At the interface

Rising sea levels, groundwater salinisation and drier summers: the consequences of climate change affect the coastal areas of northern Germany. Leena Karrasch is investigating how society can adapt to these changes. Her research combines the natural and social sciences – and establishes a direct transfer between science and society.

At the once lowest point in Germany, there will soon be a lake again.

A quiet but constant crackling is in the air. It sounds like bubbles in a fizzy drink and accompanies anyone who walks along the wooden footbridge that crosses the Langwader Groden, between the main dyke line and the summer dyke. “That’s the sound of thousands of tiny mud scuds bursting air bubbles in the mudflats,” says coastal protection expert Dr Leena Karrasch. She recommends that anyone who wants to see what a desirable future for Germany’s North Sea coast might look like should visit this wetland area on the northern tip of the Bürgedingen peninsula between the Jade Bay and the Weser estuary.

Since the summer dyke was reopened a few years ago, this has become a place where nature can freely unfold again under the influence of the tides. The salt marshes can act as natural buffer zones, providing protection from waves during storms, and are partly used as extensive pastures. A nature trail meanders across them. For Karrasch, a walk in the Langwader Groden raises the questions at the heart of her research: How can coastal and inland areas be prepared for the consequences of climate change – whether that means rising sea levels or extended periods of drought and heavy rain? How do nature and society interact? How to shape decision-making processes so that they reconcile apparently conflicting interests and use synergies in the fields of water and coastal management, nature conservation, agriculture, tourism, and also recreation and tourism?

These are questions that bring together natural and social sciences, just as Karrasch herself combines various disciplines in her own work. Her rather unusual academic pathway began with a degree in biology, after which she earned two Master’s degrees at the University of Oldenburg. She has been a postdoctoral researcher in the Ecological Economics working group led by Prof. Dr Bernd Siebenhüner ever since. The 37-year-old has also conducted research at the university’s Centre for Environmental and Sustainability Research (COAST) for over a decade.

Karrasch realized early on that strategies for regional climate adaptation were what really interested her. She wanted to develop her research together with the people who decide which measures to deploy or are affected by them, so that society benefits directly from the results. The principle behind this transdisciplinarity, combines scientific findings with their practical application, and is what makes her work at the university special. Karrasch is currently involved in the large-scale transdisciplinary project “Gute Küste” (“Good Coast”), funded by the Ministry of Science and Culture of Lower Saxony and the Volkswagen Foundation. She also works in two other projects, has already completed five more, and has several others in the pipeline. All these collaborative projects deal with water and coastal management and the consequences of climate change – and Karrasch’s task is always the same: to build bridges between research and practice.

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The geographical focus of Karrasch’s work is her home region – the North Frisian Archipelago in the northwest region of Germany. “When I was doing my Master’s degree, many of the students were studying the impact of climate change in distant parts of the world – mangrove forests in the tropics or Pacific islands under threat, for example,” recalls Karrasch, who grew up in the town of Wilhelmshaven on Germany’s northwest coast. “But East Frisia is also affected,” she reflected. However, efforts to adapt to the changing climate in the northwest region were largely limited to building and reinforcing dykes, she explains. “But there are other approaches, and I want to be part of it.”

Take Krummhörn, a municipality with 54 kilometres of coastline situated near the estuary of the river Emme. In a project launched in 2011, Karrasch spent four years working with local experts in water management, nature conservation, agriculture, tourism, and community politics to develop a strategy for sustainable land use. Not only did the Intergovernmental Panel on Climate Change in 2007 cite the findings in a special report on the state of the world’s oceans. The strategy was also directly incorporated into the country’s regional planning programme in 2018. “That kind of thing usually takes a long time. I was quite surprised and enthusiastic to see our participatory research make an impact so quickly,” says Karrasch recalling the project titled COMTESS, which was funded by Germany’s Federal Ministry of Education and Research.

In the first stage of the project Karrasch, together with Oldenburg landscape ecologists Prof. Dr Michael Kleyer and Dr Martin Maier and COAST coordinator Dr Thomas Rüenke, had developed several future scenarios for the municipality of Krummhörn, of which one third lies up to 2.5 metres below sea level. At present, its marshland is drained by a network of
ditches and canals is also mainly used for agriculture and dairy farming. Karrasch then used maps to show where it would make more sense to focus on creating water storage areas – also considering the increasing frequency of droughts –, and identified areas where waters with reed could be used for carbon capture and storage. She then presented strategies that everyone can adapt to the changing climate, she stresses. “We humans will always find a way to deal with new situations,” (ds)

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