Inside this issue

Community collection of ocean current data: An example from Northern Aceh Province, Indonesia
S. Rizal et al. p. 3

“Modernology”, cultural heritage and neighbourhood tourism: The example of Sheung Wan, Hong Kong

“Fish and People”: An innovative fisheries science learning tool for the Pacific
S. Foale p. 21

Recent publications... p. 24

Editor’s note

This edition consists of three contributed articles, plus notes on a few selected recent books. In the first article, “Community collection of ocean current data: An example from Northern Aceh Province, Indonesia”, Syamsul Rizal and his co-authors describe the involvement of local fishermen in a data gathering project conducted to augment and complement their own local knowledge. In contrast to long-term projects using experts, the approach described in this article illustrates an inexpensive way of data collection involving fishermen. Because it involves fishermen in all stages of the research process, later application of the results to develop the skills and therefore the incomes of fishermen is facilitated. The research system was designed so that participating fishermen could collect oceanographic data while engaged in regular fishing activities using fishing boats, gear and equipment that included GPS sounders with data logging formed provided as part of the post-tsunami recovery assistance to Aceh fishermen by the Body of Rehabilitation and Reconstruction. This GPS and its accessories are used by fishermen to collect and record oceanographic properties of the water when they go fishing. Fishermen are trained in using a GPS and reading the maps produced by the data they gathered, with trainers chosen both from among fishermen and university students. They were trained how to train for approximately one week. These people then trained the fishermen how to use a GPS. The data obtained by the fishermen were collected by the trainer, who used the information to produce a map. The fishermen also provided information on underwater hazards they had experienced, so it could be added to the maps.

Economic and leisure activity diversification is a constant challenge to small states, be they islands, cities, or something else. So the second article in this issue, in which Sidney Cheung and Jiting Luo describe an innovative project conducted in the Sheung Wan neighbourhood of Hong Kong Island, by the Department of Anthropology at the Chinese University of Hong Kong, to assist the diversification and improved management of local cultural resources for Hong Kong’s in-bound tourists, should be of particular interest in the Pacific Islands region. Hitherto, visitors to Hong Kong have been directed toward shopping, and led to sample a variety of cuisines in just the main tourist destination districts. Although in that way visitors can enjoy the unique atmosphere in Hong Kong as an Asian metropolis, the marketing of the city as a “consumer destination” fails to convey a sense of local Hong Kong cultures, traditions or heritages. The project’s immediate objectives were to examine the cultural and heritage roles of a local community and tap into its collective knowledge, ascertain the needs of the tourists regarding cultural tourism, and develop a local
community cultural tour prototype that, by using an Internet information base, enables tourists to learn about local and national history, traditional trade relations, impacts of globalization, Chinese culinary culture, local development, and heritage preservation strategies. This project employed cross-cultural, interdisciplinary and critical approaches in order to understand the historical background and culinary heritages of Hong Kong society, as a social and cultural basis for the development of sustainable tourism. In the long term, the prototype developed in Sheung Wan can serve as model so that more local Hong Kong neighbourhoods would be included in an overall cultural tourism project. To better understand the history and trade system of Shueng Wan as a coastal hub, the authors and their team conducted interviews with traders (importers, wholesalers and retailers) as well as shoppers in the local community. They did this to tap into their knowledge and stories about their trades and heritage preservation strategies. Information gathered from these interviews, surveys and archival materials forms the basis for an interactive website that contains walking maps and academic articles and books for reference. It enables visitors to explore the history and culture of Nam Pak Hong (a south–north trading company), the Chinese herbal medicine street, and the salted fish alleys in Sheung Wan. This way, communities’ awareness of being promoters for Hong Kong tourism can be enhanced, and both in-bound and domestic tourists can enjoy and benefit from learning — from the perspective of everyday life — how Hong Kong developed into a world-renowned city. Particularly important also is that the collective knowledge of a community can be preserved and passed on to future generations.

The project is ongoing. Professor Sidney C.H. Cheung is Chairperson of the Department of Anthropology and concurrently Associate Director of the Centre for Cultural Heritage Studies, The Chinese University of Hong Kong. His research interests include visual anthropology, tourism, heritage studies, and food and identity, which are reflected in his co-edited books “Tourism, Anthropology, and China” (White Lotus 2001), “The Globalization of Chinese Food” (Routledge Curzon 2002), and “Food and Foodways in Asia: Resource, Tradition and Cooking” (Routledge 2007). Luo Jiting received her M.Phil degree in Anthropology at the Chinese University of Hong Kong and is now a research assistant in the Department of Anthropology, The Chinese University of Hong Kong. She is interested in traditional ethnic architecture, food studies and heritage studies, as reflected in her articles published in Hong Kong Discovery and Sheung Wan.

In the third article, “Fish and People: An innovative fisheries science learning tool for the Pacific”, Dr Simon Foale of the Department of Anthropology, Archaeology and Sociology at James Cook University, in Townsville, Australia describes a new fisheries science education DVD targeted mainly at high school students in Solomon Islands and Papua New Guinea. However, it is already proving popular with a much broader range of audiences in Solomon Islands and Papua New Guinea, and in far-off Kenya. The tool is constructed around a series of interviews with Solomon Islanders (fishers, scientists, non-governmental organization workers, government officials and teachers), each of whom delivers a key part of the message, in language and context of immediate relevance for the target audience.

Kenneth Ruddle
Community collection of ocean current data:  
An example from Northern Aceh Province, Indonesia

Syamsul Rizal,1 Haekal A. Haridhi,1 Crispen R. Wilson,2 Akhyar Hasan3 and Ichsan Setiawan1

Abstract

As part of a recovery assistance package following the Indian Ocean earthquake and tsunami that occurred in December 2004, some fishing boats were equipped with global positioning system sounders with a data-logging device. Using this equipment, we conducted research that tried to promote a mutually beneficial framework between researcher and fishermen, based on ocean current data collection carried out by fishermen. One of the beneficiaries was the purse-seine fisher. Data from the purse-seine fisher’s activities — date, time, position, speed, and water depth — are recorded by this equipment. These records enable us to distinguish where they drop their nets. This research and data collection was done between 25 November 2007 and 31 December 2008. The current was measured according to the sea level rise, and these levels are divided into four categories: rising, high, falling and low tide. Observation and model results were compared, and found to agree well.

Introduction

The devastating Indian Ocean earthquake and tsunami that occurred in December 2004 ranks among the worst natural disasters ever recorded. In Indonesia’s Aceh Province alone more than 186,000 people died, including an estimated 15–20% of fishers (~ 10,000 individuals). In addition, the tsunami damaged or destroyed over 10,000 small-scale fishing boats, countless items of fishing gear, and associated fisheries-related infrastructure (Garces et al. 2010; Stobutzki and Hall 2005).

Besides the fisherman’s lives that were lost, another incalculable loss that resulted from the tsunami was the practical professional information possessed by the dead or missing fishermen. Prior to the tsunami, no scientific observations had been made in the surrounding waters where the fishermen operated, hence there was no documentation regarding local fishing grounds. Likewise, the local knowledge of the fishermen had not been recorded.

In order to augment and complement the knowledge of fishermen, scientific research and survey is required in this region. However, most conventional research methodologies are expensive, take a long time to accomplish, and require the services of experts (Garces et al. 2010), whereas what is required is that: 1) research be inexpensive, 2) information be easily gathered, 3) data collection involve fishermen, and 4) all stages of the research process and its outcomes be applied to develop the skills and incomes of fishermen.

To accomplish that we used a community-based survey as a research activity, in which fishermen were involved in collecting the data. The research system was set up so that the fishermen could collect oceanographic data at the same time as they were engaged in their regular fishing activities. As part of the post-tsunami rehabilitation and reconstruction process in Aceh, fishing boats, gear and equipment formed part of the assistance provided to fishermen by the Body of Rehabilitation and Reconstruction (BRR) in Indonesia. Some fishermen were given global positioning system (GPS) sounders with data-logging devices as part of fishing equipment installed on their boat. They used the equipment to collect and record oceanographic data while fishing. Fishermen were trained in using a GPS (Fig. 1) and reading the maps produced by the data they gathered (Fig. 2). Potential trainers were chosen both from among the fishermen and university students, and were shown how to train for approximately one week. These people then trained the fishermen to use GPS. The data obtained by the fishermen were collected by the trainer who used the information to produce a map. On the boat, the

---

1 Jurusan Ilmu Kelautan, Universitas Syiah Kuala, Darussalam, Banda Aceh, Indonesia  
2 Asian Development Bank  
3 Jurusan Teknik Mesin, Universitas Syiah Kuala, Darussalam, Banda Aceh, Indonesia  
* Corresponding author: Syamsul Rizal, syamsul.rizal@unsyiah.net
fishermen and trainer discussed daily sea-related activities. In the Panglima Laot\(^4\) office, the fishermen also provided information on the underwater hazards (e.g. coral reefs) they had encountered, so that these could be added to the maps.

The methodology we applied is not new. A few surface currents were recorded in these waters using a ship drift method (Cutler and Swallow 1984), which is still used as a main reference source (Shankar et al. 1996), as well as for model and observation comparison (Schott and McCreary 2001; Shankar et al. 2002), and model validation (Durand et al. 2009; Song et al. 2003). However, none of those observation surveys used fishermen as data collectors; rather, a scientific research vessel was used.

The waters around Aceh are bounded by the Indian Ocean and the Strait of Malacca, with myriads of small islands along the coast of Sumatra (Fig. 2). Few oceanographic data have been collected from the Malacca Strait and the waters near Aceh. Thus, the recording and collection of oceanographic data by fishermen is a very useful activity not only for fishermen, but also for universities, research institutions and governmental agencies.

For fishermen the collection of oceanographic data is of direct importance to their livelihood because the purse seine they use can easily be damaged by coral reefs. This research provides fishermen with detailed information about currents, which enables them to avoid coral heads. Mapping ocean currents can be done by fishermen themselves at very low cost, and because they can use the maps produced by the data, the benefits of the research are immediately obvious. This immediate and obvious feedback reinforces the value of participation in the research.

To validate the data, we compared the collected data with the results of numerical modelling (Rizal et al. 2012). The goals of this research were to 1) establish interaction between the university and the fishermen, and 2) increase the fishing community’s knowledge of its environment.

**Materials and methodology**

**Participation of fishermen.** Data were collected daily for 36 days, using 45 purse-seine boats. Theoretically, data should have amounted to 1,620 units; but because some boats did not operate on all 36 days, the actual amount of data collected is 856 units. Most fishermen who participated in this research have their fishing ground in the northern waters of Banda Aceh. As a result, the ocean current data described here are for the northern waters only.

The data collection requires no special or extra effort by the fishermen. They deploy their net when they spot a school of fish, and later haul the net back into the boat (as they normally do). It is during this regular fishing activity that we identify and measure the ocean current by analyzing the boat track.

**Boat and fishing gear.** The size of the purse-seine boats involved in this data collection is

\(^4\) In Aceh Province the Panglima Laot institution dates back to the 17th century (Nurasa et al. 1987). The term refers to both the institution and those elder men elected from among the senior boat captains to lead the fishermen in the immediate area. The duties of the Panglima Laot include enforcement of traditional fishing regulations, control of access to key areas, resolving disputes between fishermen, and organizing sea rescues for vessels in distress (Wilson and Linkie 2012).
about 27–30 gross tons. The boats are wooden, with a round bottom, and powered by a 150–230 horsepower diesel engine. Twenty-two fishermen (including a skipper) were onboard for each fishing trip. Figure 3 shows the activity when the bottom of the net is closed.

Most purse seines used by these local fishermen are about 1,200 m long and 80 m deep. This gear acts as a giant drifter that starts with the closing of the bottom of the net and ends when the net is hauled as shown in Figure 3. The net is hauled manually, which takes approximately 30–40 minutes.
Track analysis. To collect raw data, the standard operational procedure is as follows:

a. The boat goes to point A, and to point B.

b. From point B, the boat follows a circular course (only once) that ends at point B again. At point B, the propeller must be stopped.

c. From point B to point C, and until reaching point D, the boat starts drifting, and is moved by the ocean current only.

d. At point E, the work is finished and the net is hauled into the boat.

Figure 4 shows the steps of the standard operating procedure. From Figure 4, we measured the distance B–C–D ($z_{B-C-D}$). From this information, using the following formulas, we determined the current velocity ($|v|$) and its direction ($\alpha$), with time being the time needed by the boat to go from B to C to D; $y$ the distance of B–D projected on the longitudinal axis, and $x$ the distance of B–D projected on the latitudinal axis.

$$|v| = \frac{z_{B-C-D}}{\text{time}} \quad (1)$$

$$\alpha = \tan^{-1}(y/x) \quad (2)$$

Analyzing tides. Figure 5 shows the location of two tide stations — Ulee Lheue, by the Malacca Strait and Pulau Rusa, by the Indian Ocean — used to categorize the data. For each station the exact timing of the four tide categories was determined as shown in Figure 6: (a) rising, (b) high (local maximum sea level is reached), (c) falling, and (d) low (local minimum sea level is reached).

In the example shown in Figure 5, data from Ulee Lheue station was used, as it was the closest station to the recorded boat's track (in green).

Results and discussion

Figure 7 summarizes the ocean current direction and velocity calculated from data provided by fishermen. Figures 8, 9, 10 and 11 show the ocean currents observed during the period 25 November 2007–31 December 2008 for locations 1, 2, 3 and 4.

In order to validate the data, all observed and analyzed current velocities (in the u component, the east–west vector component) were plotted on model figures obtained and derived from numerical model results (see Rizal 2000, 2002; Rizal et al. 2012).
Figure 5. Tide station selection. In this example, Ulee Lheue station was chosen as it was the nearest one to the boat’s track.

Figure 6. Tide type categorized using a day’s worth of data. The red lines in each figure correspond to the start and the end of each tide type: (a) rising, (b) high (local maximum sea level reached), (c) falling, and (d) low (local minimum sea level reached).
Figure 7. Ocean current direction and velocity calculated from data provided by fishermen. Location 1 is the Aceh Islands and surrounding waters; location 2 is offshore of Lhok Nga; location 3 is offshore of Leupung; and location 4 is offshore of Glee Bruek. Most observations were recorded within the waters of the Aceh Islands and offshore of Leupung; few observations were made offshore from Lhok Nga and Glee Bruek.

Figure 8. Ocean currents observed around the Aceh Islands by fishermen (see corresponding location and legends in Fig. 7).
Figure 9. Ocean currents observed offshore of Lhok Nga by fishermen (see corresponding location and legends in Fig. 7).

Figure 10. Ocean currents observed offshore of Leupung by fishermen (see corresponding location and legends in Fig. 7).

Figure 11. Ocean currents observed offshore of Glee Bruek by fishermen (see corresponding location and legends in Fig. 7).
Figure 12. Comparison between fishermen’s observations of currents around the Aceh Islands (Fig. 8) and model results during December 2007. Solid black line indicates values extracted from the model; circles correspond to values extracted from observations.

Figure 13. Comparison between fishermen’s observations of currents offshore of Lhok Nga (Fig. 9) and model results during December 2007. Solid black line indicates values extracted from the model; circles correspond to values extracted from observations.

Figure 14. Comparison between fishermen’s observations of currents offshore of Leupung (Fig. 10) and model results during December 2007. Solid black line indicates values extracted from the model; circles correspond to values extracted from observations.

Figure 15. Comparison between fishermen’s observations of currents offshore of Glee Brueh (Fig. 11) and model results during December 2007. Solid black line indicates values extracted from the model; circles correspond to values extracted from observations.
As can be seen in Figures 12, 13, 14 and 15, most velocity values extracted from data collected by the fishermen agree well with the model results.

Conclusions

The involvement of fishermen was highly successful, and they willingly shared their data, which they regard as being of importance to both them and the researchers. Because daily data collection was done by the researcher on each boat returning from a fishing trip, fishermen and the researcher were able to interact and transfer their knowledge about using the GPS sounders with data-logging device, and share data results and other experiences. The fishermen were interested to know the results of the data that they collected.

From the results described above, it can be concluded that the observation and collection of data by fishermen is an effective and low-cost way to gather abundant observations, and can be used to facilitate knowledge transfer between researcher and fishermen.

The observations and model results of current velocity agree well for this region. This collaboration demonstrates the importance of observation by fishermen, in collaboration with a researcher can yield fruitful results, both for observation and for validation with the model. These experiments achieved successful results despite the limited budget.

Acknowledgements

This research was funded by the Asian Development Bank, through the Community-Based Bathymetry Survey project. This writing and publication were funded by the Directorate General of Higher Education, Ministry of Education and Culture, Republic of Indonesia, International Research Collaboration and Scientific Publication, with SP2H Number: 188/SP2H/PL/Dit. Litabmas/IV/2012, April 30, 2012.

References


