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German Environmental Prize goes to Marine Biologist Boetius and Leipzig Waste Water Experts

German President to present prize 28 October in Erfurt – Significance of Oceans and “Clean Water for All”

Osnabrück. Marine biologist Prof. Dr. Antje Boetius (51, of the Alfred Wegener Institute Helmholtz Center for Polar and Marine Research, Bremerhaven) and an interdisciplinary team of wastewater experts from Leipzig who have made the distant vision of "Clean Water for All" a truly tangible goal in Jordan, will each receive half of the 2018 German Environmental Prize award by the German Federal Environmental Foundation (Deutsche Bundesstiftung Umwelt, DBU), which is endowed with EUR 500,000. The DBU thus emphasizes the importance of the seas for climate, biodiversity and food supply and warns of climate change, environmental pollution and overfishing. At the same time, the further demand of the United Nations to make clean water available to the entire world population by 2030 and to ensure adequate sanitation for all, and thus significantly better living conditions, is to be underlined. The prize will be presented by German President Frank-Walter Steinmeier on 28 October in Erfurt to Prof. Boetius and to the team from Leipzig which includes Prof. Roland A. Müller (55), Dr. Manfred van Afferden (57), Dr. Mi-Yong Lee (47), – all of the Helmholtz Center for Environmental Research – and Wolf-Michael Hirschfeld (70), the initiator of the Education and Demonstration Center for Decentralized Wastewater Treatment.

"Living oceans are a must. Without them, we cannot exist."

DBU Secretary General Alexander Bonde emphasized today at the announcement of the award winners that oceans are an important habitat for animal and plant species, and are also the most important heat accumulators on our planet, regulating its climate. They buffer the effects of industrialization and absorb large amounts of carbon dioxide and heat, he continued – and they are the "weather kitchen" of the earth, because

Contact Person

Franz-Georg Elpers
- Press Officer –
Kerstin Heemann
Jana Nitsch
Gesa Wannick

Contact DBU

An der Bornau 2
49090 Osnabrück
Phone: 0541|(0)9633-521
0171|(0)3812888
Fax: 0541|(0)9633-198
presse@dbu.de
www.dbu.de

wind, storms and precipitation often arise above them. Bonde: "Living oceans are a must. Without them we can't exist."

Death zones in the oceans over 245,000 square kilometers in size

In fact, however, the oceans are in a precarious state, it was stated: the melting of the polar caps, warming, industrialization, overfishing and unimaginable amounts of waste are increasingly endangering this fascinating ecosystem. According to Bonde, the number of so-called death zones in the world's oceans – oxygen depletion areas that endanger the populations of living organisms – has grown by more than a third since 1995 to currently over 400, covering more than 245,000 square kilometers, which corresponds to more than two thirds of the area of Germany. This is also due to the fact that 80 to 90 percent of wastewater in developing countries is discharged directly and untreated into rivers, lakes and seas, he said. Creating a functioning, manageable, low-maintenance, cost- and energy-saving wastewater sector in these countries was designated as "a crucial groundbreaking step for improving the livelihoods of local people and their children and grandchildren". At the same time, it was stated that there are still knowledge gaps in the marine ecosystem that need to be filled in order to understand the connections between microbial diversity in the deep sea and global developments such as climate change. Bonde: "Only if we understand these processes can we understand the global climate cycle and act on these findings."

A scientist with outstanding talents

Antje Boetius, the deep-sea and polar researcher and Director of the Alfred Wegener Institute Helmholtz Center for Polar and Marine Research in Bremerhaven, was described by Bonde as an "outstanding scientist with an extraordinary talent for the interdisciplinary understanding of systemic processes in the world's oceans, and for communicating the connections". Her research was said to have shown the importance of deep-sea bacteria for the global climate: Microbes are responsible for the degradation of natural gas (methane), which occurs in large quantities in the ocean floor, to the exclusion of oxygen. "Methane acts as a greenhouse gas with 25 times more impact than carbon dioxide. These bacteria ensure that only part of the gas escapes from the oceans into the atmosphere, and thus prevent the planet from heating up faster," said Bonde. However, according to the concept of "planetary boundaries" developed by leading international scientists, the consequences of global warming above two degrees can no longer be foreseen, he added. The most obvious manifestation of the results of this warming is the constantly dwindling Arctic sea ice cover. The environmental consequences of the decline in sea ice are currently also being researched by Boetius.

Human activity verifiable in the remotest corners of the earth

The marine biologist, ecosystem researcher and science communicator is credited with having repeatedly proven that human activity is detectable in the most remote corners of the earth. Boetius herself is certain that "climate change is also changing the algae and microorganisms on the sea surface. They degenerate through gravity and are the food of deep-sea animals. Therefore, the changes that take place above have a direct effect even in the deepest deep-sea trenches." The researchers at their institute were recently able to detect microplastics in sea ice and in the deep sea. In addition to climate change, Boetius believes that fishing has already changed the world's oceans. Whaling in the 1930s, for example, has decimated the largest sea mammals to this day. This, as well, affects the food web all the way down to deep-sea microbes.

Diversity of life in oceans and in polar regions is also an important resource for the future

Bonde: "As an 'advocate of sustainable management of the seas and polar regions', she also sits at the negotiating table with representatives of the 'ocean industries' at conferences hosted by the United Nations, for example." Their aim is "to make it clear that the as yet unexplored world of the deep sea does not become the victim of destructive deep-sea mining processes, as would be possible through the mining of raw materials such as manganese, iron, cobalt and rare metals. Our oceans should be understood as a part of the planet included in the needed societal action which is also called for in the United Nations' Sustainable Development Goals. The diversity of marine and polar life is included in the important future resources that must be protected."

"Neutral advocate for water resources protection"

The team around the research group in the Department of Environment and Biotechnology at the Helmholtz Center for Environmental Research, and the BDZ initiator Hirschfeld, were described by Bonde collectively as a "neutral advocate for water resource protection", for whom "helping people to help themselves" is the key to success. In Jordan – one of the three countries most affected by water scarcity worldwide and a country whose population has increased by almost 70 percent from 5.6 million in 2006 to 9.5 million (2016), not least due to an influx of refugees from Syria -- the team was said to have done "great pioneering work" for the protection of water resources and to have become "active at all levels: interdisciplinary in science, advisers in business, mediators in politics, informing society and taking a hands-on approach in practical implementation".

Overcoming the boundaries between research and practice

It was stated that with their solution of decentralized wastewater systems, which can be flexibly adapted and can complement existing systems, the wastewater is treated directly at the point of origin and can be used to

irrigate agricultural land. At the same time, the groundwater is protected from wastewater contamination and thus sustainably secured as a drinking water resource. Combining old and new structures and developing and advancing sustainable wastewater treatment have only become possible by overcoming the boundaries between the natural-, engineering- and social sciences, but above all between research and practice, according to Bonde: "Unfortunately, this is a stroke of luck which is too rare in German research."

Lack of water plays a decisive role as a central cause of migration

The DBU's Secretary General said that the political anchoring and long-term realignment of Jordan's wastewater sector has made it realistic to achieve the Jordanian Ministry of Water's goal of increasing the annual volume of treated wastewater from the current 140 million to 235 million cubic meters by 2025, and to achieve a connection rate of around 80 percent. It was stated to be of major importance that this should work, in light of the fact that at least two billion people worldwide use drinking water that is contaminated with feces. In addition to poverty, the lack of economic prospects and of political participation, and difficult living conditions including water shortages, play decisive roles as central causes of migration.

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