

# JICA's WORLD

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**Change  
the Oceans,  
Change the World**

## ABNORMAL CHANGES IN THE OCEANS COULD IMPACT THE WHOLE WORLD

The oceans cover 70% of the earth's surface. They provide us with a variety of gifts and services, including abundant food and trade routes, and help maintain the planet's ecological equilibrium. Human activity, however, has damaged the health of the oceans, endangering these important roles. Such adverse impacts have not attracted enough attention. Japan is among the nations striving to fulfill global goals that will protect this vital resource.

The water of the world's oceans has its own immense circulation system that is regulated in part by temperature. In the Atlantic Ocean, seawater cools as it flows past Greenland in the Arctic Circle, becomes more dense and sinks to the ocean floor. It then slows and moves to the south until it passes the southern tip of Africa and crosses into the Indian Ocean. There it merges with water that has cooled in the Antarctic and continues eastward to the Pacific Ocean. The seawater, warmed during that long journey, rises to the surface, and returns westward in the Pacific Ocean, to the Indian Ocean and south around Africa, finally flowing back northward in the Atlantic Ocean.

If the oceans of the world all warmed, the cooling function of the seawater in the Arctic and the Antarctic would be weakened, and the circulation of deep seawater would slow or stop. If that happened, although the exact impact is unclear, there is no doubt that the world's climate, environment, and ecosystem would be greatly affected.

The oceans are also facing acidification due to increased carbon dioxide emissions in the world. According to one es-

timate, the oceans absorb half of the carbon dioxide released into the atmosphere by the burning of fossil fuels such as oil and coal, and when carbon dioxide dissolves in water, the water is acidified. That increase in the carbon dioxide level in the ocean changes the marine environment significantly. It hinders the synthesis of calcium carbonate, which in turn affects living organisms that have calcium carbonate shells, such as shellfish and coral. Because these organisms play a key role in the marine food chain, their disappearance causes tremendous deterioration of the oceanic ecosystem.

In discussions of the conservation of the oceans and marine resources, the main issues have so far been the prevention of marine pollution and the sustainable management of fishery resources, issues that are directly connected with human life. However, thanks to raised awareness of the importance of the marine environment and ecosystem, the need for comprehensive management and sustainable use of the oceans has been recognized widely. Goal 14 of the Sustainable Development Goals (SDGs) refers to that need.

Sustainable Development Goal 14 is summarized as, "Conserve and sustainably use the oceans, seas and marine resources for sustainable development," and it lists ten targets. Those targets include: 1) prevention of all marine pollution such as contamination by land activities; 2) restoration of marine ecosystems; 3) minimization of the impact of ocean acidification; 4) control of fish catch volumes; 5) abolition of illegal and unlimited fisheries; and 6) conservation of at least 10% of coastal and marine areas. An earlier version of such efforts is embodied in the United Nations Convention on the Law of the Sea (adopted in 1982 and in effect since 1994), which established

# Change the Ocean Change the World

a new approach to management of the oceans under the principle of management of marine affairs.

## HUMANITY'S SHARED HERITAGE: RIGHTS AND RESPONSIBILITIES

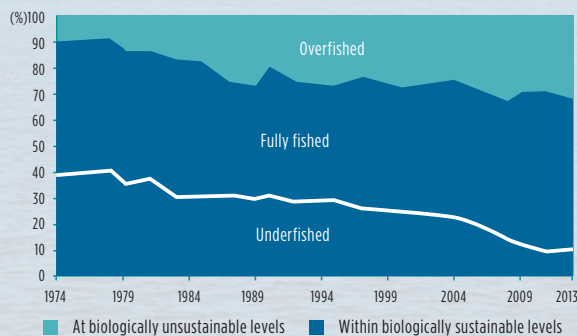
The United Nations Convention on the Law of the Sea established a deep ocean floor mapping system, stipulating that a country's marine territory lies within 12 nautical miles (about 22.2 kilometers) of the country's coasts. The system included rules governing exclusive economic zones and continental shelves, making the marine areas outside nations' marine territories and continental shelves the common property of mankind. The convention also granted maritime countries the exclusive right to develop and utilize the oceans to a distance of 200 miles (about 370 kilometers) from their coasts and demanded that they manage those marine areas responsibly. Since there are no boundaries in the oceans, and since fish migrate extensively, if the natural balance were lost in just one location, that imbalance could spread widely. Clearly, unregulated development and utilization of the oceans carry unpredictable risks. In the 2010s, international discussions of, and efforts toward, ocean conservation and sustainable development and use grew more vigorous. However, while academics and experts are aware of the urgent need for international work to conserve the oceans, most countries and a large segment of the general public lack a sense of crisis.

In June of 2017, the United Nations held the Maritime Conference to Support the Implementation of Sustainable Development Goal 14, demonstrating clear global action to protect the sustainability of the oceans. In the United Na-

tions, efforts have been underway since 2015 to develop legally binding documents governing the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction of each country. The movement to protect biodiversity in the open seas is gaining momentum.

Japan, surrounded by seas with climates ranging from subarctic to tropical, and containing many rich fishing grounds, once had a negative impact on the coastal environment and ecosystem through its economic activities. Confronting its regrets and reflecting on past mistakes, Japan has been taking a variety of measures for conservation and sustainable use of marine ecosystems and resources. That practical experience can benefit many countries including the Pacific Islands. For example, although industrial water pollution in Japan created serious environmental health consequences such as Minamata disease, Japan solved those problems over the years, developing water pollution control laws and carrying out preventive measures. Another example is Okinawa's efforts to restore coral reefs damaged by the sedimentation of red soil, which got into the coral reefs from soil as a result of land development. Okinawa has been promoting research and countermeasures to address the red soil problem. Furthermore, small-scale coastal fishery is active in Japan, as it is in many developing countries. This presents an opportunity for sharing knowledge and experience related to the management of marine fishery resources and the promotion of fisheries. Through collaboration among countries, rather than the application of each country's strength and wisdom in isolation, optimal conservation and sustainable use of marine biodiversity and ecosystems can be achieved.

### GLOBAL TRENDS IN THE STATE OF WORLD MARINE FISH STOCKS SINCE 1974

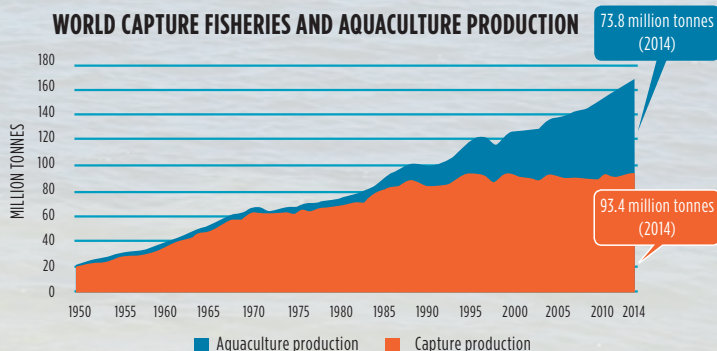


※ **Underfished:** Underdeveloped or new fishery. Believed to have a significant potential for expansion in total production.

**Fully fished:** The fishery is operating at or close to an optimal yield level, with no expected room for further expansion.

**Overfished:** The fishery is being exploited at above a level which is believed to be sustainable in the long term, with no potential room for further expansion and a higher risk of stock depletion/collapse.

### WORLD CAPTURE FISHERIES AND AQUACULTURE PRODUCTION



Source: FAO The State of World Fisheries and Aquaculture (2016)

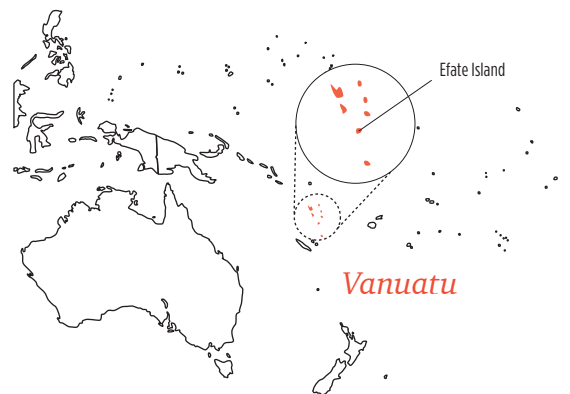


All photos on pages 4-7: Kaku Suzuki

A trainee holding green snails in the coastal area of Mangaliliu village. This valuable shellfish is used for creating mother-of-pearl crafts, including the one found in Konjiki-do (the golden hall) in Chusonji temple, a World Heritage site in Japan's Iwate prefecture.

## Reviving the Coastal Area

Vanuatu, consisting of more than 80 large and small islands, lies in the Pacific to the east of Australia. Its coastal areas are blessed with rich ecosystems, including coral reefs. However, growing demand has endangered some fishery resources, such as the turbo marmoratus, which is locally called green snail. Currently a community-based resource management approach is finding success in reviving coastal shellfish populations that are valuable to the country's culture and economy.



## DEPLETED GREEN SNAIL POPULATION: TEACHING INHABITANTS TO MANAGE RESOURCES SUSTAINABLY

Traditionally in Vanuatu people gather food in the shallows along the coast, which are referred to locally as the 'coastal area.' Women walk in the shallows to pick shellfish and men go by canoe to fish in deeper waters. Even in this modern era, that lifestyle has not changed. However, in recent years, the human population has been increasing, and the resources of the coastal area have been rapidly shrinking. Green snail, in particular, which have high commercial value as material for mother-of-pearl inlay crafts, were harvested excessively from the late 1980s to the early 1990s. They almost completely disappeared from Efate Island, on which the capital, Port Vila, is located. The loss of this valuable resource reduced the income of many fishers.

Proper management is essential to the restoration of the resource-rich coastal areas. In Vanuatu, coastal resources have traditionally been managed by local communities under the supervision of a community chief. However, the effectiveness of that approach was limited. For example, there was no planned approach to fishing outside the non-fishing areas.

JICA's technical cooperation project, 'The Project for the Promotion of the Grace of the Sea in Coastal Villages,' was launched in 2006 to help Vanuatu manage its coastal resources. JICA experts worked with the Vanuatu Fisheries Department (VFD) of the Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity (MALFFB). Together, they decided to focus on giant clams and green snails because the growth of these resources could be observed easily. In the first phase of the project, juvenile shellfish were released and mature shellfish were transplanted into four coastal communities of Efate Island; after that, a resource management plan was drawn up.

The second phase of the project, which began in 2011 on Efate Island and two other islands, focused on activities to establish community-based coastal resource management (CBCRM). Using techniques based on Vanuatu's own resource management practices, in each community, a CBCRM committee was created by the community itself under the direction of the community chief, with expert advice from the Fisheries Department, to formulate rules for proactive resource management, such as setting non-fishing areas and non-fishing species.



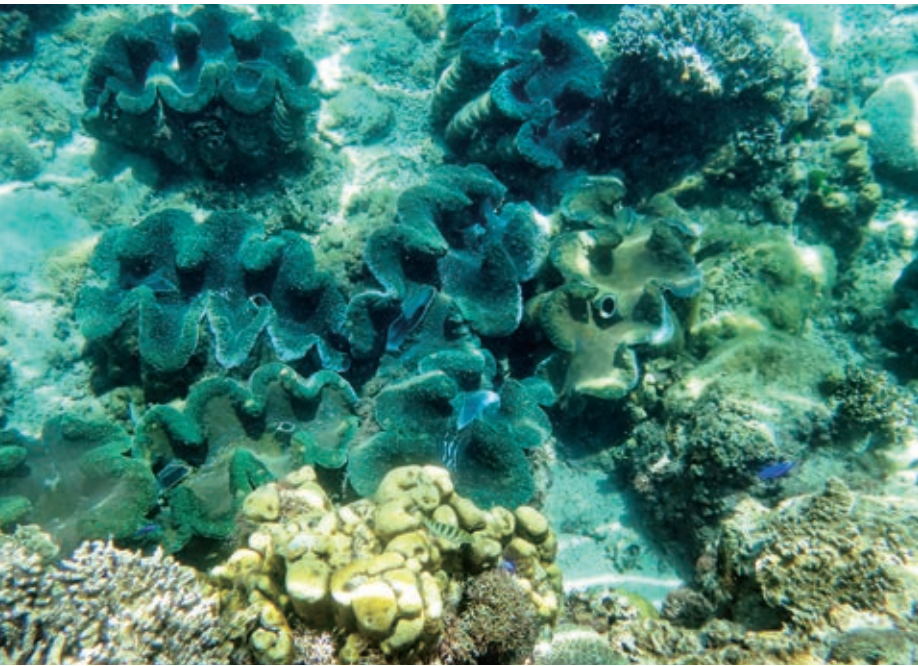
Outrigger canoes are still commonly used in Vanuatu.



Fish is a precious protein source in Vanuatu. In the market, lap lap, a traditional pudding-like dish with fish, is sold.

Akiya Seko, a senior consultant from Japan's IC Net, Ltd., who supported the creation of the committee as a JICA expert, says, "The Fisheries Department advised that young people and women, who have weak political voices, should be included in the committee, and in response we stipulated that any resident could be involved in resource management."

The promotion of a voluntary approach brought a shift in the awareness of the local fishers. For example, on Lelepa Island, to the north of Efate Island, when super cyclone Pam struck in March 2015, the island's CBCRM committee was called upon to respond to the emergency. Max Kalsong, a CBCRM committee member and authorized fisheries officer of the local committee for the promotion of the project, proposed that the non-fishing areas be opened to secure food supplies. Similar measures were taken in other areas, but in many cases, the non-fishing areas remained open even after the emergency situation ended. While the areas were open, Kalsong continued to monitor them, and he returned the areas to the non-fishing status one month later as there were prospects of other means of securing food. "If I had



Giant clams near Mangaliliu Village. The mother shells that were transplanted from Tonga in the first phase of the project have grown and are now being cultivated.

not learned the importance of resource management through working on that project, I might have neglected the areas, too,” says Kalsong.

On Aneityum Island, one action that was seen as necessary was to give the clans who are long-term owners of coastal areas an understanding of resource management activities. When the CBCRM committee respectfully explained to the owners the management principles, they understood their significance. As a result, six areas were designated for control by the committee and the work proceeded successfully. The effort to protect green snails was successful. The mother green snails, which were released on Efate Island, came from Aneityum Island. Rewben Neriam, an authorized fisheries officer, says, “Large cruise ships frequently come to this island from countries such as Australia. The increase in our coastal resources will support tourism, which will in turn increase our motivation to engage in resource management.”

Results show that changes in the community are leading to resource recovery. When the third phase of the project began in March of 2017, it was confirmed that giant clams and green snails, whose juvenile and mature shellfish had been released in the first phase, were breeding extensively. “I was very excited when I confirmed that new shellfish were born in some locations on Efate Island,” says Sompert Gereva, a manager at the Research and Aquaculture Division of the VFD, as he looks back on those days.

### TRAINING IN MANGALILIU VILLAGE: SEEING ALTERNATIVE MEANS OF LIVING

One of the areas where the shellfish population revival was confirmed is Mangaliliu Village, on northern Efate Island. In October 2017, in a project staff training activity, the trainees visited shallows and excitedly looked for shells. One staff member held up two green snails bigger than the palm of

his hand, and posed for a photo. Village Chief Mor Mor says, “For some time there has been a resource management organization in this village, but I must say it was not functioning well. In this project, we adjusted our approach by drawing on the example of Aneityum Island, and now the community members can manage these resources in accordance with the rules.”

However, it is not easy to maintain the local people’s motivation, as setting a management area of the sea for harvesting imposes limits on the residents’ food supply and income sources in the short run. For this reason, the project also aims at diversifying the residents’ livelihoods. Efforts include the introduction of fish aggregating devices for fishing off the coast and the use and management of solar refrigerators to support distribution. Mangaliliu Village is also supporting the development of women’s shell crafts. In addition to supplying the materials for polishing shells beautifully, Japanese experts met with the village women to discuss ways to improve the production costs and design of their crafts. A local ‘Eco Label’ was created to indicate that these products were made by the groups who endeavored to manage coastal resources.

Two people who joined the training and took an interest in the local shell crafts are George Frank, authorized fisheries officer from Emae Island, and Wilson Roy Peter, a representative of an existing Emae Island resource management organization called Fenuataii (which means “land and sea” in the



**Above:** Amos of the VFD (second from left) explains the content of a debate to a trainee.

**Below:** Mor Mor, the young chief of Mangaliliu Village. Taking over from his predecessor, who died in 2016, Chief Mor Mor has been actively promoting resource management.

local language). The project will start at full scale on Emae in 2018. “We have already set the non-fishing areas, but we have not established a management approach, so we hope to learn a lot from the experience of other villages,” he says eagerly.

After an investigative tour of the village, the trainees gathered at a meeting place and held small-group discussions. “With regard to the efforts of Mangaliliu Village, please discuss whether this approach is sustainable or not, from four perspectives including resources and economics,” instructed George Amos, from the Development & Capture Division of the VFD. He has been working with Japanese experts to implement community-based resource management in each community. Seko and the others watched quietly as Amos directed the training sessions. The objective was to raise participants’ awareness of such issues as who is responsible for decision making and who is affected by those decisions.

At the beginning, this project proceeded under a top-down approach and staff members of the VFD tended to impose ideas on community members. However, Amos said that such attitudes have changed, as he looks towards the Japanese experts who provided such warm, respectful support to the people. Amos says, “Basically, our organization takes a top-down approach, but I came to know for the first time of a different approach, a community-based means of moving forward.”

Amos also suggested that Seko promote provincial government involvement in this project. In response, Seko began work to develop a structure for the creation of a resource management plan centered around an area council within each provincial government. Each area council would be in charge of development planning for its area. “The community might find it confusing if they were given separate explanations by various departments, such as advice on resource management from the Fisheries Department and input on hygiene from the Health Department. If the area councils could explain to the local people how resource management would be connected with other fields and how that work would ultimately lead to the development of the community, it would eventually deepen the understanding of the community, making it possible to present an integrated, overall development plan to the project members,” Seko explains. On Emae Island, Christopher Daniel, the area secretary who is developing the plan under the area council, is working with the project with an awareness of the need for cooperation. “Currently, we are creating development plans not just for resource management, but also for six areas of concern, including agriculture, youth issues, and support for the disabled. We are planning with the connections between fields in mind.”

### BEYOND THE PROJECT: ENCOURAGING COMMUNITY-BASED MANAGEMENT

The project will also promote the fisheries industry in matters such as cultivating tilapia, developing efficient distribution routes, and processing fish products such as dried and smoked fish. Wil-



**Above:** A woman in Mangaliliu Village knitting a pouch from pandanus leaves. These knitted goods are sold along with shellfish crafts at the souvenir shop at the entrance to the village.



**Below:** Shellfish crafts with eco labels attached. Japan Overseas Cooperation Volunteers affiliated with the VFD collaborated in the creation of the labels.

liam Naviti, Acting Director of the Fisheries Department, says, “I was impressed by this project: It is not just providing materials, it’s also taking the time to change the local people’s way of thinking. We formulated a new fisheries policy at the end of 2016 and incorporated the promotion of community-based coastal resource management in that policy. This shows our determination to continue these activities even after the project is over.”

A person who plays an important role in aligning the project with the overall government policy is Nepcevanhas Benjamin Shing, Acting Director General of the MALFFB. He had been involved in the formulation of Vanuatu’s National Sustainable Development Plan ‘Vanuatu 2030’, which has three integrated pillars: society, environment and economy.

Traditionally, the government’s development plans focused primarily on the economic aspects. The Vanuatu 2030 uses a triple bottom line approach that integrates environmental and social elements as integral parts of development. It recognizes that environmental and social aspects are as important as, and intertwined with, economic aspects in achieving sustainable socioeconomic growth. Shing believes that JICA’s project epitomizes this ideology, and therefore helps to illustrate it.

In its own efforts, Vanuatu took up Japan’s vision of seeking ways of coexisting with nature. The Solomon Islands, a neighboring country, is paying attention to the experiences of Vanuatu, and JICA is now conducting field surveys there with the intention of starting a new project. Japan will continue to watch the unfolding of community-based coastal resource management, which has already begun to spread across Oceania.



Benjamin Shing, Acting Director General of Vanuatu’s Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity.

# Japan and Chile Team up Against Red Tide

**‘R**ed tide’ is a costly blight that endangers health, imperils livelihoods, and knows no international boundaries. It appears when certain plankton proliferate abnormally and turn the sea bright red and it occurs in many areas of Japan almost every year. In 2016, across the Pacific, a record outbreak of red tide caused serious damage to fisheries in Chile. In response, Japanese and Chilean researchers began cooperating on projects aimed at finding ways to predict red tide at an early stage.



Many stakeholders from Japan and Chile gathered to discuss the aims and procedures of the project.



Shellfish farms on Chiloe Island, Chile. Bivalves can be seen hanging thickly on the ropes.



## PROTECTING THE FISHERIES THREATENED BY RED TIDE: A NEW APPROACH

Chile has a thriving fisheries industry along its extensive north-south coastline. Salmon exported from Chile is commonly seen in supermarkets throughout Japan. The widespread red tide in 2016 caused the suffocation death of some 23 million salmon in fish farms in Chile, resulting in a loss of about one billion U.S. dollars.

The Japanese project team visited salmon farms for a field survey in August and September of 2017.







Staff inspecting shellfish at the Ministry of Health Inspection Institute. Equipment provided earlier by Japan through its JICA technical cooperation projects is also in use here.

The main cause of red tide is the abnormal proliferation of phytoplankton, which leads to the discoloration of the sea, rivers, and lakes. Researchers think that one of the causes of the plankton proliferation is the outflow of domestic and/or factory wastewater into the sea, which increases the level of nutrients such as phosphorus and nitrogen in seawater. However, the full details of this mechanism are not yet known.

Japanese universities and research institutes at Kyoto University, Okayama University, and Japan's National Research Institute of Fisheries Science joined three universities in Chile in a collaborative research project aimed at developing a method for predicting the occurrence of red tide at an early stage. The project is supported by development aid from the Japanese government and will start in April of 2018. It is part of the five-year Science and Technology Research Partnership for Sustainable Development (SATREPS), which brings together researchers from institutes in Japan and developing countries to conduct joint research to solve global problems.

"I have been interacting with a professor at La Frontera University, a leading institution in Chile, since we first met at a conference 15 years ago," says Japanese research representative Dr. Fumito Maruyama, associate professor at Kyoto University Graduate School of Medicine. "Two years ago, while we were involved in a joint research project studying pathogenic bacteria derived from fish disease, a large red tide occurred in Chile. I thought that an investigation of red tide might be relevant to our collaborative research, so we set up a new project."

In the project, first, in order to identify the specific agent that causes red tide, seawater samples will be collected and subjected to genetic analysis. This study will differ from conventional research in that it will not focus on plankton as elemental substances, but will regard red tide as an ecosystem of microorganisms including algae, viruses, and bacteria, and will work to determine which agent is causing the growth of red tide plankton. Once the causal substances are identified, the researchers will

develop a kit that can detect only those components of seawater. The ultimate goal is to develop a system for monitoring seawater and predicting the occurrence of red tide.

If the envisioned system can alert salmon and shellfish farmers and local independent fishers, they should be able to take preventive measures before a red tide occurs. Those measures would include stopping the feeding of fish so as not to increase the nutrient content of the sea water and moving fish to a location which will not be affected by the red tide.

### FIELD SURVEY REVEALS HIGH STAKEHOLDER EXPECTATIONS

The members of the project team, including Dr. Maruyama, visited Chile in August and September of 2017 and conducted a survey to support the formulation of a detailed plan for the project. In addition to visiting three universities in Chile for collaborative work, the team inspected fish farms. Some farms cultivate more than one million salmon at a time, using numerous large-scale fish preserves 30 meters square. Other farms cultivate bivalves on 200-meter-long ropes, hanging the shellfish at equal intervals. The scale of those fish farms gives an idea of the importance of the fisheries industry in Chile.

The local level of interest in the red tide issue is very high. "Many more institutes showed interest in the project than we expected," says Dr. Maruyama. "Actually, it was not possible to coordinate the large number of institutes who expressed interest in participating in the project."

Particularly significant was the participation of the Fisheries Development Institute (Instituto de Fomento Pesquero, IFOP), since IFOP's research has been based on the hypothesis that red tide comes from the south with the ocean current. The joint research partners hope that the monitoring data that IFOP has accumulated will be useful for the project.

There is another issue of concern in Chile: Some plankton can cause shellfish poisoning, a potential health hazard since a great number of Chilean people consume substantial amounts of shellfish. For that reason, Chile's Ministry of Health, which inspects 200 cases of harvested shellfish each day, joined the project. Thus, another goal of the red tide prediction system is to protect people's health.

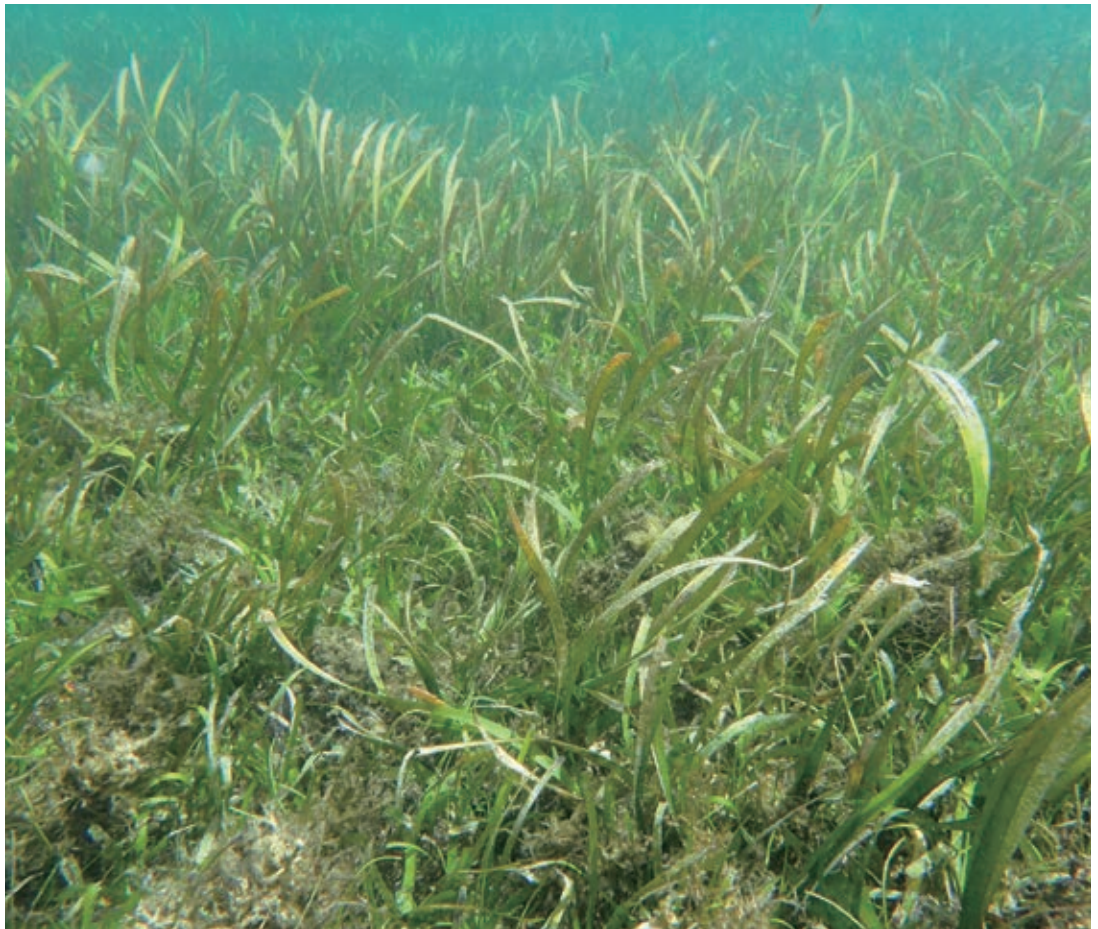
Dr. Maruyama's motto is, "There is an important key hidden in any person's words." Following his motto, he always takes care to engage in dialogue with various stakeholders. The current survey involved interviews with local independent fishers. One of them stressed the importance of organizing frequent explanatory sessions through the local fish farmers' associations to help local independent fishermen understand the situation. The researchers decided to include such sessions in the project in the future.

In Santiago lies the tomb of Dr. Yoshikazu Shiraiishi, a fisheries expert who contributed to research on salmon and trout in Chile. Clearly there is a strong, well-established mutual interest between Chile and Japan in terms of ocean work. These new cooperative efforts to protect the fisheries industry are an extension of that longstanding bond.



After completing the entire field study program, Dr. Maruyama (front row right) and other members gather at the grave of Dr. Shiraiishi to pray for the success of the project.

A seagrass meadow in the Bunaken Sea National Park in northern Sulawesi, Indonesia



# Conserving Marine Fauna for the Coastal Community and the World

**T**he advance of global warming has prompted researchers the world over to seek ways of lowering environmental carbon dioxide. The mangroves and seagrass that flourish in coastal regions in the tropics not only offer a habitat for fish, but also act as a ‘sea forest’ that absorbs carbon dioxide. However, even as they are being recognized for their environmental merits, these habitats are rapidly being destroyed. Japan, the Philippines, and Indonesia are launching collaborative research projects to save these invaluable coastal ecosystems.



The Bunaken Maritime National Park, famous for its coral reefs and wide variety of fish, is a popular diving spot.



Preparing for a diving survey at the Bunaken National Park. Professor Nadaoka (second from the left) had already begun tackling coastal ecosystem problems which had been brought to his attention during his lectures in Okinawa, Japan.

## GROWING ATTENTION TO ‘BLUE CARBON’ ABSORBED BY COASTAL ECOSYSTEMS

Carbon dioxide is one cause of global warming. Photosynthesis, the process by which plants use carbon dioxide and water to produce carbohydrates for energy, may be a key to fighting it. When we think of plants, we tend to picture forests and grasslands, but there are also plants by the seaside and under the sea in coastal regions, particularly mangrove

forests and great patches of seagrass. Now the United Nations and researchers all over the world are lauding the power of these coastal plants to absorb carbon dioxide. “We give the name ‘blue carbon’ to the carbon that the coastal ecosystem absorbs and fixes as organic matter, to distinguish it from land-based carbon,” explains Professor Kazuo Nadaoka of

the Tokyo Institute of Technology. “Despite the fact that sea plants absorb as much carbon dioxide as do land plants, it was only in 2009 that a United Nations Environment Program (UNEP) report brought the world’s attention to blue carbon.”

Coastal plants have benefits in terms of what are called ecosystem services. For example, seagrass can support rich fishing grounds, and mangrove forests can mitigate the damage caused by tsunami and rough waves. There is rising concern that the rapid destruction of coastal ecosystems may hurt the coastal communities that are directly affected and that it may indirectly impact the rest of the world, too.

The fact that Indonesia has more than 20% of the world’s mangrove forests indicates how important the coastal ecosystems in Southeast Asia’s maritime countries are for the global environment. “The triangular area covering Indonesia, the Philippines, Malaysia, East Timor, Papua New Guinea, and the Solomon Islands is called the ‘Coral Triangle.’ The biodiversity in that area, the great number of species including coral, is the most extensive biodiversity in the world’s seas; however, in that region, human activity has a significant influence on coastal ecosystems,” says Professor Nadaoka. “There is a large population of poor people in the coastal areas. There is use of illegal fishing methods, which are easier than traditional ones, and destruction of the mangrove forests to make fish farms. The significant issue here is that it is difficult to halt that excessive use of coastal resources; and of course, we cannot just drive out the people who live in that region to create a vast nature reserve.”

### **COLLABORATION WITH LOCAL COMMUNITIES: FROM RESEARCH TO POLICY PLANNING**

Japanese researchers under the leadership of Professor Nadaoka have studied coastal ecosystems and blue carbon in cooperation with government institutions and universities in the Philippines and Indonesia. Together they have started a large-scale project, BlueCARES, aimed at creating ‘Blue Carbon Initiative’ policy recommendations to preserve coastal ecosystems as a countermeasure to global warming. BlueCARES is managed by the Science and Technology Research Partnership for Sustainable Development (SATREPS), a Japanese government program that promotes international joint research projects. The Philippines is working to establish a national blue carbon commission, and Indonesia is also moving to incorporate the maintenance and management of marine resources into its policy.

The conservation of marine ecosystems is an urgent task for the Coral Triangle countries. Japan shares this sense of urgency: While on a much smaller scale than those in the Philippines and Indonesia, the Islands in the south of Japan are endowed with coral reefs and mangrove forests, and seagrass is widely distributed in other areas around Japan. Another commonality between those two countries and Japan is the deep relationship between coastal human life and ecosystems.

Until two years ago, Professor Nadaoka was at work on another SATREPS project, a joint survey conducted in collaboration with the University of



Busuanga Island in the Philippines. The rich forest along the coast has a significant impact on the coastal ecosystem.

the Philippines, studying coastal ecosystem conservation in six regions of the Philippines. The team discovered major ecosystem damage in all but one of the survey sites, damage resulting from excessive use of coastal resources. To solve that problem, the investigation team recruited local people.

“No matter how wonderful the survey results or research papers are, it is the locals who have to actually take action, so we tried thinking together with them about the means of balancing sustainable local development with coastal ecosystem conservation. We conducted a total of 30 local meetings at six locations, and incorporated what we learned there in our research policy approach in order to return the project’s achievements to the local communities. Now again I would like to hear the opinions of the local people from the early stages and devise a strategy to help them conserve their local ecosystems,” Professor Nadaoka comments.

One essential tool for applying survey results to create actual countermeasures is computer simulation. To run large-scale simulations that can take into account various marine ecosystem factors, the team will use the the TSUBAME 3.0 supercomputer that went into operation in the summer of 2017 at the Tokyo Institute of Technology. Takashi Nakamura, a Tokyo Institute of Technology lecturer who is in charge of creating the simulation model, explains, “This project is intended to cover 80% of the coastal areas in both countries. Simulation on that scale is a challenge, but I will be taking special care not to miss any pitfalls that could arise in the calculation process. I will observe the site carefully and verify the simulation design so that the results accurately reflect reality.”

Nakamura said that his hobby, scuba diving, led him to choose to study marine ecosystems and eventually be involved in this project. On the other hand, Professor Nadaoka started to pay attention to coastal ecosystems when a number of local students in his class at the University of the Ryukyus presented a report on their study of the damage to the ocean resulting from outflows of red soil. It is said that due to the recent worldwide rise in sea temperature, 70% of Sekiseishoko, a stretch of coral reefs (Japan’s largest) near Ishigaki Island, have died as a result of bleaching. Protection of these coastal ecosystems is an urgent matter. Current and planned research to protect the ocean ecology in Southeast Asia could help preserve Japan’s ocean resources and eventually the environment for the entire world.



A meeting with the mayor of Puerto Princesa on Palawan Island in the Philippines.

## Sato-umi conservation as the core of regional revitalization

The fishing town of Hinase, which includes some nearby small islands, faces the Seto Inland Sea. Hinase suffered dwindling catches in coastal areas in the 1970s. At the time, the fishers thought that the cause of the decline was the decreased area of amamo seagrass (in English, common eelgrass), which grows naturally in the shallow areas along the coast. The fishers began replanting the amamo colony with the help of volunteers. This activity led to the idea of Sato-umi, which refers to appropriate development of the coastal environment and ecosystem as a whole. The fishery cooperative in Hinase Town acts as the nucleus of the regional economy, not only managing Sato-umi but also selling marine products directly to customers and operating a restaurant. The overseas trainees will apply what they learned about Sato-umi when they return home. They made comments such as, "I visited a community that is practicing Sato-umi and now I understand the mechanism of that," and, "Although the types of fish and the fishing methods are different there, I think the concept of Sato-umi can be shared around the world."

In front of Gomi market, where freshly caught seafood is sold. This market is the center of the economy for Hinase Town, since the main industry there is fisheries.



# Japan shares its fishing know-how with the world

The seas surrounding Japan are a treasure trove of fisheries. A cold current and a warm current collide in the Pacific Ocean near Japan, and to the north lies the Sea of Okhotsk, rich in marine fauna including salmon, trout, and crabs. On the continental shelf in the Sea of Japan, great numbers of 'demersal fish,' or sea bottom dwellers, gather. There is also a wide variety of fish in the Seto Inland Sea. Japan, so rich in fish species, has developed unique fishing methods to match the variety of fish. JICA Trainees from all over the world come to Japanese fishing ports to learn some of these approaches.



## Island seafood treasures in Tokyo school lunches

Hachijo-jima is an island located some 300 km south of Tokyo Bay. A wide range of fish are landed there. Luxury species are sent to the markets in Tokyo, but cheaper fish for everyday consumption, such as mackerel scad, often remain unsold. The women's division of the Hachijo-jima fishery cooperative noticed the situation and started processing those fish, mincing or chopping them, and shipping them to Tokyo for use in school lunches, working in cooperation with school lunch organizations. In addition, members from the women's division of the co-op visit elementary and junior high schools in Tokyo to deliver a dietary education program to introduce Hachijo-jima fish and give the pupils an opportunity to sample them. Trainees from overseas stayed on the island for a few days to observe this approach. The trainees were quite impressed; one of them commented, "Processing fish to add value and create markets and promoting educational programs are really a unique approach."



Processing fish to create added value is a great idea for coastal people in other countries.



### Kamaishi City, Iwate Prefecture

## Resources for the future: Grow your own

Fishery cooperatives in Iwate Prefecture are releasing fry of species such as salmon and flounder in an effort to stabilize the future of fishery resources. This is part of their efforts to promote the concept of creating and cultivating fisheries. The co-op members are also proactive about protecting existing resources: If the fish they catch are too small, they release them back into the sea. Trainees from French-speaking African countries visit the Kamaishi fishing port once a year to learn about landing fish from fixed nets and securing parent salmon for release in the wild. The trainees also observe the speedy selection and auction of fish, and the attention to hygiene and freshness control in the fish market. The trainees seem to have gained many insights. Their comments include, "I was encouraged by the activity and vibrance of the fishermen's cooperative despite the tsunami damage," and, "I would like to make the best use of what I learned here."

Freshness is the most important issue in the fish industry. Many trainees are interested in the mechanism for keeping fish fresh and in learning about approaches to prompt distribution.

### Minami-Sanriku Town, Miyagi Prefecture

## Eco Label certification spurs earthquake reconstruction



Trainees learning to shuck oysters. They were impressed with the efforts of Minami-Sanriku people to turn disaster into opportunity.

The Tokura district of Minami-Sanriku Town, which used to cultivate oysters, scallops, seaweed, and coho salmon in the bay, suffered a devastating blow from the Great East Japan Earthquake. Aquaculture facilities were swept away. To rebuild their business, aquaculture companies formed a group and used the remaining fishing boats as fish farms. When they rebuilt their facilities in Tokura district, to reduce the burden on the environment and improve the quality of oysters, they decided to reduce the density of aquaculture rafts. Subsequently the group obtained Aquaculture Stewardship Council Eco Label certification from the World Wide Fund for Nature (WWF).

Since the earthquake, trainees from all over the world have been visiting Tokura district three times a year to observe the aquaculture facilities and experience the harvest. The Tokura district's efforts seem to have a profound effect on the trainees. Their comments included, "It is very interesting to learn about this approach to working together, which is centered around the fishery cooperative," and, "Learning about the process of obtaining Eco Label certification is useful for us for both fishery promotion and market strategy."

### Kisarazu City, Chiba Prefecture

## The tradition of Edo-mae as a tourism resource

Tokyo Bay is rich in aquatic resources, and the term Edo-mae (Tokyo Bay and its style) has been used since the Edo period. Digging clams and cultivating laver in tidal flats have been thriving industries for hundreds of years, and the traditional ways continue to this day in towns such as Kisarazu City and Futtsu City in Chiba Prefecture. One important aspect of clam harvesting in this area is that the clams are still collected and screened by hand, in the interest of conservation. In addition, the farms where clams are cultivated in the winter are open from spring to summer to allow tourists to enjoy clam digging.

The trainees from overseas were initially a bit doubtful about the charm of clam digging as a combination of tourism and fishery, but when they actually experienced the digging, they could see its appeal. A frequent comment was, "It was surprisingly enjoyable when I tried digging clams myself." The trainees were also impressed by the local efforts to conserve resources by sorting clams by hand.



Clam digging, which is very familiar among the Japanese, was a new and unexpected fun experience for many of the trainees.

# · TRENDS ·



United Kingdom

## JICA President in London: Meeting with DFID, Speech at Chatham House



**J**ICA President Shinichi Kitaoka visited the United Kingdom between January 21 and 24, 2018. He held talks with UK government officials and British academic experts, and spoke on the role of Japanese ODA in the Indo-Pacific region at a seminar sponsored by British think tank Chatham House.

Mr. Kitaoka met with Nick Dyer, Interim Permanent Secretary at the Department for International Development (DFID), to discuss the need for partnerships with the private sector, as well as the importance of creating common standards for international cooperation, given the growing importance of the role of emerging donors.

Later, Mr. Kitaoka gave a talk at a seminar sponsored by Chatham House, discussing the assistance JICA is providing in the Indo-Pacific region. Noting the Japanese government's Free and Open Indo-Pacific

*JICA President Shinichi Kitaoka in discussion at Chatham House*

Strategy, he presented examples of JICA's contributions to regional development. These included social development support through improvement of infrastructure, such as the Delhi Metro in India; maritime safety enhancement work centered in Southeast Asia; the Initiative for Food and Nutrition Security in Africa (IFNA); peace building and refugee crisis response in locations including the Philippines and Myanmar; and post-disaster recovery and reconstruction assistance as well as disaster risk reduction in Nepal.

The British experts who participated in the seminar made positive comments about Japanese ODA. One said, "The Japanese contribution to the development of a more open international community is significant." Later, Mr. Kitaoka met with Chatham House Deputy Director Adam Ward to discuss topics including approaches to uncertainty in international relations (as exemplified by Brexit); relations with Russia and China; the role of Japanese ODA; and the differences between British and JICA assistance.



Jordan

## Financing Jordan's Largest Solar Project: Power diversification and climate change mitigation



**J**ICA has signed a loan agreement with Baynouna Solar Energy, a company owned by Abu Dhabi Future Energy (Masdar) and Taaleri, for a solar power project in Jordan. The loan is co-financed by the International Finance Corporation (IFC), Deutsche Investitions und Entwicklungsgesellschaft mbH (DEG), and the OPEC Fund for International Development (OFID).

Jordan faces a tight power supply-demand balance and its power production facilities are deteriorating; continuous power development is essential. Because Jordan imports 97% of its energy, it is easily affected by fluctuating fuel prices. The government aims to increase renewable energy capacity by up to 20% by 2020.

To that end, this project will construct and operate a 200-megawatt solar power plant in

*Masdar's CFO (center), IFC's Manager of the Middle East and North Africa Infrastructure (left), and Mr. Junichi Yamada, Senior Vice President, JICA*

the Al-Muwaqqar District of Amman Governorate. It will be the largest photovoltaic plant in Jordan, and it is expected to reduce carbon dioxide emissions by some 360,000 tons per year.

The project's solar plant will supply power to urban host communities that have been accepting refugees from nearby countries. The Japanese government has pledged at two international summits and at the UN General Assembly to strengthen Japanese support for the stabilization of the Middle East and the provision of aid for countries and communities that accept refugees. These promises are embodiments of Japanese assistance policy.

JICA has supported the introduction of an automatic tariff adjustment system that is linked to energy prices through Development Policy Loan and the formulation of an optimal power supply plan, and it will continue to cooperate with international financial institutions working to improve the socioeconomic situation in developing countries.



India

## Japanese ODA agreement with India for water and sewerage infrastructure



**O**n January 24, 2018, JICA signed a loan agreement in Delhi with the Government of India to provide a Japanese ODA loan of up to 45 billion yen for Phase 3 of the Bengaluru Water Supply and Sewerage Project.

The project will be carried out in the southern Indian state of Karnataka, and it will provide water supply facilities that will use the Cauvery River as a water source, and sewerage facilities for the Bengaluru metropolitan area. The target area of the project, the Bengaluru metropolitan area (with a population of 8.5 million), is a core region of the software industry in India. As of March 2017, 90 Japanese companies have offices in that region. As a result of rapid industrial development, the metropolitan area has expanded and has seen an increase in the population, but the infrastructure for

*ODA agreement signing*

water supply and sewerage has not kept pace with the continuing rise in the need for water. This has led to challenges, particularly a chronic shortage of water and an unsanitary living environment.

The loan funds will be directed at the construction of facilities including a water treatment plant, water transmission pipes, distribution reservoirs, and sewerage treatment plants, and at providing consulting services including detailed design work, assistance with bidding, and construction supervision. The new facilities will provide stable water and sewerage services to meet rapidly rising demand, contributing to the creation of a sanitary living environment and stimulating industrial activity in the region.

JICA's intensified support in the form of a water treatment plant, water supply facilities, and sewerage treatment plants will help lead the region to greater prosperity and quality of life.

## JICA Fiji Office



**Seema Chand** (left)  
Program Officer

In Fiji, the ocean is an integral part of daily life. The Pacific Island nation is comprised of about 322 islands and a surrounding Exclusive Economic Zone (EEZ) of about 1.3 million square kilometers. JICA Fiji coordinates with other eight Pacific Island countries, helping improve the lives of the people while ensuring sustainable development to safeguard the marine resources.

Ms. Tavaiqia, who has been working with JICA since 2012 is supporting Pacific nations' quest for sustainable fisheries. In 2013, she joined fisheries officials and local community leaders from Tonga, Vanuatu, and Fiji for a workshop on marine protected areas and coastal resource management co-organized by JICA and the Fiji Locally Managed Marine Areas (FLMMA) Network. After visiting villages in Fiji to observe FLMMA activities such as eco-tourism projects and a sea cucumber ranch, Ms. Tavaiqia said, "JICA works with our partners to help villagers use marine resources wisely, while finding the delicate balance between maintaining traditional practices and striving for economic progress."

In the Pacific Islands, many projects are related to maritime development. Ms. Chand is currently working on an infrastructure project in Tuvalu to replace a sea-going vessel. The vessel is designed for fisheries research and training but it can also be used for emergency transportation between nine atolls spread across 680 kilometers. "We have faced setbacks in the management, operation, and maintenance of the vessel and port facilities," she says. "JICA also provides technical cooperation, and my role is to help the Japanese experts and their local counterparts work together to achieve smooth technology transfer."

Last year, Ms. Chand visited Kiribati. It was three years after a Grant Aid Project for the expansion of the Betio Port started. "I saw the large concrete jetty far ahead striking out from the edge of Betio, with a large cargo ship berthed to its end." Ms. Chand said she could

**Adi Varanise Tavaiqia** (right)  
Program Officer

sense the social impact of the increase in the number of cargo ships calling at Betio when she witnessed the expanded variety of goods in the shops. "It was a pleasant moment. I felt proud of myself for being part of JICA projects that boost the well-being of the people."

Having worked at the JICA Fiji office, which liaises with other Pacific nations to understand their needs, Ms. Tavaiqia and Ms. Chand recognize that human resource development is one of the most important issues in the marine and fisheries sectors. JICA and the University of the South Pacific (USP) School of Marine Studies co-hosted a Symposium on Future International Cooperation and Human Resources Development in Marine Science and Fisheries in January as the lead-up to the 8th Pacific Islands Leaders Meeting (PALM8) to be held in May of this year in Japan. "The building of the School of Marine Studies at USP was constructed two decades ago using Japanese ODA. Since then, they have contributed to marine science development, and now we are enhancing research partnerships and networking with Japanese universities in the marine science and fisheries fields," explained Ms. Tavaiqia. The future prospects of international cooperation and human resource development in the Pacific Islands will also be a key topic in the forthcoming PALM8.

"Japanese assistance can be described in two words; quality and self-help," said Ms. Tavaiqia. "Infrastructure constructed by top-notch Japanese engineers through ODA is high-quality and designed to suit the local environment. The Japanese regard for self-help is demonstrated in the way that technical advice and training are given so that the people here become better equipped to address issues on their own." Ms. Chand added, "I believe that the national staff are the backbone of JICA and that we are as accountable for the outcomes of the project as our international partners are. I look forward to opportunities to play a leading role as a career woman so that we can reap the benefits of this assistance."

# Message for BlueCARES

Michael Lim Tan, DVM, PhD  
Chancellor of University of the Philippines Diliman

The University of the Philippines Diliman is privileged to be a partner in the JICA-supported project for “Comprehensive Assessment and Conservation of Blue Carbon Ecosystems and Their Services in the Coral Triangle (Blue CARES)”.

Awareness of the need for environmental conservation has grown in leaps and bounds over the last few decades, but we seem to have overlooked our coastal ecosystems, particularly mangroves, tidal marshes, and seagrasses. Given the archipelagic nature of the two partner countries in this Blue CARES project – Indonesia and the Philippines – these coastal ecosystems could very well be our richest, yet most unrecognized, natural resource, considering its many roles as nursery grounds for fish, buffers against storms, and a place for the sequestration of carbon from the atmosphere and oceans, which gives these ecosystems their name—“blue carbon ecosystems”.

We need to catch up on lost time to unlock the many mysteries of blue carbon ecosystems,



obtaining information not only about each of the ecosystems but also about the ecotones or the overlapping or transition areas for two or more ecosystems, which are so common in coastal areas.

The new knowledge that we derive from this work should not be limited to the natural sciences. Social issues must also be tackled. There is irony in the fact that the coastal areas support so many human settlements and yet these communities are the most impoverished and excluded from development. In the last few decades, the potential of these

coastal areas for tourism has been discovered but, sadly, we have seen all too often that the tourism lacks ecological awareness, contributing to the destruction, rather than regeneration, of the ecosystems.

I hope to see University of the Philippines Diliman helping to “translate” the technical research into information that can be used by policy-makers, local governments, and, most important, the communities who are the front-liners in the defense of the blue carbon ecosystems.

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**Cover:**  
Children playing on the beach in Port Vila,  
the capital city of Vanuatu, with the beautiful  
ocean in the background © Kaku Suzuki

**Photo on pages 2-3:**  
The Seto Inland Sea has been known for  
its rich fishing grounds and small fishing  
villages situated on its numerous islands



The Japan International Cooperation Agency (JICA) is one of the world's largest bilateral development organization, operating in some 150 countries to help some of the globe's most vulnerable people.