

Agriculture and horticulture south of the Sahara

How can small-scale ecological agriculture succeed in the increasingly urbanized regions south of the Sahara? In the new project ECOSOLA, scientists from the University of Oldenburg together with African partner universities and other partners from the field are studying the existing conditions and future options for urban agriculture in Tanzania and South Africa. ECOSOLA stands for Ecosystem-based Solutions for Resilient Urban Agriculture in Africa. The German Federal Ministry of Education and Research and the German Academic Exchange Service will provide around 800,000 euros in funding over the next three years for

the project, which is coordinated by Oldenburg economist Professor Dr. Bernd Siebenhüner.

The rapid advance of urbanization in many areas of Sub-Saharan Africa poses serious problems for its societies. African cities like Nairobi (Kenya), Kinshasa (Democratic Republic of Congo) and Dar es Salaam (Tanzania) are growing at breakneck speed and displacing the rural-agricultural economic systems that surround them. At the same time, small-scale farms and horticultural businesses have established themselves in Africa's cities and are making an important contribution to feeding their populations. The farmers, however, are struggling with

problems such as insecure or unclear land-use rights, lacking political acceptance, soil, water and air pollution, inadequate water supplies and major damage caused by flooding. The scientists working on the ECOSOLA project plan to focus on a number of ecological business models and develop concrete solutions for urban farming in Africa. Siebenhüner's working group "Ecological Economy" and the "Landscape Ecology" working group led by Oldenburg ecologist Professor Dr. Michael Kleyer are collaborating closely with the University of Dar es Salaam and the Nelson Mandela Metropolitan University (Port Elizabeth, South Africa) in the project.



Urban farming: Bat guano is used as fertilizer for mushrooms growing at an organic farm on the outskirts of the Tanzanian metropolis Dar es Salaam. On the basis of ecosystem-based business models like this one, the ECOSOLA project aims to provide concrete solutions for urban agriculture in Africa.

Longitude – no problem for migratory birds

Migratory birds are able to orientate with astounding accuracy, using the position of the sun, the stars and the Earth's magnetic field. Until now this is how scientists have explained birds' ability to determine their north-south position, but how they are able to determine their east-west position has remained one of the biggest mysteries in the field of migratory bird research for decades. Now Prof. Dr. Henrik Mouritsen of the University of Oldenburg and an international team

of scientists have shown through experiments with reed warblers (*Acrocephalus scirpaceus*) that the birds can detect magnetic declination. In other words, the birds identify the angle between magnetic north and true north. The researchers presented the results in the online edition of the prestigious science journal *Current Biology*. According to Mouritsen the results shed a whole new light on scientists' ideas about how birds navigate.

Music builds bridges

Music activates the brain and produces happiness hormones, has therapeutic effects, lowers aggression and promotes mental and social development in the young. The latter aspect is the focus of the three-year joint project "Musical Interventions for the Sustained Integration and Cultural Participation of Children and Youths with Refugee Backgrounds" (MINUTE), which will receive a total of 250,000 euros in funding from the Federal Ministry of Education and Research until the end of 2019.

This joint project between the Goethe University Frankfurt and Oldenburg University examines for the first time the potential of musical interven-

tions such as singing or playing music for promoting cultural integration. The study also aims to provide guidance for the development of specific educational initiatives promoting the cultural integration of refugees. While the Frankfurt researchers are focussing on young men still living in refugee centres, the Oldenburg researchers led by musicologist Professor Dr. Gunter Kreutz are concentrating on primary school children from refugee families. These children are taught in the same class as local children and children who have settled permanently in Oldenburg. Two hundred third-grade children from four Oldenburg primary schools are taking part in the study.

Success in the Hyperloop competition

The goal of the innovative "Hyperloop" transportation system is to transport passengers at speeds of up to 1,200 kilometres per hour. Students at Oldenburg University and the University of Applied Sciences Emden/Leer sent their prototype to compete in the Hyperloop Pod Competition II initiated by SpaceX founder and Tesla boss Elon Musk. Although they narrowly missed making it into the final

round at the SpaceX headquarters in Hawthorne, California, the competition's organiser SpaceX awarded the team its innovation prize, one of four prizes in total, for the sophisticated braking system it designed for its prototype electromagnetic levitating pod. During the competition, the Oldenburg and Emden students experienced technical difficulties on the test track.

So that new knowledge benefits all

To intensify exchange with businesses, society, public authorities and cultural institutions and thus boost innovation in the region – this is the stated aim of the knowledge transfer project „Innovative Hochschule Jade-Oldenburg!“ run by Oldenburg University and the Jade University of Applied Sciences. This is Lower Saxony's only approved project in the „Innovative Hochschule“ funding initiative, and the researchers on the project have applied to receive approximately 11 million euros in funding from federal and regional governments until 2022. The project aims to systematically harness new target groups, partnerships, pathways and spaces for the transfer of knowledge.

The ambitious transfer project is divided into seven sub-projects: „SchülerWissen“ aims to inspire young people to tackle scientific research problems. „KarriereWege“ focuses on the transition from university to the professional world. The „Innovation(s) Werkstatt“ offers start-ups and established business professionals a space to develop innovative ideas, while the „Innovation(s)Management“ project is about systematically analysing and mobilising innovation potential in the region. The sub-project „Innovation(s)Labor digital“ aims to develop practical applications to meet the challenges of the digital age. Behind the „Innovation(s)Mobil“ are a bus and a ship, both equipped with innovative engine systems, which as a „Showroom“, mobile communications platform and experimental workshop aim to boost innovation in the region. A comprehensive „ScienceBlog“ will make the research activities, results and innovations from the project accessible to wider audiences and encourage feedback and discussion. Finally, there is a „Lab-on-the-Web“ in the pipeline where web-based data from scientific studies can be collected.

Junior research group “RightSeeds”

Is the agricultural industry producing the right seeds for sustainable agriculture? Can commons-based ownership rights to plant species trigger an ecological and social revolution in crop production? These are the questions addressed by the junior research group “RightSeeds” headed by Professor Dr. Stefanie Sievers-Glotzbach at the Institute for Ecological Economics Research. The collaborative project with the Department of Agricultural Ecology at the University of Göttingen, the Institute for Ecological Economics Research Berlin and other partners from the field will be funded for five years by the German Federal Ministry for Education and Research (BMBF) as

part of its Social Ecological Research funding line. Crop cultivation has developed into a commercial system over the past 100 years, putting seed ownership in the hands of a handful of private corporations. For ecological agriculture in particular, the commons approach represents a viable alternative. The scientists are examining initiatives, networks and companies that offer predominantly sustainable seed types, forego private patents and keep the cultivation process transparent. They are also supporting a South-North exchange between a commons-oriented collective in the Philippines and German initiatives and businesses.

Molecular fingerprint created

A single altered gene in the human genome can have a major impact. Macular dystrophy, a disease which affects the area of the retina where vision is sharpest, can be traced back to precisely this type of point mutation. Researchers led by biochemists Professor Dr. Karl-Wilhelm Koch and Farina Vocke and working together with human geneticists from Tübingen, Verona (Italy) and Philadelphia (USA) have now succeeded in identifying and studying a key gene in the genome of macular dystrophy patients. The gene contains the blueprint for a protein that controls important neurotransmitters in the cells of the retina. Here, the researchers found clues about how the defective protein disrupts cell functions. Based on these findings they hope to be able draw conclusions about other types of retinal disease. The results were published in the journal “Human Molecular Genetics.”

Data from tidal flats

The measuring station of the Institute for Chemistry and Biology of the Marine Environment (ICBM) has been in operation almost continuously for the past 15 years. Equipped with several different types of sensors and situated in the straits between the islands of Spiekeroog and Langeoog, the station measures salinity levels, temperature and the speed of sea currents among other things. It operates around the clock and in all weathers. Researchers from a variety of disciplines are currently using the station for different research projects. These include the BEFmate project, in which researchers are studying the biodiversity and function of ecosystems, and the Citizen Science project “Macroplastics”. The station was built for the DFG research group “Biogeochemistry of the Tidal Flats” in 2002 and was the first of its kind.

Research training group

Combinations of hydrocarbons – such as crude oil or natural gas – are the basis for countless products made by the chemical industry, from painkillers to plastic packaging. How can direct reactions that otherwise occur only circuitously be induced in carbon-hydrogen bonds? This question is the main focus of the new research training group “Chemical bond activation” at the University, which will receive around 3.5 million euros in funding from the German Research Foundation (DFG) for an initial period of four-and-a-half years. Answers to this question could potentially save the chemical industry material, energy and time, pave the way to new materials and drugs and help to combat disastrous oil spills more effectively. Twelve PhD candidates have been conducting research in this future-oriented field since March, and as many as twelve more doctoral students from the participating research groups at the Institute of Chemistry and the Institute for Chemistry and Biology of the Marine Environment (ICBM) will join them on the project. Under the aegis of at least eleven professors the young scientists will study the activation of these otherwise relatively inert carbon-hydrogen bonds from different perspectives – for example under the influence of specific catalysts or bacteria that break down crude oil. The aim is to develop and analyse new methods. Research training groups support young scientists at universities. The aim of the DFG is to qualify doctoral students, foster independent research and prepare them for the complexities of “science” as a professional career. “Activating chemical bonds” is one of a total of seven DFG research training groups currently underway at the University of Oldenburg.

Hearing researchers continue along their successful path

The University has cleared the first hurdle in the Excellence Strategy programme, the follow-up to the Excellence Initiative of the German Federal Ministry of Education and Research and the German Research Foundation. Its draft proposal for a Cluster of Excellence titled “Hearing4all: Research for personalized treatment of hearing deficits” has been selected to proceed to the full proposal stage. The Oldenburg researchers developed their proposal together with hearing researchers from Hannover based on the results of the previous Cluster of Excellence. The full proposal must be submitted to the German Research Foundation by February 2018, and the final decision will be reached in September of next year. Building on the findings of the former Cluster of Excellence the researchers want to develop solutions specifically

tailored to the individual needs of patients across the spectrum of hearing deficits. To this end they plan to bundle their work into four research strands reflecting on the one hand the chain of development from basic research to hearing technology and on the other the severity of the hearing impairment. The first strand aims to use the latest neuroscientific methods to gain a deeper understanding of the complex interaction between hearing, perceiving and processing in the brain over the course of a person’s lifetime. The second comprises IT-based research aimed at constructing a virtual multilingual hearing clinic. In the third strand the researchers plan to develop individually tailored diagnostics and treatments for patients with medium to severe hearing impairment and full deafness. The objective of the fourth

strand is to develop an entirely innovative systems technology for the hearing aids of the future, based on the Cluster’s scientific and technological findings. A total of 25 neuroscientists, medics, psychologists, linguists, physicists and engineers from the universities of Oldenburg and Hannover are involved in the planned project. The Jade University of Applied Sciences, the Hör-Tech GmbH company, the Hearing Centres in Oldenburg and Hannover, the Fraunhofer Project Group Hearing, Speech and Audio Technology and the Fraunhofer ITEM institute are also project partners. The coordinator for the planned Cluster is Oldenburg physicist and physician Professor Dr. Dr. Birger Kollmeier. “Hearing4all” is one of the world’s leading centres for medical engineering, hearing research, audiology, medical diagnostics and therapy.



Virtual simulation of complex hearing environments: researchers use high-tech laboratories to develop customized hearing aids for the full spectrum of hearing impairments.