Adopt a Drifter: Introducing long-term ocean observation to schools

The GEF/UNDP ASCLME Project, based in Grahamstown, South Africa, is poised to launch a pilot project aimed at involving South African learners in ocean science. In partnership with the United States National Oceanic and Atmospheric Administration (NOAA), the Project is developing a South African curriculum-focused "Adopt a Drifter Programme" (ADP).

"Imagine a world where we didn't have any weather stations to tell us what is happening to the earth's climate," says James Stapley, the ASCLME Project's Communications and IT Coordinator, "This is a little bit like the oceans have been for researchers up until quite recently."

Large international efforts have paved the way towards filling in this gap in our understanding of the world. Thousands of robots now patrol the deep ocean, quietly working away and sending back data to land for researchers from around the world to analyse and learn about the oceans in unprecedented detail. The data from many of these initiatives is available in near real-time to anyone in the world with an internet connection - without requiring subscriptions or passwords. "Seeing the furore that has erupted over "Climategate" in the last few months shows us the value in having free and open access to scientific data, a greater public understanding of climate science and of scientific research in general" remarks James.

Climate science, much like the earth's climate system, is incredibly complex, a field that employs hundreds of researchers in a vast array of disciplines around the world. It's hard to demystify when most of the work involves "equations that make my brain ooze out of my ears" as James remarks about such intricate numerical models. But not all ocean science is quite so mathematically challenging and it's important to give learners a chance to gain a deeper, practical understanding of the way scientists come to understand global climate change and environmental variability in a hands-on way.

"This is a phenomenally exciting time to get involved in marine science" says James, "and the Adopt a Drifter Programme will give learners a chance to actually get involved themselves". Schools which get involved in the Programme will be partnered with a school from the United States, giving learners on two sides of the world a chance to learn more about each other and collaborate in understanding the world's oceans. As exciting as doing real science with real data might be, most learners find adopting the actual drifter to be a highlight of the Programme. Schools are sent stickers, which the learners then sign with a waterproof marker. These stickers are affixed to a satellite drifter, which is launched from a research vessel as soon as one is available. Learners are then able to see the progress of their own drifter through the ocean in real time. "We take pictures of your buoy as it's being deployed from the ship – it's an exciting moment, like sending a friend on a long trip. You'll soon see how your drifter is affected by ocean currents – sometimes in rather surprising ways", says James. The drifters also measure sea surface temperature, so you can keep your eye on how warm the ocean is. On average, drifters operate for up to 400 days at sea before their batteries run out.

Using real-time data and the Internet, learners will quickly dive into the same data that scientists around the world are using to understand our oceans and look for patterns indicative of climate change. Innovative educators can use the data to develop new lesson plans relevant to South Africa's national curriculum, and will be supported by the ASCLME Project and NOAA's ADP resource in learning how to interpret the data for learners so that they will be able to analyse the data and draw conclusions from it.

There are other accessible sources of information about the ocean's temperature too, like the Argo float network and ATLAS mooring system. Argo is a huge army of over 3,200 robotic floats that profile the ocean's temperature and salinity between 2,000m and the surface for up to five years each, and give an indication of the strength and direction of both deep ocean and surface currents. Argo was completed in 2007 and is giving scientists an unprecedented view of the oceans:

"Before Argo, every single research vessel in the world collected a total of about 5,000 profiles of the ocean's temperature and salinity a year. That might initially sound like a lot, but imagine if that were weather stations around the world. With only a single weather station taking just one measurement of temperature every hour for a year, you'd take nearly 9,000 measurements. Considering just how

vast the oceans are and how important they are to the Earth's climate system, that's a tiny amount of data. Fortunately, the Argo network now sends us over 100,000 temperature and salinity profiles a year and will allow us to understand the oceans and their variability in unprecedented detail and we'll be able to detect the signs of climate change," says James.

"ATLAS is also a fantastic tool. In the Indian Ocean, our Project is helping to deploy a network of moorings called RAMA, which couples oceanographic instrumentation under the water with a comprehensive weather station at the surface on a large buoy and helps us to understand the interactions between the ocean and the atmosphere. We've received a phenomenal amount of support from NOAA for our plans to ensure that the ASCLME Project leaves a lasting legacy in a functioning long-term monitoring and early warning system and of course, trained personnel in each of the countries of the western Indian Ocean, able to understand and manage their shared marine ecosystem using the ecosystem approach, as called for in the targets set by the World Summit on Sustainable Development and the United Nation's Millennium Development Goals."

Such an understanding will also likely improve the accuracy and long term forecasting ability of climate models and help meteorologists, scientists, governments and resource managers better predict the effects of climate change and use that knowledge to help mitigate its effects and assist their people in adapting to climate change. "We're also hoping that increased information will help climate scientists to give us finer-scale information, so instead of telling us what large areas of South Africa might be like, we'll be able to tell what will happen to particular towns and villages," says James.

"We're really excited to hear from educators who would like to "jump aboard" our programme, and I'd welcome them to contact me for more information".

James Stapley and Dr. Tommy Bornman, will be presenting a lecture entitled "Sexy Science! Ships, Buoys and Robots" about marine technologies and their use in research and will discuss the importance of such research to ordinary people. The lecture is at 11:30 am on Monday 29th of March at Scifest in Grahamstown. A satellite drifter is on display at the ASCLME Stand in the Thomas Pringle hall during Scifest 2010.

For more information, please visit:
NOAA's Adopt a Drifter Program [sic] website:
http://www.adp.noaa.gov/

The ASCLME Project's website:
http://www.asclme.org/scifest2010/

The Argo Project
http://www.argo.ucsd.edu/

The RAMA Atlas Buoy Array:
http://www.pmel.noaa.gov/tao/doc/rama.html
http://www.pmel.noaa.gov/tao/

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General Information about the ASCLME Project

It is estimated that approximately four million tonnes of fish are harvested off the east coast of Africa every year and that fisheries exports alone contribute US$943 million (R6.9 billion) to the economies of the region. The value of non fishery-related marine ecosystem goods and services is even higher, but is not recorded by traditional accounting or economic practices. Yet, while scientists believe that fewer than 50% of marine species off the east coast of Africa have been described, human activities - such as pollution, over-fishing and environmental degradation – seriously threaten the region's coastal and marine resources. Climate change is expected to further compound the issues.

This is the reality facing the nine countries of the western Indian Ocean, namely Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, South Africa and Tanzania.

The five-year ASCLME Project is centred on the two Large Marine Ecosystems (LMEs) of the Western Indian Ocean region. These are the Somali Current LME in the north and the Agulhas Current LME in the south. An estimated 56 million people, living in the nine countries of the region, are dependent on the resources of the two LMEs.

Over the next five years, the nine countries will work together through the ASCLME Project to:

- gather new and important information about the complex ocean currents and how they interact with and influence the climate, biodiversity and economies of the Western Indian Ocean region;

- document the environmental threats - such as marine pollution and declining fisheries - that are faced by the countries of the region;

- create a long term monitoring and early warning system to detect, enable adaptation to and mitigate the effects of climate change in partnership with the countries of the region.

- develop a strategic action programme to deal with environmental threats;

- strengthen scientific and management expertise, with a view to introducing an ecosystem approach to managing the living marine resources of the Western Indian Ocean region.

"The Agulhas and Somali currents have a major influence on the societies and economies of the Western Indian Ocean region," says Dr David Vousden, Director of the ASCLME Project, "yet there are large gaps in our understanding of their oceanographic processes, biodiversity and other fundamentals."

Between 2008 and 2012, researchers affiliated to the ASCLME Project will embark on a series of well-coordinated oceanographic research cruises in an attempt to gather information about the oceanography and living marine resources of the two LMEs. The coastal resources and their critical link to the well-being of coastal communities will also come under intense scrutiny.

Research findings will lay the groundwork for the nine countries of the region to develop a strategy for collectively managing the resources on which their people and economies depend.

"The countries of the region have already recognised their collective responsibility for their shared marine resources and voiced their support for this regional initiative," says Dr Vousden.

The ASCLME Project is funded by the Global Environment Facility (GEF) and implemented by the United Nations Development Programme (UNDP). Funding of $12.2 million (R90 million) has been secured from the GEF for the duration of the Project. The UNDP country office in Mauritius is acting as the lead country office for the Project and South Africa is hosting the ASCLME Project in Grahamstown at the South African Institute for Aquatic Biodiversity.

For more information:
http://www.asclme.org/