

# A stabilisation pond system in Namibia increases yields

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The main objective of the research project is the upgrading of existing wastewater pond systems to generate irrigation water for agriculture. Credit: Peter Cornel

What is a simple way to upgrade wastewater stabilisation pond systems in Africa so that the water can be reused for animal fodder production? Under the direction of Technische Universität Darmstadt, the joint project "EPoNa – upgrading wastewater ponds to generate irrigation water, using the Cuvelai-Etosha basin in Namibia as an example" has been researching into a comprehensive response to this question since the start of September.

The town of Outapi in Northern Namibia operates a 4-step pond system to treat their wastewater. When the ponds were constructed twelve years ago, Outapi had around 4,000 inhabitants, with only a small proportion having access to sewerage services. Project engineer Jochen Sinn from the Wastewater Engineering Research Group at the Institute IWAR of TU Darmstadt estimates that now, more than 5,000 inhabitants in this constantly growing town are already using the sewerage system. The produced wastewater passes through a succession of four ponds. The suspended solids sink to the bottom, where they are broken down by microorganisms, and the sun's ultraviolet light disinfects the water.

But the system is so heavily overburdened and now silted up, that the originally constructed evaporation pond keeps overflowing. At the same time, the community is facing a problem of fodder shortage towards the end of the dry season lasting around nine months. The lack of water means that they can no longer cultivate enough fodder crops, so if the rain does not come, they have to slaughter livestock as a matter of necessity. The Town Council made use of its contact from the earlier [CuveWaters wastewater project](#) and approached the Institute IWAR to solve both problems.



Water sampling for water quality analysis. Credit: Jochen Sinn

As described by project manager Prof. Dr. Susanne Lackner, head of the Wastewater Engineering Research Group at the TU's Institute IWAR, "It is about finding a simple way to upgrade the existing ponds so that the wastewater can be used to irrigate fodder crops." Different pre-treatment variants are investigated; firstly using an anaerobic biological process and then a mechanical micro-strainer. Guiding walls in the pond will ensure better flow control and an effluent filter will improve the water quality with regard to solids, algae and hygiene.

"These basically known methods are being combined for the first time and adapted for use under the constraints that exist in Africa," explains

Susanne Lackner. One of the two "treatment lines" will initially be left in its present state, to act as a comparison for gauging the effect of the modifications. In parallel with upgrading the ponds, the Hochschule Geisenheim University will carry out tests to find the most suitable low-cost irrigation technique, as well as testing different crops and cultivation methods for suitability. If the concept proves effective, the entire plant can be converted, and the town as operator will be able to start extensive, all year round irrigation of fodder crops with wastewater sooner rather than later.

The "[EPoNa](#)" joint research project is funded by the German Federal Ministry of Education and Research (BMBF) to the tune of almost 2.6 million euro. It brings together the scientific and technical expertise of six project partners from different fields. Aspects of plant engineering and economic operation will be taken into consideration, as will irrigation techniques, socio-ecological approaches, or the question of which crops are suitable for cultivation with the aid of treated process water. The impact on livestock and living conditions of the people is also included in the considerations. TU Darmstadt is coordinating the project and is also focusing directly on matters of water analysis and quality assurance. Additionally the project will generate student projects and act as a practical example for teaching.





The project's concept is based on a holistic approach combining technical, ecological, economical and societal aspects. Credit: Jochen Sinn

Not only water is reclaimed in the EPoNa facility. "What is really exciting is that German wastewater treatment plants spend a lot of money and effort eliminating nitrogen and phosphorous from the wastewater, whereas here, we want to use them specifically for agriculture", explains Susanne Lackner. "Not only do we retain the resource of water itself, we also retain essential nutrients as fertiliser."

The concept is based on a holistic approach and it should be transferable to other countries in the region. "There has been only little exploration of

the concept of reuse, i.e. recycling [water](#), especially in arid countries." But this is an approach with enormous potential, especially with regard to climate change. "Water is a resource that is far too valuable to simply flush away," says Jochen Sinn.



Desludging: Sludge removal of the first pond. Credit: Peter Cornel

Provided by Technische Universität Darmstadt

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