



The oceans as an opportunity and challenge Groundbreaking exhibits in the German Pavilion

Expo 2012 Yeosu Korea – 12 May to 12 August

Motto of the International Exhibition: The Living Ocean and Coast

Hamburg, 7 March 2012 – They cover more than two-thirds of the earth's surface and more than a billion people live at their coasts: The oceans. Expo 2012 Yeosu Korea is dedicating itself to this large ecosystem on Earth, from 12 May to 12 August, under the motto "The Living Ocean and Coast". This still astonishingly unresearched part of our planet plays a crucial role in the future of mankind. Therefore, responsible handling of seas and oceans is all the more important.

The German Pavilion is directing attention to the key aspects of the Expo theme with innovative and forward-looking exhibits. The exhibits offer future-orientated solutions and ideas for global challenges in three areas of emphasis. The bandwidth of the informative and entertaining exhibits covers the economic aspects, as well as issues of environmental protection and biodiversity.

In the first exhibition area, "Coasts", the visitors are received by multimedia beach chairs that deal with life on the coasts and in bodies of water near to coasts. One beach chair is dedicated to Tsunami early warning systems. The dangers that can result from huge flood waves, was experienced by people, inter alia, on 11 March 2011 in Japan, when a Tsunami ravaged the Japanese main island and caused considerable damage to the Fukushima nuclear power plant.

Tsunamis are either triggered by seaquakes, as in 2011 off Japan or through major landslides. Warning systems do not prevent such disasters, but they can gain valuable time for the people, in order to prepare for the threat. After the huge seaquake off Sumatra in December 2004 and the subsequent, destructive flood wave, Germany made a significant contribution to the development of a Tsunami early warning system in the Indian Ocean, under the leadership of the German GeoForschungsZentrum GFZ in Potsdam.

Daniel Acksel, Project Manager at GFZ: "A key function of early warning systems is to compile all available information and generate warning messages from it, so that authorities can initiate evacuation measures very quickly and the population can be brought to safety."

The early warning system in the Indian Ocean is the newest of its type so far. It measures the earth movements through an efficient network of seismometers and GPS stations along the tectonic fault zone, south of Sumatra and Java. Gauge stations on islands of the coast and on other sections of the coast supply additional information. Daniel Acksel: "Tsunamis are a global problem. The Mediterranean is also under threat of seaquakes and related flood waves, due to the existing tectonics. Plans already exist for several neighbouring states to also implement an early warning system here."

At the exhibit in the German Pavilion, the visitors can select various seaquake "hot spots" using a touch screen. A computer simulation shows how the waves extend from the respective epicentre of a seaquake and illustrates the operating principle of the Tsunami early warning systems. The visitors find out something about the worldwide spreading of the huge waves on



the basis of the three example regions of the Pacific Ocean, Indian Ocean and the Mediterranean Sea. Simulations are shown of the Tsunami events in Japan in 2011, Indonesia in 2004 and Algeria/Mallorca in 2003. Colour codes show the height at which the individual waves hit the coasts.

Important findings about the Tsunami risk of a region is provided by the surface condition of the ocean floor. Its exploration and measurement, the so-called bathymetry, is carried out by unmanned diving robots. In the second exhibition area, "Biotope", the German Pavilion shows spectacular films about the use of such a diving vehicle on an exhibit. The pictures originate from the QUEST diving robot of the MARUM Centre for Marine Environmental Sciences at the University of Bremen. It belongs to the class of so-called ROVs (remotely operated vehicles), which are linked with a research ship through a supply cable.

Dr. Volker Ratmeyer, Project Manager, MARUM Deep Sea Technologies: "With the QUEST, we are researching, inter alia, black smokers and mud volcanoes on the ocean floor in depths of up to 4,000 metres. In April, we will be researching off the coast of Japan, to see which traces the seaquake of March 2011 has left on the ocean floor." The 3.5-ton ROV has been in use since 2003 and is constantly being upgraded with the latest technologies. Dr. Volker Ratmeyer: "It is our 'workhorse', because by the beginning of 2012, it has participated in 26 expeditions and has completed 317 dives in all of the oceans. During the course of this, we have gathered around 2,500 hours of film material."

The German Pavilion is showing some of the best MARUM QUEST pictures in the highest HD quality and will provide the visitors with unique insights into life at several thousand metres' depth. Cold water corals, which serve as children's school for many fish, mud volcanoes in the Black Sea, which are inhabited by shimmering, purple tubeworms and methane hydrate deposits in the Indian Ocean that are covered with mussels are examples of the fascinating diversity of the deep sea.

The ocean floor also plays a key role in the "Treasure Chamber", the third exhibition area of the German Pavilion. An exhibit shows a manganese nodule as a symbol for the future excavation of raw materials in the deep sea. Molecular Biologist, Prof. Werner E.G. Müller from the Institute of Physiological Chemistry of the medical faculty of Mainz University, which has provided the exhibit: "In addition to nickel, copper and cobalt, manganese nodules also contain the sought-after, rare earths that are required for the production of computers, smartphones and solar cells."

In the Pacific, a manganese nodule belt extends from the west coast of Mexico past Hawaii on the ocean floor. Several industrialised nations, including Germany and Korea, have secured exploration licences there. With around 75,000 square kilometres, these areas are larger than the Benelux countries. In response to the question regarding the excavation of the raw materials, the Mainz institute achieved a major advance recently. Prof. Werner E.G. Müller: "Together with a Chinese scientist, we researched how we can filter the specific inorganic components from the seawater, without needing to excavate the manganese nodules."

The manganese nodule in the German Pavilion, which originates from the German territory in the Pacific, has a diameter of nearly ten centimetres and weighs around 200 grams. As the



nodules only form extremely slowly and grow layer-by-layer, like an oyster pearl, the exhibit has an estimated age of up to five million years.

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