitored the water quality.

The sandprawns quickly reduced the amount of algae in the system by 50% – much more than they had expected. And long-term results from the field – at Zandvlei Estuary in Cape Town – showed the little crustacean's impact in the wild to be even greater.

"We discovered that areas with sandprawns had 70% less phytoplankton than other adjacent areas in the estuary where there were no sandprawns," says Prayag, a master's student at UCT's Department of Biological Sciences who assisted with statistical analyses.

After just four days, the researchers could already see how the water was being cleared by the sandprawns' burrowing; the prawns' water pumping creates a stream that drives the phytoplankton from the water above into the burrows. This then gets trapped on the burrow walls and becomes a food source for the sandprawns.

The main threats to sandprawns, globally, are people harvesting them as fish bait – which disturbs both their population and burrows – and the destruction of their habitat in estuaries and bays through development and the conversion of soft sand into hard structures like canals.

"Once you put a concrete layer over the sand, all of the burrowing creatures that filter the water cannot do so anymore," says Pillay. "Many of the estuaries in South Africa, especially in our urban areas, have been canalised to some degree to stabilise the area at times of flooding.

"A possible solution for this could be to create a honeycomb-effect in the canal, where you have some openings that allow sandprawns to continue their activity while still providing some stabilisation."

Venter points out how important it is to understand the different ways in which we benefit from nature.

"If we want to ensure a healthy and sustainable environment in which nature and people can thrive, we need to conserve the natural processes from which we benefit and actually depend on – even if we are not aware of them.

"Sandprawns are impacting ecosystems on a large scale. It is important to understand and appreciate how they improve our water quality and to ensure that we conserve them and their water purification service."



Sandprawns are renowned burrowers that can dig several metres deep into the ocean floor.

Photo: Charles Griffiths

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