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Ocean monitoring system 'vital to mankind'

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A monitoring system for the world's oceans is vital for the future of mankind, according to an international group of scientists.

They are urging support for a £1.5bn marine monitoring system to be built within 10 years.

Warming seas, over-fishing and pollution pose threats which have to be constantly measured and monitored, according to the Partnership for Observation of the Global Oceans (POGO).

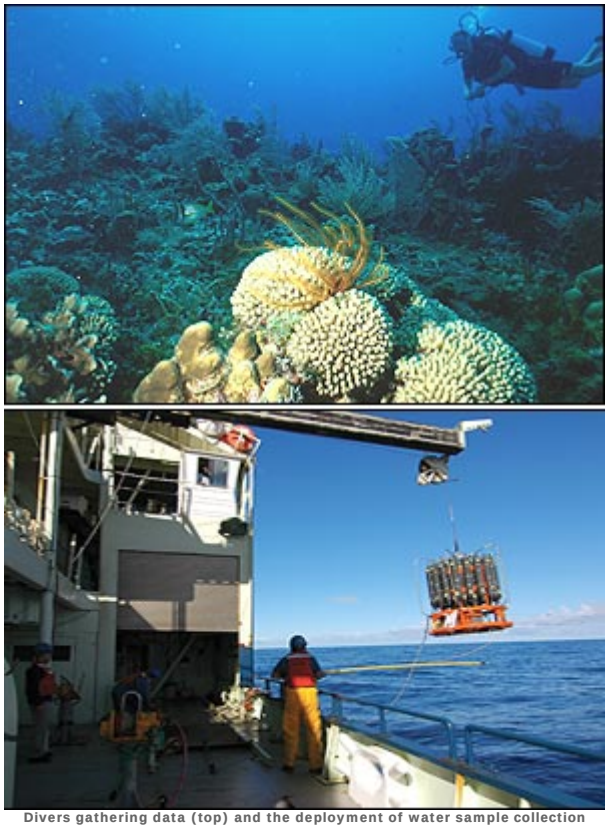
The scientists say an integrated ocean observation system would quickly pay for itself by providing early warning of storms, including tsunamis, safer maritime operations and conservation of fish stocks as well as collecting the vital signs of the ocean needed to monitor climate change.

The call comes as officials from 71 countries gather in Cape Town for the intergovernmental Group on Earth Observations (GEO) conference.

The meeting will review progress and map out the next steps in a 10-year effort to build a ground-based, ocean-drifting, air-borne and space-based Global Earth Observation System of Systems (GEOSS) to monitor all of Earth's environmental conditions.

Dr Tony Haymet, Director, Scripps Institution of Oceanography, University of California San Diego, USA, and Chair of POGO's Executive Committee, said: "A system for ocean observing and forecasting that covers the world's oceans and their major uses can reduce growing risks, protect human interests and monitor the health of our precious oceans.

"The world community resolved to construct a comprehensive, integrated ocean observing system two decades ago. The good news is we have demonstrated that a global ocean observing system can be built, deployed and operated with available technologies.



Divers gathering data (top) and the deployment of water sample collection equipment

"Now we must move from experiment and proof-of-concept to routine use. We have progressed less than halfway to our initial goals. Let's complete the task before we are struck by more tsunamis or comparable calamities."

The monitoring system would involve the expansion of such systems as:

- a stable network of satellites surveying vast extents of the surface of the oceans;
- fixed stations taking continuous measurements on the seafloor or as floats and buoys moored in the water column and at the surface;
- small robot submarine ocean monitors, some drifting with the currents, others motoring along programmed routes;
- marine animals ingeniously outfitted with electronic tags that equip them to capture and transmit data about the environments they visit;
- merchant marine and research vessels observing and taking measurements along their routes.

There are already 3,000 small, drifting "Argo" probes that measure pressure, salinity and temperatures at depths of up to 2kms but POGO says up to 10 times as many are needed to produce a high-resolution global picture of marine conditions.

Field testing is underway of 'air-clippers' - atmosphere and ocean surface sensors tethered to balloons. From these scientists have been able to measure atmospheric and ocean measurements from within the eye of a strong cyclone where the balloons become trapped.

Robot submarines are also used to record life and conditions in ocean deeps but scientists say they have barely scratched the surface with the resources available.

They have also tagged more than 2,000 marine animals who travel into the deep oceans including elephant seals, white sharks, leatherback turtles, squid and albatross. Elephant seals, spend 10 months at sea and dive up to 1.5 km below the ocean surface.

Light, depth, temperature and salinity data measured by the tags is transmitted via satellite as the creatures travel. This helps reveal diversity hot-spots, fish nurseries and migratory routes that need protection.

Across the earth's equatorial region 50 moored buoys have been deployed to measure temperature, currents, waves and winds, salinity, carbon dioxide, allowing scientists to study the signs of and predict destructive weather patterns such as El Niño.

Scientists say four times as many are needed to create more uniform coverage. Some areas have no sampling stations at all.

Pressure gauges deployed near shore and on the deep seafloor help detect both sea level rise and tsunamis. The deep-sea operation involves a surface buoy to receive the information from below and relay it to ground stations via satellite.

There were six Deep Ocean Assessment and Reporting of Tsunamis (DART) stations, all of them deployed in the Pacific, at the time of the earthquake and devastating Indian Ocean tsunami of December 2004. An additional 32 DART buoys were soon announced, including stations in the Indian, Caribbean and Atlantic oceans.

The scientists also want to see more satellites which provide a high-altitude window on marine characteristics such as sea surface roughness, temperature, currents, ice cover and shifting meadow-like areas where marine plants grow.

"Oceans cover a majority of our planet - 71 per cent - yet are vastly under-sampled," said Dr Haymet. "We have an urgent need and new technological marvels available today to complete a system by which marine scientists could authoritatively diagnose and anticipate changing global ocean conditions - something akin to the system that enables meteorologists to predict weather.

"A continuous, integrated ocean observing system will return the investment many times over in safer maritime operations, storm damage mitigation, and conservation of living marine resources, as well as collecting the vital signs of the ocean that are needed to monitor climate change.

"The information gleaned will improve understanding of plankton blooms, fish migrations, changing ocean conditions, climate change, underwater volcanic eruptions, earthquakes and the processes that cause them, and help warn of approaching tsunamis."