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BENEATH THE WAVES

Canessa, standing, and graduate student Cathryn Brandon. UVIC PHOTO SERVICES

A UVic-led study uses advanced 3D mapping to assess the impact of shipping noise

by Kim Westad

It's easy to overlook the vibrant world beneath the ocean's surface. After all, maps and satellite images of Earth show the land in all its variations, with texture and perspective. But the ocean is usually shown as flat and bare of anything that reflects the active life in its depths.

It's something that has always stood out to Rosaline Canessa, a University of Victoria geographer with a passion for computer mapping.

"When the ocean is depicted as flat and lifeless—which it is not—it's easier for people to think, "Well, we can do whatever we want with it because there's nothing much there," says Canessa. "There's a vast unmapped world under the surface, but if people don't see or hear it, they tend to think it's not important."

Canessa is leading a three-year research project that seeks to change those perceptions. The study is using advanced 3D mapping techniques to better understand how underwater noise from passing ships can impact marine ecosystems.

Ship-based noise is expected to increase as marine vessel activity expands due to longer ice-free passages in the Arctic, planned port expansions, a new marine terminal in Vancouver and proposed pipeline expansions.

Studies show that ship noise can interfere with the ability of marine animals such as whales and fish to communicate, forage and navigate. This has conservation implications for marine species at risk and possibly for subsistence and commercial fisheries.

As a result, government and industry are increasingly being required to take mitigation measures against acoustic disturbance—without reliable data to inform their decisions.

The UVic-led study is collecting and analyzing data on ship movements and sound off BC and in the Arctic Ocean, and dealing with gaps in data collection, particularly noise from recreational boats.

The study is focusing on three areas: the busy Salish Sea, which is facing a large increase in vessel traffic; Sgaan Kinghlas-Bowie Seamount marine protected area, a productive and sensitive ecosystem west of Haida Gwaii; and Sachs Harbour and Amundsen Gulf, a shipping route bottleneck in the Arctic.

This month, Canessa led a workshop with stakeholder groups—members of the Haida Nation, Fisheries and Oceans Canada, fishing industry representatives and environmental groups—to explore early results of shipping and noise patterns in the Bowie marine protected area.

The researchers are using a variety of systems, including Automated Identification Systems (AIS) and air surveillance to track vessels and improve cumulative noise exposure models.

Making the resulting mass of data useful is Canessa's area of expertise. She and several graduate students will bring the ocean world to life by translating the information into a visual "language" via GIS-based, 3D interactive maps.

Stakeholder groups will be able to view 3D maps loaded with the best available data on large, interactive touch tables. These tools will be used by everyone from community groups to government and industry as they jointly face the issue of mitigating noise impacts from marine vessels.

"Maps are a tremendous way of communicating and collaborating," says Canessa. "If planners and decision-makers have an opportunity to explore the ocean in this way, it will give depth to their understanding and hopefully depth to their policies."

The study is funded by the Marine Environment Observation Prediction and Response (MEOPAR) network.

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The three main sources of manmade noise in the ocean are commercial shipping, military sonar and seismic exploration. In the open Pacific, underwater noise levels have been doubling in intensity every decade since the 1960s.

About 90 per cent of world trade is carried by the international shipping industry. There are more than 50,000 merchant ships plying the oceans, transporting every kind of cargo.

While maps and GIS are already used in marine spatial planning, they're generally limited to mapping processes on the ocean surface and don't capture and communicate the complexity of interrelated marine phenomena.

The 3D mapping developed in this study will allow researchers to run simulations of how much noise can be expected from increased shipping along the coast, and whether this increase could be mitigated through speed restrictions, time-area closures or ship-quieting technologies.

Canessa is director of the Coastal and Ocean Resources Analysis Lab (CORAL) at UVic, which uses spatial technologies to help decision-makers manage resources, resolve user conflicts and protect key ecosystems. Info: *coral.geog.uvic.ca/*

In her classes, Canessa uses her research to show students the many different perspectives people have about the marine environment. "Our challenge is to think about a sustainable plan that meets the objectives of many stakeholders," she says.

Meet Rosaline Canessa at *bit.ly/uvic-canessa*