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IN THE SCALLOP SEA

ZMT project in Peru's Sechura Bay

As the sun rises, boats quietly glide across the calm waters of Sechura Bay. Peruvian fishermen are on their way to harvest their shellfish beds – and on board are scientists from ZMT. They want to dive into the depths to their scallop cages and collect another batch of data. “We measure the temperature and turbidity of the water, the scallops’ growth and the volume of biomass they produce. We also register their oxygen consumption and observe changes in the species composition of the Bay,” explains Marc Taylor of ZMT.

Delicate balance

Since 2010, thousands and thousands of scallops have been growing here on the bottom of the Bay – an ideal spot for these creatures thanks to the upwelling system that provides them with nutrient-rich water from deep down, and the Bay’s strong currents that guarantee a good supply of oxygen. The cultivation and export of scallops generates a turnover of more than a hundred million dollars a year in Peru. But the cultures are at the mercy of the recurring climate phenomenon El Niño, which raises the temperature of the water; in its wake, the rivers pour freshwater into the Bay. This combination can lead to mass extinction of scallops, which is why, just at the moment, the fishermen are trying to cultivate as many scallops as possible. But this, in its turn, could destabilise the ecological balance of the Bay. So fishermen and researchers are both interested in the same question: when will the Bay’s carrying capacity be reached – in physical, productivity, ecological and socio-economic terms?

Model system

“Sustainability Analysis of Scallop Culture in Sechura Bay” (SASCA) is the name of the project being run jointly by Bremen scientists and Peruvian colleagues from the Universidad Agraria La Molina in Lima, coordinated by ZMT’s Matthias Wolff. Until 2015, field work, symposia and workshops are being funded by the Federal Ministry of Education and Research. Scientists are using the data to develop a model to assess the impact of various influences on the system. “The aim is to formulate recommendations for scallop culture management to ensure that the complex system remains stable in the long term,” says Marc Taylor. But the expedition to Sechura Bay can do more than just that. “We are modelling such a multi-layered situation here with regard to the carrying capacity of the system that we’re eventually even going to be able to make general statements about the sustainability of aquacultures.”

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WORLD IN-BETWEEN

Change of leadership at the top of ZMT's Mangrove Ecology Group

Ulrich Saint-Paul's life in research has been decidedly undecided: he has spent years commuting between Bremen and Brazil – all for the sake of a world between water and land, the mangroves. Researching these tropical flood areas is near to his ecologist's heart. When he joined ZMT in 1993, he started the "Mangrove Ecology" research group, heading the Mangrove Dynamics and Management project (MADAM) from 1995 to 2005. "I wanted to understand the multi-layered world of the mangrove in all its diversity, to get a holistic take on the system."

Together with Ulrich Saint-Paul's research work on the MADAM project, ZMT grew into the leading international marine research institute it has become today. When the project began, ecologists and social scientists spent ten years working alongside ecosystem modellers and biogeochemists in the Caeté Estuary of northeastern Brazil. They spent months on the spot, cooperating closely with Brazilian partners and teaching in academia. "This integrated approach was crucial to the success of the project, and the philosophy we practised then has become the norm for all ZMT projects today," Saint-Paul explains. After 21 years at ZMT, the mangrove ecologist is retiring and passing on the leadership of his group to Martin Zimmer.

Irreplaceable bulwark

"The interdisciplinary research work that has already been done in the mangrove forests is invaluable for my own research in this area," his successor emphasises. Up to now, the soil ecologist has conducted most of his research in salt marshes, the intertidal zone in the coastal systems of the temperate region of northern Germany and North America. But his question is applicable to all in-between worlds: "How does interaction amongst organisms in the transition zone between marine and terrestrial habitats function?" The multilayered interaction in this extremely complex system of communication, cooperation, relationships and symbioses of life forms has not yet been understood.

Not least due to ZMT's sustainable research, mangroves are now a focus of worldwide investigations. Their importance for regions and for the world is comparable to rain forests. Regionally, mangroves are invaluable as a resource for coastal inhabitants and for protecting the coast itself; globally, according to Martin Zimmer, their protection is seminal to climate researchers. "Apart from their function as a buffer to the coast against extreme events, mangroves store enormous amounts of carbon in their sediment – if the forests are destroyed, that will all be released."

When Martin Zimmer assumes his new post at ZMT, the first thing he will do is to travel from Bremen to Brazil to reconsolidate the German-Brazilian collaborative landscape. Ulrich Saint-Paul will spend two years there, researching on behalf of the Brazilians. So collaboration between ZMT's former and future top mangrove scientists will continue to take place there – for the good of the irreplaceably valuable in-between existence of the mangrove forests.

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International Mangrove Symposium

In honour of Ulrich Saint-Paul, who is retiring from ZMT, the institute organised an international symposium with mangrove experts from



Ulrich Saint-Paul



Martin Zimmer

all over the world this year. Dis-

ussions re-

volv

ed around future common

research tasks in this field with

a particular focus on the role of mangroves in the global carbon

balance and on more precise

investigation and monitoring of existing reforestation

efforts. [> READ MORE](#)

efforts. [> READ MORE](#)



WORLD GOING UNDER?

Due to climate change, future sea levels are expected to rise – what risks does this imply? Three questions for the anthropologist Anke Möisinger and the geologist Alessio Rovere

How real is the threat posed by the rise in sea levels?

Rovere: In order to answer this question we need to know a lot more about how much higher sea levels were in earlier periods of Earth's history and what that meant at the time. So, as a geologist, I always look for the ocean imprint on land formations at higher levels. Seawater creates beaches, platforms, reefs and cliffs – and leaves behind traces when the water level drops.

Möisinger: Given all the scientific insights we have, I ask myself, as an anthropologist, how people really perceive an environmental threat of this kind and how they react to it. This knowledge is the pre-condition for appropriate long-term strategies for their own protection. At the moment, I'm working on Takuu, or Mortlock, an atoll in the north east of Papua New Guinea with 313 inhabitants whose home may be inundated in the future. The people have a very close relationship with their environment and, for years, politicians and scientists have been confronting them with this threat scenario.

What insights have you gained so far?

Möisinger: My research will show that perceptions of rapid environmental change on Mortlock are heavily influenced by religious commitment, generation and extra-island connectedness. More than 2/3 of the population are, for economic as well as social reasons, living off the island and reside elsewhere in Papua New Guinea. They are the ones who mostly perceive the threat of climate change because they have access to news stories and other media outlets and then communicate these fears to the Mortlocks living on the island. But they are largely dismissed by people currently living on the atoll. These inhabitants attribute changes in the environment to seasonal variations. Changes in sea level mostly go unnoticed.

Rovere: But from a geological point of view, sea levels were higher “yesterday” and could be again “tomorrow”

without any problem. As an example, three million years ago was the last time we had global temperatures that were three or four degrees higher than they are today and climatic conditions of the sort we are expecting in the future. Sea levels were probably considerably higher then – maybe even between 12 and 35 metres higher. This is the period my ZMT-MARUM research group and I will be focusing on in the next few years, collaborating with a major NSF project called PLIOMAX, led by Maureen Raymo at LDEO, Columbia University.

Can you profit from your different perspectives?

Rovere: I find it extremely interesting to discover how human cultures react in long-term processes. There is evidence to suggest that major changes in the civilisations around the Mediterranean were linked to climate change and fluctuations in sea level.

Möisinger: The crucial thing in the future will be for scientists not only to pass on their abstract knowledge about rising sea levels to politicians but also to be able to make recommendations about how this knowledge can be communicated to different human cultures.

SEA LEVEL AND COASTAL CHANGES

Alessio Rovere heads ZMT's new junior research group, which is a joint venture with MARUM at the University of Bremen, funded by ZMT and the German Excellence Initiative. The group will gather knowledge on fluctuations in sea level during the Earth's history and investigate the origins of coastal changes. **Anke Möisinger** is a PhD candidate in ZMT's Department of Social Sciences, working in the research group of Leibniz-chairholder, Bettina Beer. Amongst other things, she is investigating the social dimensions of marine management and conservation in the context of climate change. [> READ MORE](#)

THE SEEDS ARE GERMINATING

ZMT evaluation 2013 – success confirmed

The scientific performance and future strategy of the Leibniz Center for Tropical Marine Ecology are convincing! So said the Leibniz Association Senate following an independent scientific evaluation of the institute – and approved the continuation of ZMT's funding by Federal Government and the Länder. According to the Review Board, ZMT's research work is not only very good, it is also well-positioned to answer the pressing ecological questions on tropical marine ecosystems and global environmental issues.

Outstanding advice

The experts also acknowledged that ZMT had developed impressively. With its new themes in the research programmes and regional focus areas ZMT is setting new standards. The institute's advisory services in the tropical target countries are rated as outstanding. Furthermore, thanks to inhouse collaboration between natural scientists and social scientists, and the successful combination of their methods, the institute has managed to create an unusually visible place for itself in the research landscape.

Even more knowledge transfer

Even though ZMT's performance in transferring research results to practical applications in the partner countries has been impressive so far, it wants to enhance it yet further. In order to extend knowledge transfer the institute has already created a new position (see ZMT FACES on this page). [> READ MORE](#)

BEST SCHOOLING AT ZMT

School student wins "Jugend forscht"

To encourage scientific curiosity amongst school students – that is the aim of "Jugend forscht", a science competition for pupils funded by the Federal Ministry of Education and Research. This year ZMT helped a student with his research project: Simon Kamann from Stuttgart investigated the impact of sunscreen on aquatic organisms at MAREE. He discovered that sun protection products damage corals, earning him victory in the regional round of the competition.

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ONGOING COLLABORATION

Stable network with Indonesia

In April 2014, representatives of the Indonesian Ministry of Marine Affairs and Fisheries and other international organisations (FAO, CTI, GIZ) met in Bremen and agreed to continue collaboration in future: ZMT, which has cooperated with Indonesia on the SPICE Program for more than ten years and will do so until 2015, will become involved in the Indonesian Sea Large Marine Ecosystem Project (ISLME). [> READ MORE](#)

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ZMT FACES

Matthias Wolff, head of ZMT's Ecological Modelling Department, has been awarded an honorary doctorate (Doctor Honoris Causa) by the National University of Piura (UNP) for his long term research on fisheries and trophic networks and his teaching involvement with Peruvian research institutions. The honour recognises the fisheries biologist's three decades of commitment to the study of Peru's fisheries resources. Congratulations!



ZMT welcomes **Bevis Fedder** – the new science manager is set to coordinate and strategically develop knowledge sharing between ZMT and key actors in partner countries. The aim of this dedicated position is to enhance the visibility and thus the benefit of the institute's scientific results and its core expertise by sharing knowledge in the partner countries and with international decision-makers.



PUBLICATIONS

Articles

Spatio-temporal patterns of C:N:P ratios in the northern Benguela upwelling system

A. Flohr, et al., 2014. Biogeosciences 11, 885-897.

[> READ MORE](#)

Fishing the last frontier: the introduction of the marine aquarium trade and its impact on local fishing communities in Papua New Guinea

K. Schwerdtner Mániez et al., 2014. Marine Policy 44, 279-286. [> READ MORE](#)

Energy demand of larval and juvenile Cape horse mackerels, *Trachurus capensis*, and indications of hypoxia tolerance as benefit in a changing environment

S. J. Geist et al., 2013. Marine Biology 160/12, 3221-3232. [> READ MORE](#)



Allied in research in Indonesia