

## Mapping the Sea: Knowledge for Natural Resources Management

By Crispin Wilson and Pieter Smidt

- **With loss of life from the devastating tsunami of 2004, knowledge of fishing grounds around Aceh was reduced: the locations of reefs and other underwater hazards became less clear to the remaining fishers; consequently, they frequently damaged or lost their nets.**
- **To restore knowledge of fishing grounds, the ADB-assisted Earthquake and Tsunami Emergency Support Project partnered with the Panglima Laot—Aceh’s traditional fishing authority—and with fishers to conduct a community-based bathymetric survey and map the ocean floor.**
- **The beneficiaries collected data to help produce maps of hazardous coastal areas, potential fishing grounds, and ocean currents.**
- **Because of the survey, the Panglima Laot and fishers learned to partner with others and their capacity to keep more transparent accounts was improved.**

### Challenge

When a tsunami struck Aceh in Northern Sumatra, Indonesia on 26 December 2004, it killed 186,000 people and caused widespread destruction. ADB and other organizations provided emergency support through the Earthquake and Tsunami Emergency Support Project.

Many fishers died and, as a consequence, much knowledge of coastal areas, fishing grounds, ocean currents and navigational hazards disappeared. Over the centuries, such information had been transferred from father to son. With its loss, fishers often damaged or lost their nets on underwater obstructions, and faced difficulties in identifying their position at sea. This impacted the livelihoods of boat owners, captains, crews, and families.

### Approach

To recover fishing know-how, the project partnered with the Panglima Laot, Aceh’s traditional fishing authority, to undertake a community-based bathymetric survey and map the ocean floor.

In existence for more than 4 centuries, the Panglima Laot is a network of local fishers’ associations that share a strict set of rules and regulations. There are currently 193 Panglima Laot in Aceh, each one centered on an estuary or a harbor. Panglima Laot is both the name of the institution as well as the title of the elders who lead the organization. Their responsibilities include arbitrating disputes, regulating fishing areas, and organizing rescues. Should a fisher violate its strict code of conduct, the



All hands on deck on an Acehnese fishing boat

Photo by Crispin Wilson

Panglima Laot can “ground” the boat. If the fisher continues to disobey rules, the Panglima Laot can forbid him to sell fish in the market, confiscate the catch, and, in rare cases, prohibit a fisher from operating in the area.

### Results

The survey used readily available and affordable technology. The participating captains were provided with 63 Global Positioning System (GPS) sounders that are locally available at a cost of \$750 per boat. With the installation of the sounders on artisanal fishing boats selected by the Panglima Laot, fishers could navigate more easily and automatically gather the data needed to map the ocean floor.

In return for installation of the GPS sounders, facilitated by training, captains allowed project staff to come onboard, download map data, and copy catch logs. New navigational maps were drawn from the data. These were then distributed at navigational training courses to over 486 captains, fisheries department staff, and enforcement officials. It was the first time that many had ever seen such maps.

The survey’s bottom-up approach worked better than expected. In a little over 7 months, fishers were able to collect over 5 million data points and produce a better map of the area than had ever been made before. Comparing their collective traditional know-how with currently available navigational and scientific knowledge, they were able to identify 3 previously unmapped sea mounts, 4 unmapped geologic faults, and a large number of formerly “unknown” coral areas. A significant direct benefit was that the incidence of damaged nets fell from an average of 38 per year to just 1.

Survey-related project activities built capacities sector-wide. Fishers learned to frame and respond to a variety of organizational, technical, and scientific questions. The Panglima Laot also developed more transparent accounting practices and reporting procedures. As a group, the fishers greatly improved

their relationships with the provincial Department of Fisheries, the Marine Police, the Department of the Interior, and local academic institutions.

### Other Outcomes

Several beneficial outcomes from the project had not been anticipated:

- fishers saved fuel by navigating directly to and from fishing grounds;
- one of the 3 previously unmapped sea mounts may add about 13,000 square kilometers to Indonesian waters, thereby extending the country's boundaries;
- in one case, and there may have been more, knowing exactly where they were saved the lives of a captain and his 18 crew members who were able to radio their position after their boat broke; and
- close cooperation between the Panglima Laot, government agencies, and local universities set the stage for better management of Aceh's coastal resources.



The catch of the day: a 25-kilo yellowfin tuna

Photo by Crispin Wilson



Officers of Panglima Laot Lhok Krueng Aceh gather in prayer

Photo by Crispin Wilson



On deck, hands-on training of fishers and fisheries officers in the use of modern technology

Photo by Crispin Wilson

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