Bridging the political divide across the Gulf of Aqaba

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The Gulf of Aqaba is a strategic waterway that includes less that 10 miles of Israeli coastline and provides Jordan's only access to the sea. Credit: Levi Cochran, Woods Institute for the Environment, Stanford University

Scientists from Stanford University have teamed up with Israeli and Jordanian researchers to protect the Gulf of Aqaba, a strategic waterway whose fragile marine ecosystem is vital to both Israel and Jordan. Participants in the NATO-funded project say they are bridging the Arab-Israeli political divide for the sake of science, peace and environmental conservation.

"The people involved are interested in international collaboration in

science and protecting the place they live," said project co-director Stephen Monismith, a professor of civil and environmental engineering at Stanford. "Nothing in the ocean understands political borders."

That's especially true in the Gulf of Aqaba (known in Israel as the Gulf of Eilat), a 99-mile-long extension of the Red Sea surrounded by four countries - Israel, Jordan, Egypt and Saudi Arabia. Lush coral reefs flourish here, offering habitat for hundreds of fish and invertebrate species. The beaches and reefs have turned the neighboring cities of Aqaba, Jordan, and Eilat, Israel, into major tourist destinations that provide much-needed income for both countries.

But the gulf is also an important transportation route for oil, and its shores are lined with industrial plants, naval bases and chemical export facilities, all of which threaten to spoil the delicate marine ecosystem.

Science for peace

To protect the gulf against oil and other toxic spills, Monismith and Stanford colleague Jeffrey Koseff, a professor of civil and environmental engineering, embarked on a unique collaboration with four marine scientists from the Middle East - Jordanians Riyad Manasrah and Tariq Al-Najjar, and Israelis Amatzia Genin and Hezi Gildor.

In November 2006, the researchers were awarded a three-year grant from the NATO Science for Peace and Security Program to study the physical processes that drive water circulation on the surface of the gulf. The goal of the project is to provide detailed oceanographic data that will help environmental agencies in Israel and Jordan respond to spills and minimize pollution.

Coral reefs in the Gulf of Aqaba provide important habitat for marine life and are major tourist destinations for Jordan, Israel and Egypt. Credit: Stephen Monismith, Woods Institute for the Environment, Stanford University

"The movement of surface currents is a big part of how an oil spill spreads," said Monismith, a senior fellow at Stanford's Woods Institute for the Environment. "Our idea was to create a real-time map with the surface currents, and then theoretically we could see where the spill is going and clean it up."

Since 2007, the scientific team has installed three high-frequency radar systems - two in Israel and one in Jordan - that measure surface currents on both sides of the gulf, along with Acoustic Doppler Current Profilers, which use sonar to measure current velocities at various depths, and other instruments.

So far, the researchers have discerned gyres, internal waves and a large-scale convection in the surface waters. These findings have greatly increased the understanding of how currents behave inside the gulf, and

how water is exchanged between the gulf and the larger Red Sea, Monismith said.

Beyond borders

In spring 2008, as part of the data-gathering process, Monismith traveled to Jordan to join his Middle East colleagues on the first cross-gulf scientific expedition.

"We boarded a boat in Aqaba with a Jordanian crew, and we did transects from coast to coast," recalled project co-director Amatzia Genin, a professor of ecology at the Hebrew University of Jerusalem. "We had oceanographic equipment, and we did transects back and forth between Jordan and Israel. There was no customs, no passports, no police. That was the first time ever, and that was so nice."

The cruise was "an exciting accomplishment for both Jordan and Israel," added Koseff, co-director of Stanford's Woods Institute. "It's also been a very positive program for Stanford and gives students amazing opportunities to work internationally." To date, three Stanford graduate students have completed core elements of their doctoral dissertation work in the gulf.

In addition to mitigating environmental disasters, an understanding of how the gulf circulates and mixes could help officials plan large-scale water projects, such as the proposed Red Sea-Dead Sea Canal. That project aims to provide power and fresh water to Jordan, one of the most water-starved countries in the world, but its environmental consequences remain a source of controversy.

"This is really just the start for understanding the dynamics of water circulation in the gulf," said NATO project co-director Riyad Manasrah, a physical oceanographer at the Marine Science Station in Aqaba,

Jordan. "We still need more work to fully understand how the gulf water mixes with the Red Sea."

Eventually, the scientists hope to work jointly with researchers in Egypt and Saudi Arabia, two other countries that border the gulf. Meanwhile, the research team has asked NATO to extend the Stanford-Jordanian-Israeli project through 2010.

"For me, this is the first joint project with colleagues from an Arab country," said project co-director Hezi Gildor, a physical oceanographer from the Weizmann Institute of Science in Rehovot, Israel. "From my point of view, it has worked very well. We shared the data, we shared the instruments, we did a joint cruise. It was a nice and unique experience to deal with this type of collaboration, and I'm looking forward to continuing it."

Source: Stanford University (news : web)