

Ocean Newsletter

Selected Papers

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Ocean Policy Research Foundation

Director's Message

As mankind moves into the 21st century, integrated policies of ocean governance are necessary for the sustainable development and use of our oceans and their resources and for the protection of the marine environment.

Towards this end, the Ocean Policy Research Foundation (formerly: Ship & Ocean Foundation) orients its research on ocean issues in line with the mission statement "Living in Harmony with the Oceans".

The Ocean Policy Research Foundation aims to conduct cross-sectoral research in ocean related issues in order to initiate debate on marine topics and to formulate both domestic and international policy proposals.

We publish a Japanese-language newsletter called the "Ocean Newsletter" (previously known as "Ship & Ocean Newsletter") twice a month. "Ocean Newsletter Selected Papers No.18" contains English-language versions of papers from the Japanese Newsletter edition, published from No.311(2013.7.20) to No.330(2014.5.5).

The Ocean Newsletter seeks to provide people of diverse viewpoints and backgrounds with a forum for discussion and to contribute to the formulation of maritime policies conducive to coexistence between mankind and the ocean.

Our Foundation believes that the newsletter can expand effective communication on these issues by introducing timely research abroad to an informed readership. It also welcomes responses from readers, some of which appear in the Newsletter.

It is our sincere hope that these Selected Papers will provide useful insights on policy debate in Japan and help to foster global policy dialogue on various ocean issues.

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Executive Director

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On the New Revision of the Basic Plan on Ocean Policy

[KEYWORDS] Basic Plan on Ocean Policy / ocean energy and mineral resources / ocean security

Ichita YAMAMOTO

Minister in Charge of Ocean Policy and Territorial Issues
(Ocean Newsletter No.311, July 20, 2013)

Five years have passed since the Basic Plan on Ocean Policy was drafted. During this time, there have been great changes in social conditions concerning our ocean areas. These include a movement to review our energy strategy prompted by the Great East Japan Earthquake and Tsunami, increased expectations for the development and use of ocean resources beginning with methane hydrates and rare earth seabed mud, and changes in the international situation that affect ocean security and ocean rights and interests. While the Revised Basic Plan on Ocean Policy will serve as a guideline in making Japan a maritime state, unified efforts by all concerned are also important.

Introduction

Upon the enactment of the Basic Act on Ocean Policy in 2007, the Headquarters for Ocean Policy were established, with the Prime Minister as the Director-General. A Basic Plan on Ocean Policy was also drawn up, and a system for intensively and comprehensively promoting ocean-related measures was set out.

The Basic Plan on Ocean Policy is supposed to be reviewed every five years or so. Thus, following repeated dialog between public and private sectors on the implementation of Japan's ocean policy, changes in social circumstances, etc., and the future outlook, among other issues, a new Basic Plan on Ocean Policy was decided by the Cabinet on April 26th, 2013.

The Vision to be Pursued by Japan as a Maritime State

As changes in social circumstances vis-à-vis Japan's oceans over the last five years, one could first cite a review of energy strategies triggered by the Great East Japan Earthquake disaster. Amid the ongoing national debate on future energies, expectations of offshore wind and other marine renewables have also risen. Meanwhile, ever greater expectation is being placed on the development and utilization of marine energy and mineral resources. For example, the increasing instability of the rare earth supply and growth in imports of expensive natural gas have increased the importance of securing stable resources. Research on methane hydrate and other resources is ongoing in the seas around Japan, and sediments containing rare earth have been discovered near Minami-tori Island.

Another key issue concerns maritime security and marine interests. In addition the increasing assertions and activities of neighboring countries on this issue, damage is still being caused by piracy in seas off Somalia and elsewhere, and the importance of protecting marine interests and securing maritime safety has been increasing. Furthermore, in response to the depletion of sea ice in the Arctic Ocean due

to climate change, there is now increasing global interest in the potential of a Northern Sea Route.

As the vision to be pursued by Japan as a Maritime State based on this situation, the new Basic Plan on Ocean Policy cites four targets for the stance on future efforts and the basic directionality to be pursued. Namely, (1) contributing to international cooperation and the global community, (2) gaining wealth and prosperity by developing and utilizing the oceans, (3) changing from "a country protected by the seas" to "a country that protects the seas", and (4) challenging unexplored frontiers.

Main content of initiatives in the new Basic Plan on Ocean Policy

(1)Balancing the development and utilization of ocean resources with conservation of the marine environment

It is gradually becoming clear that reserves of oil and natural gas, sea-floor hydrothermal deposits, methane hydrate and various other marine energy and mineral resources exist in the seas around Japan. In future, technology aimed at commercializing methane hydrate by fiscal 2018 will be developed, while for rare earth, resource volume surveys will be conducted and other efforts made over the next three years or so.

As for marine renewables, demonstration projects for offshore wind are underway off Choshi and Kitakyushu for the bottom-mounted type, and off Goto in Nagasaki Prefecture and off Fukushima for the floating type, respectively. These are just a few examples where utilization is expected to be promoted in future, while studies are also underway on wave power, tidal power and ocean thermal energy, among others. To accelerate practical realization and commercialization in future, we will attempt to develop environments through pioneering initiatives in port and harbor areas, etc., and reviews of frameworks for coordination, including legislation on the use of sea areas.

(2)Making the seas safe

To ensure the safety of the oceans around Japan as well

as sea lanes and remote islands, we will strengthen cooperation between the countries concerned and collaboration between relevant ministries and agencies, including the Self-Defense Forces and the Japan Coast Guard. Also, to ensure all possible measures are taken for the maintenance and policing of maritime order, we will strengthen the system of maritime security and promote measures to prevent shipping accidents. Moreover, as well as continuing the piracy countermeasures undertaken to date, we will also promote special measures for private armed security of Japan-flagged vessels.

(3) Enhancing scientific knowledge

With regard to marine science and technology, we will promote surveys and R&D in response to policy needs, such as global warming and climate change, marine resource development, protection of ocean ecosystems, sustainable use of bioresources, and response to natural disasters. Besides these, we will study the potential for using the Northern Sea Route and increased use of satellite information in the oceans.

(4) Healthy growth of marine industries

We will make comprehensive efforts to develop shipbuilding, ports & harbors, and shipping routes, and to secure and train seamen. On international shipping, we will promote a strategic response based on changes in the global environment, including the application of a tonnage standard tax system, and, for the shipbuilding industry, we will take steps to strengthen order-winning capacity and boost competitiveness by expanding into new markets and new business, etc.

In future, further expansion is forecast for ocean resource development, including oil and natural gas, as well as the global market for offshore wind. Tackling this global demand for ocean development and taking steps to nurture and grow Japan's marine industries are expected to be key issues in Japan's growth strategies. Therefore, as well as promoting initiatives aimed at creating new marine industries, as typified by offshore logistics hubs, we will also tackle the industrialization of marine renewable development.

(5) Comprehensive management of the oceans

As well as promoting comprehensive management of coastal areas in conjunction with land areas through collaboration between the central government, local authorities and others, we will push for the creation of an overarching system of laws concerning ocean management in order to promote the use of the EEZ, etc. We will also promote the stable protection and management, etc., of Japan's territorial waters and border islands that justify the outer limit of the EEZ.

(6) International cooperation on the oceans

We will contribute to the creation of international rules and consensus, and to the formation and development of an international oceanic order based on the rule of law. This will involve encouraging countries to share the attitude of prioritizing the use of international judicial bodies and other third-party organizations when attempting to resolve disputes and other issues concerning the oceans.

To establish Japan as a Maritime State

At a meeting of the Headquarters for Ocean Policy held in advance of a Cabinet meeting on April 26th, 2013, the Prime Minister and Director-General of the Headquarters for Ocean Policy Shinzo Abe made the following statement: "The successful trial production of gas from methane hydrates for the first time in the world, among other achievements, has prompted increasing expectations for the development of ocean resources. Meanwhile, the security environment has become ever more perilous, requiring Japan to firmly protect its territorial waters. The new Basic



The new Basic Plan on Ocean Policy being discussed at the 10th Meeting of the Headquarters for Ocean Policy (Prime Minister's Office, April 26th, 2013)

Plan on Ocean Policy will guide the realization of Japan as a maritime nation. It will be crucial that the Headquarters for Ocean Policy exercises its functions as a control tower and that the government works as one to implement ocean policy. I ask ministers for their further efforts to this end." As I mentioned at the beginning, the environment surrounding Japan's oceans is continuing to change daily. I hope we will respond appropriately to this situation and set our sights on establishing Japan as a globally recognized Maritime State. ■

Float to Survive: Tsunami lifeboats are a new idea to protect yourself

[KEYWORDS] tsunami lifeboat / evacuation challenged / Shikoku Tourism and Transport Bureau

Kenichi MARUYAMA

Director, Shikoku Tourism and Transport Bureau, Ministry of Land, Infrastructure and Transport
(Ocean Newsletter No.311, July 20, 2013)

While the usual approach to protect oneself in the event of tsunami is to evacuate to high ground or a tower, an easier way is to board a lifeboat and “float to survive.” This is the concept behind the tsunami lifeboat. Many precious lives were lost due to the Great East Japan Earthquake and Tsunami. The anti-tsunami measure introduced here was born out of the hope for some way to prevent such a tragedy from ever happening again. It is my sincere desire that the tsunami lifeboat will be rapidly adopted, so that every possible life might be saved in the event of an earthquake mega-disaster in the Nankai Trough, considered highly likely to occur in the near future.

Tsunami lifeboats – seeds of the concept

“Floating to survive” a tsunami – the tsunami lifeboat has been developed in line with this new concept. It adds another powerful option to conventional tsunami counter-measures, which involve moving to higher locations such as uplands or evacuation towers.

The development was triggered by the immense tsunami damage caused by the Great East Japan Earthquake disaster. Its seeds lay particularly in the profound sorrow at the loss of so many lives, and the desperate wish to find some way of preventing such a tragedy from ever happening again. When an earthquake strikes, there are very many areas that could be hit by a massive tsunami in a short space of time. When that happens, there will be people who have difficulty in evacuating – in particular, residents of areas where there are no uplands or similar areas available for evacuation nearby, people who have been injured by the earthquake, and “evacuation vulnerables” (such as the elderly and infirm, infants and others). How can they all be rescued?

To answer this question, emphasis was placed on making the evacuation distance as small as possible. Studies were started from the perspective of seeking means of enabling people to evacuate safely, however large the tsunami, that could be installed near evacuees’ homes or other locations. As a result, a study was begun on “tsunami lifeboats” as lifesaving devices, modeled on lifeboats carried by large

ships and the like, since they are relatively compact and robustly built.

However, major technical problems stood in the way. For example, how could the structure of the tsunami lifeboat itself be made sufficiently strong to prevent it from breaking up, even during a tsunami with massive destructive force? And what could be done to prevent evacuees in the tsunami lifeboats from suffering excessive impact?

The rigorous conditions demanded of tsunami lifeboats

In February 2012, the Shikoku District Transport Bureau launched a “Study Group on Tsunami-Proof Lifeboats”, which started studying issues such as the conditions required of tsunami lifeboats. The Study Group is chaired by Professor Kunio Otoshi of Kochi University, and its members include experts in tsunami disaster mitigation and various related fields of engineering, as well as disaster prevention staff from local authorities, representatives of the Japan Coast Guard, and others.

If a tsunami lifeboat were to collide with a bridge pier, building or other structure, it would cause the most hazardous situation both for the lifeboat and for the evacuees inside it. Therefore, tsunami data from the Great East Japan Earthquake disaster were first analyzed and the tsunami flow rate ascertained. As a result, it was discovered that the maximum tsunami flow rate in the Great East Japan Earthquake disaster was around 10m/sec, and so this was made a basic condition for the design. Also, on the recoverability of the lifeboat after capsizing or suffering damage to its hull, it was decided that the conditions demanded of lifeboats carried on ships would also apply to these tsunami lifeboats. Again, anticipating a situation in which a tsunami lifeboat would drift out to sea, other conditions such as the installation of toilets, etc., a storage function for water, food, medical and other supplies, and consideration for alleviating the anxiety of the evacuees were also added so



Tsunami Lifeboat No.1 with a view of the interior



that the lifeboat could adequately withstand drifting for 7 days.

Birth of the tsunami lifeboat

The Shikoku District Transport Bureau then issued an open invitation for prototypes of a tsunami lifeboat that would satisfy all these stringent conditions, using the FY2012 Cabinet Disaster Response Comprehensive Promotion and Coordination Fund. The purpose of this was to verify whether a tsunami lifeboat that could meet these conditions was technically feasible. As a result of the planning bid, the IHI company started work on designing, manufacturing and testing a tsunami lifeboat.

The developed prototype was based on lifeboats carried on ships, but with shock absorption material fitted all around it. The hull was designed to prevent roll as far as possible, using a bilge keel¹⁾ and other devices. Openings and windows were made as wide as possible, while consideration was also given to the ease of embarkation and disembarkation and reducing the sense of enclosedness inside. Seats for 25 people were arranged inside, each fitted with a headrest and seatbelt to cushion impact. In February, a drop test was held, in which the vessel hit the ground at a speed equivalent to a tsunami flow rate of 10m/s. It was confirmed that the strength of the vessel and the level of impact on the evacuees satisfied the conditions. Then, in March 2013, IHI completed a tsunami lifeboat that satisfied all of the requirements, whereupon the first tsunami lifeboat in Japan – no, in the world – was born (see photos).

The “floating to survive” tsunami lifeboat has several characteristics that differ from tsunami evacuation facilities existing until now.

Firstly, because it floats, it enables people to evacuate safely, however high the tsunami. Therefore, even in the worst case scenario, if a tsunami with a height exceeding expectations were to strike, the tsunami lifeboat would allow people to evacuate safely. Next, the prototype is compact at about 8 meters long and about 3 meters wide, meaning that it can be installed in car parks, on top of office buildings and in other places as long as there is enough room for it. This will significantly improve the ease of evacuation, as it can be placed very near the homes and workplaces of the evacuees.

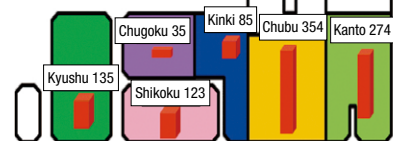
Again, since the vessel can be mass-produced in factories, there is ample potential for the price to be reduced. Moreover, it can be moved as and when necessary after installation, and can be powered from outside. These give it various advantages, such as that it can be used as accom-

modation similar to an outbuilding at normal times. On the other hand, if installed in parks or other open spaces, it could fall victim to theft of equipment or mischief if not properly looked after, while periodic evacuation drills would need to be carried out in non-emergency times. People would also need to familiarize themselves with the inside of the tsunami lifeboat to prevent panic if the lifeboat drifts. Thus, such precautions unique to tsunami lifeboats would need to be borne in mind.

Toward a smooth diffusion

As well as introducing the tsunami lifeboat to local authorities in Pacific coastal areas south of Kanto, the Shikoku District Transport Bureau conducted a survey on issues such as the requirements of tsunami lifeboats. The response revealed that more than 90 municipalities were interested in introducing tsunami lifeboats, and that a total of 1,006 tsunami lifeboats were required across the nation. It also became clear that authorities regarding tsunami lifeboats as necessary are not limited to Shikoku but are spread across the whole of the Pacific coastal region (see diagram).

■ Numbers of tsunami lifeboats required by local authorities in Pacific coast regions south of Kanto (March 2013)



Meanwhile, many authorities expressed hopes that the system of public support to encourage the introduction of tsunami lifeboats would be enhanced. There were also strong demands that a system of quality assurance should be developed for tsunami lifeboats, to offer greater reassurance when purchasing them.

Based on such views, the Shikoku District Transport Bureau compiled “Guidelines on Tsunami Lifeboats”, including guidelines on quality assurance, maintenance management and other aspects of tsunami lifeboats, which it published in May.

Tsunami lifeboats have only just entered the world. Many people still know nothing about them. Before all else, the Shikoku District Transport Bureau aims to broadcast the existence of these “floating to survive” tsunami lifeboats to the nation, in order to inform the many people who feel anxious about evacuating from a tsunami. It is our sincere wish that the smooth diffusion of tsunami lifeboats will be encouraged, and that as many human lives as possible will be saved in the event of a massive Nankai Trough Earthquake disaster, predicted to occur with certainty in the near future.

1) Bilge keel: Plates attached along the curvature of a ship's hull from bow to stern, to reduce rolling.

Post-disaster Drifting Debris and Accompanying Invasive Species

[KEYWORDS] drifting piers from the tsunami / Oregon coast / marine product alien species

Toshio FUROTA

Former Professor, Toho University

(Ocean Newsletter No.312, August 5, 2013)

There is concern over the large number of marine exotic organisms expected to arrive on the west coast of America from Japan, with the large pieces of floating debris that had been washed out into the Pacific by the March 11 tsunami at the time of the Great East Japan Earthquake. The likelihood of marine organisms from Japan invading the west coast is undoubtedly increasing due to the arrival of the floating debris from the tsunami. Marine scientists from America visited Japan to research what organisms had lived with the floating docks which the same type of the dock had been washed out to sea by the tsunami. Japanese scientists and other experts helped the research.

Tsunami marine debris and invasive marine species

In July 2012, I visited Dr. John Chapman of the Oregon State University Hatfield Marine Science Center on the west coast of America. My purpose was to survey invasion levels of *Hediste diadroma* (a type of ragworm) carried from Japan to American coasts. *Hediste diadroma* inhabits Japanese estuarine mudflats in large numbers, and is sold as fishing bait. Originally, only a freshwater variety identical to this *Hediste diadroma* was thought to inhabit the west coast of America. Some years ago, however, when I supplied a researcher at Kagoshima University with samples I had brought back as this freshwater variety, they were in fact identified as Japanese indigenous *Hediste diadroma*, judging from their genetic makeup and style of reproduction. It would appear that the Japanese species had become rife on the west coast at some point. This is a ninja-like invasion by an exogenous species. Many exogenous species have already invaded the west coast of America from Japan and East Asia, threatening the habitats of indigenous species and causing qualitative changes in ecosystems.

Floating dock washed ashore on the Oregon coast

The main issue is the impact of the Great East Japan Earthquake disaster on American coasts in light of the above. Of course the tsunami itself also reached the west coast, but it had no direct impact on living organisms. The problem is that, along with the bulky marine debris released by the tsunami and drifting in the Pacific Ocean, many marine species from Japan have also arrived. The invasion of even more exogenous species is being viewed with some alarm locally. When I visited the Oregon State University Hatfield Marine Science Center, the floating dock set adrift by the tsunami had already washed ashore on a nearby coast.

The dock, about ten meters long, had been stranded on a broad beach at low tide (Photo 1). It had arrived about a



■ Photo 1:

The floating dock that washed ashore at Newport, Oregon (June 2012)

month earlier, and the organisms on its surface had already been completely removed. Researchers and local citizens had collaborated in scraping the organisms off, and the residue had been finally removed with a burner. The organisms were researched in detail, and amounted to nearly 100 species, including seaweeds, barnacles and mussels. In particular, infamous invasive species in the form of starfish and *wakame* seaweed were also confirmed. The coastal biota of the west coast of America is less complex than that of Japan; it is easier for invasive species to become established, and the impact of this is conspicuously evident. American sensitivity to the invasion of marine exogenous species stems from its previous experience of the scale of such impacts.

The floating dock had already been broken up and removed, the cost being borne locally. Japan also offered support, but the offer was apparently declined on grounds that “this kind of disaster could occur on the coast of Oregon some day, so we will do it ourselves as a way of sharing the experience of disaster damage.”

The floating dock in question had drifted all the way from Misawa Fishing port in Aomori Prefecture. Altogether there were four of these docks at Misawa, and all of them had drifted out to sea. So far, two of these have already landed

on the west coast of America, one is still in the Pacific Ocean, and the fourth has been missing since the initial stages of the tsunami. Besides these docks, large quantities of tsunami marine debris have drifted out to sea from the whole of the Tohoku Pacific coast. In April this year, a small fishing boat also drifted as far as the west coast. It was accompanied by a striped beakfish, a species not found on the west coast until then. Thus, not just attached organisms but even pelagic fish species arrive together with the debris, and as such, opportunities for Japanese marine species to invade the west coast have definitely increased with the arrival of tsunami marine debris.

At the end of last year, I received an urgent proposal from Dr. Chapman. It was “to research what was attached to the floating dock when it started drifting, based on docks currently in Misawa Fishing Port.” Some of the organisms attached when the dock washed ashore will have become attached as it drifted across the Pacific, in addition to those that were attached from the beginning. Making a distinction between the two will also provide important knowledge, both in biological terms and in terms of forecasting future invasions by exogenous species. The author took responsibility for the invitation arrangements on the Japanese side, and with the cooperation of the Misawa Fishery Cooperative (JF Misawa), Misawa City and Aomori Prefecture, the survey was carried out on March 19th and 20th this year. These dates were chosen in order to obtain organisms from the same season as when the dock drifted out to sea. When conducting the survey, the involvement of Japanese marine biology researchers was indispensable. Researchers of the various taxons and genetic analysis from Tohoku University, Toho University, Yokohama National University, Kobe University, and Kagoshima University took part and cooperated in the survey, as did researchers in environmental consultancy.

The Survey at Misawa Fishing Port

On his visit to Japan, Dr. Chapman was joined by Dr. Leslie Harris, a polychaete (sandworm) researcher at the California Natural History Museum, and Terry Thompson, Commissioner of Lincoln County, Oregon State. Divers collected organisms attached to floating docks installed at least one year earlier (Photo 2). Mr. Thompson also had talks with local government representatives from Misawa City and Aomori Prefecture, in which he expressed his condolences over the tsunami damage and exchanged opinions on the situation of the tsunami and the floating docks that had washed ashore.

The samples obtained at this time were sent to the Hatfield Marine Science Center, where they are currently being



■ Photo 2:
Biological survey at
Misawa Fishing Port



■ Photo 3:
Oregon agate (origin
of the name "Agate
Beach") and frag-
ments of concrete
from the floating dock

analyzed by Japanese and American researchers, among others. Although it will take a little more time before the results are known, we will announce them as soon as they have been compiled.

This arrival of a floating dock on the west coast of America is not merely a problem of the transfer of invasive species; it also reveals how Japan is connected to other countries by the Pacific Ocean, and that in connection with marine debris resulting from the tsunami, the American side does not consider itself a victim but sees this positively as an opportunity to share an experience. We realized again that international joint research is important for mutual understanding, not only in academic terms but also in cultural terms. Finally, I would like to show how Americans feel about washed up debris by referring to a message accompanying the Oregon agate and fragments of concrete from the floating dock, which Mr. Thompson brought as a gift for counterparts in Japan.

—In June 2012, a floating dock that had drifted out from Misawa Fishing Port after the March 2011 tsunami washed ashore on Agate Beach in Lincoln County, Oregon, directly confronting the local citizens with the horrors of the disaster. On the assumption that a similarly massive earthquake and tsunami will strike this coast in the near future, we are also preparing preventive measures here. Although we are separated by the vastness of the Pacific Ocean, we share the same geologically threatening environment. We hope this fragment of the floating dock and agate from the Oregon coast (Photo 3) will serve as a symbol of the bond of friendship between us.

Diving Women to Be Registered as UNESCO Intangible Cultural Heritage

[KEYWORDS] Diving women / sustainable fishing / fishing village collectives

Yoshikata ISHIHARA

Toba Sea Folk Museum

(Ocean Newsletter No.318, November 5, 2013)

Japan and South Korea share the unique cultural phenomenon of “diving women”. Now, a joint Japanese-Korean movement has been launched to have them registered as a UNESCO World Intangible Cultural Heritage. At their peak, there were around 17,000 diving women in Japan, but that number has now fallen to around 2,000. These women could hold the key to reversing the decline of local fishing village communities. As such, I hope we can help sustain the culture of diving women into the future.

What are diving women?

“Diving women” are women who make a living by diving back and forth between the surface of the sea and the bottom with no breathing equipment, holding their breath for around 50 seconds to collect abalone, *sazae* turban shells and seaweed. These diving women are unique to Japan and South Korea, where they are called *ama* and *haenyeo*, respectively. In Japan, there are 2,174 *ama* (2010 survey) living in 18 prefectures, mainly in the west of the archipelago.

In South Korea, there are around 10,000 *haenyeo*, with 4,881 on Jeju Island (2012) and around 5,000 (estimate) on the mainland. In South Korea, the oldest tradition of diving women is on Jeju Island, but in around 1903 Jeju diving women started moving across to the mainland. They then gradually expanded their area of activity, and *haenyeo* are now active in many coastal areas.

In the Japanese archipelago, the practice of diving for fish is thought to have existed at least 3,000 years ago. Now, a joint Japanese-South Korean movement to have this long tradition of diving women registered as a UNESCO (World) Intangible Cultural Heritage has been launched. The focus of the movement is on Mie Prefecture (where there are 973 diving women, about half of the national total and the largest number of any prefecture) and Jeju Province in South Korea. On October 26th and 27th of 2013, diving women from 11 prefectures attended the “4th Diving Women’s Summit” held in Wajima, Ishikawa Prefecture, and the circle of connections is ever widening.

More than anything, the motivation for this activity lies in the sharp decline in numbers of diving women. Though reaching 17,000 at their peak (1956), the number has fallen dramatically to around 2,000 today. Some people would be happy for diving women to disappear altogether, as they could be replaced by men and there are other ways of fishing anyway. Some take the extreme view that, since abalone and seaweed farming are so developed, there is no point in continuing the tradition of diving women. But is this really the case?

In my view, the diving women tradition should defi-

nately continue to exist, because they not only represent the unusual phenomenon of women who work in the sea, but are also bearers of the “diving women culture”. I will give five reasons for this below.

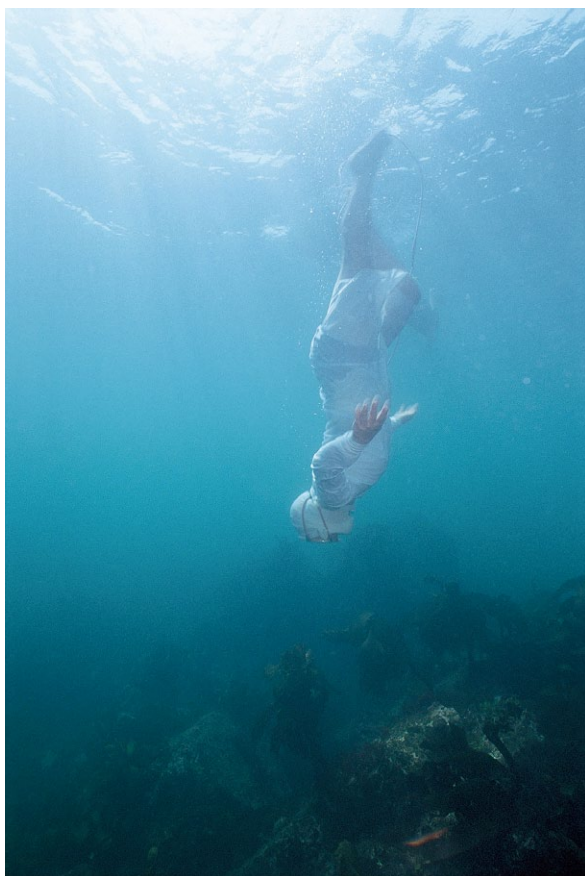
Diving as a livelihood since ancient times

The first reason is that they are, after all, independent women who have learned the special skill of diving without the use of breathing equipment. There is a clear difference in catches made by young women who have only just started diving and those in their 50s and 60s. The latter differ in their mastery of unique diving techniques and familiarity with fishing grounds, acquired through long years of experience. Ever since childhood, these women have practiced diving down to the seabed as part of their play. They know the shortest route for diving straight down with their sights on the bottom. Their skill lies in making maximum use of their breath as they search for their catches. Besides this, tidal currents in the sea are many and varied, while the locations and shapes of reefs inhabited by abalone and *sazae* are also complex. It is precisely because they know all of these that they are excellent diving women. With these special skills, they are independent women who rely on no one but themselves when they are in the sea.

The second reason is that the history of these diving women could be longer than that of any other group engaged in a livelihood. Huge quantities of abalone shells have been found together with abalone scraping tools made of antler or whalebone at Jomon sites all over the country. This could prove that there were women who dived to collect abalone in that distant epoch. Indeed, along with the northern hunting folk known as *matagi*, the tradition of divers known as *ama* could be up to 3,000 or even 5,000 years old. And since those distant beginnings, this tradition has been sustained without interruption, not by rulers or noble families but by ordinary local womenfolk.

Living together with the sea

The third reason is that they have protected ways of maintaining sustainable resources. Diving women have had



A diving woman on her way to the seabed

such a long history because the species they collect have not run out. In today's language, it is because they have devised ways of maintaining sustainable resources and have upheld a pledge not to overexploit them. These diving women have occasionally faced crises of resource depletion. For example, the invention of glass swimming goggles¹⁾ triggered concerns over excessive catches of abalone, and the goggles were prohibited for nearly a decade in many fishing villages. They eventually came to be used as their convenience could not be denied, but this led to many rules being created to limit fish catches. Now, even the size of abalone and sazae that can be collected and the length of the diving season have come to be regulated by law. The result is that resources are protected, and the sustainability of diving women's livelihoods has been maintained.

The fourth reason is the symbiosis of diving women with nature. The diving women collect abalone, *sazae*, sea urchins, sea cucumbers and other living organisms, as well as *wakame*, *hijiki*, *tengusa* and other seaweeds, i.e. plants. A

thriving natural marine ecosystem exists in the seas where diving women operate, and a symbiotic relationship has arisen through their activities. They receive the blessings of the vast ocean there and unconsciously serve to protect the ecosystem. But in future, recognizing the importance of this symbiotic relationship, they will more consciously maintain their role as guardians of the sea.

A pivotal presence in fishing villages

The fifth and final reason is that diving women are pivotal to the collective society of a fishing village. It goes without saying that human society itself is collective in nature, but people in fishing villages are especially so, as they share the same foundation for their livelihoods and depend on mutual assistance for many of their production activities. And although this element has now weakened to some extent, collectives are still alive in many aspects of daily life. At the center of this are the diving women. I have already mentioned the independence of diving women, but I am fully cognizant of the role of men who operate boats, make tools and learn the fishing grounds. This is a true collective society in which men and women participate equally.

The collective sum of this is culture. Today, there are only 2,000 diving women in a population of more than 100 million. But these 2,000 at least have the potential to revive local fishing village communities, which are gradually dying out. I prefer not to think that the modern way is to abandon the culture of diving women as something that has no reason for existing.

These diving women, who continue to take on the dangers of the "50-second challenge" under water without a second thought, are carefree and optimistic on their return to dry land. The smiles on their faces do not fade as they chat together while warming themselves by fires. ■

1) *Miikagan* goggles were invented by Yasutaro Tamaki of Itoman, Okinawa in 1884. He was so distressed at the large number of fishing people who complained of sore eyes caused by salt water when they dived in the sea that he carved the wood of a native tree into the shape of spectacles, and inserted pieces of glass to form binocular swimming goggles. (Secretariat note)

Hosting the PNLG Forum 2013 and Promoting Integrated Coastal Management (ICM)

[KEYWORDS] Shima City / PNLG Forum / ICM

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(Ocean Newsletter No.321, December 20, 2013)

Local development based on the creation of a new *satoumi*¹⁾ is an initiative designed to stimulate local communities by practicing Integrated Coastal Management (ICM).

Shima was the first city in Japan to join PNLG, a network of local governments that practice ICM. This year's PNLG Forum was hosted by the city and held here from September 30 to October 2. Although there are various issues, it was reaffirmed that ICM is an effective tool in aiming for conservation of the natural environment, sustainable ways of living and industrial promotion.

The current situation of ICM in Shima City

In the “Shima City General Plan Phase 2 Basic Plan” (2011-2015), Shima City sets out to tackle “local development based on the creation of a new *satoumi*”, in which people will live in symbiosis with the natural environments of coastal areas. Thus, in March 2012, we drew up the Shima City Satoumi Creation Basic Plan (Shima City Integrated Coastal Management Basic Plan), and we are now taking steps to conserve the natural environment of coastal areas and stimulate local communities based on the practice of Integrated Coastal Management (ICM).

Given the geographical and social characteristics of coastal regions, the promotion of ICM initiatives needs to be locally led. In Shima City, a Council for Promoting the Creation of Satoumi consisting of local authorities, residents' associations, industry-related bodies and others has been set up and is now coordinating directions for initiatives. This involves many clerical operations in which local governments have little previous experience, such as collaborating between different administrative departments, coordinating rights and interests, and evaluating results based on scientific evidence, etc. As such, an awareness among stakeholders aimed at acquiring new knowledge and forming a consensus will need to be fostered. Moreover, many remaining issues will need to be resolved in order to smoothly promote the running of the council and reap the results of local development through the creation of a new *satoumi*. One of these, for example, is how the funds needed to actually promote the project will be secured.

Hosting the PNLG Forum 2013

Amid all this, it was decided that Shima City would join the PEMSEA Network of Local Governments (PNLG), a network of local governments tackling ICM in East Asian countries, to gain knowhow on promoting ICM. It was also decided that an attempt would be made to convey the wonderful local resources of Shima City, all of which lies inside Ise Shima National Park, and to attract visitors from abroad by publicizing efforts by the city overseas. And although it was slightly hasty, at the same time as joining PNLG, a



Large number of PNLG Forum participants gather for a group photo

decision was made to invite the PNLG Forum 2013 (the PNLG annual conference) to be hosted in Shima City. Preparations for holding the Forum were then started.

Until then, Shima City had no experience at all of hosting an international conference, and the preparations were fraught with difficulty on a daily basis, this included the need to communicate with the Secretariat in English. Nevertheless, thanks partly to the Ocean Policy Research Foundation as co-host of the Forum, not only was Shima City's membership approved by the PNLG Executive Committee, but it was also decided that the PNLG Forum 2013 would be held here. Thus, the PNLG Forum 2013 was held at the Nemuno Sato Hotel and Resort in Shima City from September 30 to October 2, 2013.

The Forum was attended by 164 participants from 11 countries, representing PNLG members, other local governments currently considering membership, and others. The theme of the Forum was “Achieving the Aichi Biodiversity Targets, New Satoumi and Vitalization of Coastal Areas through Integrated Coastal Management”, based on the fact that the aim of ICM by Shima City is to make sustainable use of natural resources. As well as the PNLG annual conference, the event included a technical workshop and a local study tour. An outline of the conference and technical workshop can be found on the video blog of the Ocean Policy Research Foundation, “*Umi wo Ikashita Machizukuri*”



Scene from the inspection tour of Shima City

(Community Development Making Use of the Sea) (<http://blog.canpan.info/oprficm/>).

Results and tasks

From Shima City's point of view, I think there were many points to be learnt by holding this Forum. Firstly, in the panel discussion after the technical workshop, the Mayor of Shima City (participating as a panelist) gave a report including the background to ICM efforts being tackled by the city. When someone asked how we had gained the understanding of local citizens and the city council, I felt strongly that, in any local authority, forming a consensus on the ideal local vision and directions for efforts is an important key in promoting ICM, but at the same time is also a major task. At the moment, in the Shima City Satoumi Creation Promotion Council, I think we still need time to form this kind of consensus. Nevertheless, I feel it important to tackle PR efforts with a view to forming a local consensus, while promoting practicable efforts and others in parallel.

I was also made aware once more that PNLG efforts are being promoted very strategically in collaboration with the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA). Japan's local governments, too, are individually preparing general plans, and are to promote administrative projects based on long-term plans. As I stated at the beginning, the process in Shima City has involved giving importance to promoting ICM in the Phase 2 Basic Plan of our General Plan, and then formulating the Basic Plan. However, I wondered if this process might tend to be forgotten in the municipalities, as the grass roots of local government, which are pressed daily with the task of responding in situ. At the same time, I was reminded that sharing ideas, not just with the local government staffs, but also with residents, related groups, and businesses, is important

in order to sustain ICM as a community.

Besides this, an enthusiastic debate was held on problems shared by all the members, such as the legal system that would be necessary in order to sustain ICM. We also discussed the fact that measures to combat natural disasters are an important issue, and issues specific to certain areas where legal regulation cannot be rigorously enforced. In many cases, Shima City faces the same issues, and they were therefore very useful as reference for studying future initiatives.

When actually promoting ICM, the present reality is that the process is often held up when we encounter problems of how to gain the understanding of stakeholders and the fact that concrete outcomes cannot easily be obtained. In this Forum, however, we were told that ICM is being practiced broadly overseas, transcending different peoples and cultures, and that so far, no PNLG member has given up on practicing it. I felt it important, in terms of maintaining the motivation of stakeholders, to reaffirm that ICM is an effective tool, and while promoting it, to continue to share information with PNLG members and other local governments in Japan that are promoting the same efforts. In this way, we may properly conserve the natural blessings produced from Shima City's rich biodiversity and biological productivity, and promote industry sustainably while making effective use of those blessings



Scene from the panel discussion at the PNLG Forum 2013

Conclusion

Finally, I think that holding this Forum has had an impact not only on Shima City but also on other local governments and national government stakeholders in Japan, and has also brought into relief a large number of points to be learned. I would again like to thank the PNLG, PEMSEA and the Ocean Policy Research Foundation for giving us this opportunity, as well as the Ministry of Land, Infrastructure, Transport and Tourism along with other administrative organs and Forum staffs for providing support. ■

1) Satoumi: an ideal coastal environment where high biological productivity and biodiversity is expected because of harmonious and symbiotic coexistence between natural ecosystems and human activity. (PNLG Forum 2013)

To Materialize Support Measures under State Responsibility and a “Remote Island Special Zone System”

[KEYWORDS] State responsibility for developing remote islands / Ogasawara Islands / Remote Island Special Zone System

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Remote islands play diverse roles for the nation and its people, such as securing territory and conserving the oceans. In view of this, support measures need to be implemented under state responsibility for people to continue living freely on remote islands. However, because each remote island has hugely differing targets and basic conditions for development, a scheme like a “Remote Island Special Zone System” should be introduced to individually address the characteristics of each island.

Remote islands are all the same, remote islands are all different

The island of Sado, where I live, is the largest offshore island in Japan. I had long sensed differences in the environments of different islands, and when I was appointed Chair of the National Association for Islands Development in 2007, I decided to see for myself the situation on other islands, particularly the smaller ones. Over the next 5 years or so, I traveled to many of these islands. Even after retiring from the post in April 2012, I visited the Ogasawara Islands (Tokyo Metropolis), Ojikajima (Nagasaki Prefecture), Amami Oshima (Kagoshima Prefecture) and Minami Daito (Okinawa Prefecture), among others. What I felt then could be summed up in two seemingly contradictory statements: “Remote islands are all the same” and “Remote islands are all different”.

On the former of these, support measures need to be implemented under state responsibility for people to continue living freely on remote islands, in view of the fact that remote islands play diverse roles for the nation and its people, such as securing territory and conserving the oceans. A feature shared by remote islands is that they are cut off from the mainland by a body of water. Ferry services to the mainland are not only unstable but the frequency is limited; compared to terrestrial means of transport on the mainland, the cost of transporting people and goods is several times higher.

Remote islands also suffer from a shortage of human resources. Even the primary industries that have supported their economies are in decline, and the margin for accepting young people who have been educated for a diverse and complex society is all too narrow. Although the islands have natural environments and communities that nurture robustness and healthiness, young people on remote islands leave for cities on the mainland after their education is over, and could not return even if they wanted to. The cities merely absorb human resources from the provinces; the money spent by parents on bringing up and educating their children is not recycled to the local community. As a result, remote islands become increasingly depopulated and

impoverished.

This kind of handicap hinders the stability of lives, the growth of industry and the promotion of exchanges. Unless it can be eliminated, the environment for permanently settling on remote islands will quickly become impossible to maintain, and Japan’s national interests could be threatened.

The Tokugawa shogunate settled residents of remote islands in Ogasawara to establish effective control

On a recent visit to the Ogasawara Islands, I bought a book on the ship, thinking it would be just right for a journey of just over 25 hours from Tokyo. The book was *Kaichu Sanpo de Hirota Ribon* (“A Ribbon I Picked up on a Walk in the Sea”) by Chinatsu Nakayama. The book was about the achievements of the underwater photographer Hajime Masuda (1921-2005), greatly respected by the author as an authority on diving, and the relationship of his great-grandfather Takanosuke Masuda (1827-1904) to Ogasawara. Born on Sado Island, Takanosuke was a capable man who rose from the position of local official to that of a foreign affairs advisor. His son Takashi Masuda (1848-1938) was the first President of Mitsui & Co. and founder of the Nihon Keizai Shimbun. Given this coincidental encounter with a great figure from my home island so far away across the Pacific, I eagerly immersed myself in the book.

In 1862, shortly before the Meiji Restoration, Takanosuke Masuda traveled to Ogasawara on the Kanrin Maru as a member of the shogunate’s Ogasawara delegation, accompanied by sailors from the islands of Hachijojima and Shiwaku. In the following year, 38 settlers arrived from Hachijojima, and Masuda worked hard for 18 months to settle them on an isolated island in the southern ocean, while protecting western settlers. Foreign ships had been frequenting the fringes of the Japanese archipelago since around the beginning of the 19th century; western influence had even extended as far as Ogasawara, which had until then been uninhabited. The shogunate judged it essential to settle Japanese nationals there with a view to establishing

effective control. The ability of islanders to withstand harsh environments was held in high regard and played a major role. So even then, there was a strong awareness of the existential value of islands and the importance of people living on them.

In recent years, the areas around islands located on Japan’s national frontiers have become lively, and tension is rife. Although the actions of the shogunate at that time have been variously received, I think they offer major hints for dealing with the threat of pressure from outside the country.

For the introduction of a “Remote Island Special Zone System”

Some years ago, I visited the Tokara Islands (7 inhabited islands) belonging to Toshima Village, Kagoshima Prefecture, along with the village headman. A twice-weekly ferry operated by the village stops at each island in turn; we arrived at the southernmost island of Takarajima 13 hours after departing from Kagoshima on the mainland. On one of the islands, there are not even any satisfactory harbor facilities, and a portable walkway has to be taken to the ferry once it arrives inside the breakwater. Even the local schoolteachers helped out with this, which left a lasting impression. On another island, I was amazed to see several children racing towards the ship as soon as it had berthed. When I asked why this was, I was told that their goal was the ship’s ice cream vending machine. Of course there are no hospitals, but only a floating clinic that goes around the islands a few times a month. The islanders have to cross to the mainland if they want to see a specialist. While some of Japan’s 418 inhabited islands (like Sado) have hospitals and even convenience stores, others have no clinics or shops and are plagued with inconvenience. As such, the basic conditions and targets of development are very different from the beginning. This is what I mean by “remote islands are all different”.

In future, we should resolutely introduce a scheme such as a “Remote Island Special Zone System”, in which each island is treated according to its characteristics. I have

continued to advocate this, particularly in connection with the amendment to the Remote Islands Development Act (amended in June 2012, effective from April 2013). In the amendment, such a system is to be newly specified under “Preparation of a Remote Island Special Zone System” (Article 18–2), but the specific system design and other details are to be addressed from now on.

For example, when a major accident occurs in a densely populated urban area, the government sometimes tightens regulations without any consideration of the situation on remote islands. When transporting oil products, ferries only have room for a single tanker truck in some cases. Some islands have no vehicle testing centers, forcing car owners to spend as much on transporting their vehicles to the mainland as it costs to actually carry out the test. On those islands, there are also calls for the frequency of tests to be reduced, among others.

Conditions should also be improved so that motivated people can start their own businesses on remote islands. If preferential tax zones were permitted, companies and entrepreneurs would be encouraged to establish themselves there, and this would also contribute to settled residence. Entrepreneurs would surely be attracted by a flexibility that is not available on the mainland.

Japan as a nation of new resources and energy

The oceans used to be seen merely as open spaces where fishery resources are developed. But today, all that has changed. Significant quantities of methane hydrate, natural gas, rare earth and other precious resources lie dormant in the seas off the Kii Peninsula as well as Sado and elsewhere, just waiting to be developed. Japan’s debut as a nation of new resources and energy is not long off. Though a relatively small country in terms of land area, Japan has the world’s 6th largest Exclusive Economic Zone, thanks to its outlying islands. Securing Japan’s precious territory depends on the presence of remote island inhabitants, and it is the state’s responsibility to protect their livelihoods. We should correctly evaluate the DNA of these courageous

islanders who, without fear of failure, have conquered rough seas to settle on the islands, and have carved out the history of Japan until the present day. I hope they will be the trump card for Japan’s revival. ■



left) The Ogasawara Maru berthed at Chichijima, Ogasawara. A ship journey of 25.5 hours from Tokyo. right) When the locally operated twice-weekly ferry arrives, the men of the island all go out to unload goods. At Kodakarajima, one of the Tokara Islands.

The Gradually Unraveling Mystery of Kuroshio Meander and the Future of the Kuroshio Current

[KEYWORDS] Japan south coast Kuroshio flow path / climate variation / Kuroshio power generation

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(Ocean Newsletter No.323, January 20, 2014)

The Kuroshio current running along Japan's south coast sometimes shifts to a large southward meandering path. As well as being a scientifically very interesting phenomenon, this "meander" has a huge social impact in terms of fisheries, maritime transport and marine renewable energy. Recent research has elucidated the mechanism whereby this Kuroshio meander is generated. This mechanism and anticipated future trends in fluctuation will now be examined.

The Kuroshio in 2013

In summer 2013, the Kuroshio flow path along Japan's south coast made the news when it shifted southwards to 32°N off Enshu Nada, for the first time in four years. Once it has shifted south, the Kuroshio flow path can sometimes stay there for five years or more. This phenomenon is called "Kuroshio meander". Although there are several major currents to rival the Kuroshio in the world's oceans (such as the Gulf Stream in North America), a meander that remains stable for several years on end is an extremely interesting characteristic that is only found in the Kuroshio. Since October 2013, the summer's southward flow has been gradually returning to the coast without developing into a large meander.

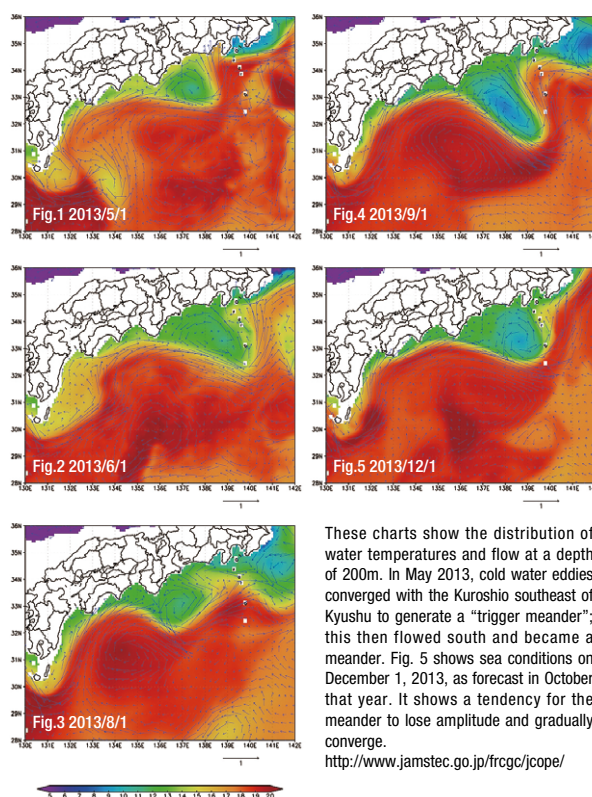
The Gradually Unraveling Mystery of Kuroshio Meander

Periods when Kuroshio meander is more frequent (the meander phase) and those when it is less so (the non-meander phase) are thought to trade places in approximately 20-year cycles. If this theory is correct, it would mean that a meander phase started in around the mid-2000s. In fact, a meandering flow path arose in summer 2004, for the first time in about 13 years, and lasted about a year. The mechanism of Kuroshio meander generation and dissipation is a fascinating mystery that has engaged marine physicists all over the world for many years. In the last 20 years, the ocean observation network has been enhanced as a result of international collaboration, making it possible to express realistic fluctuation in the Kuroshio based on a computer-generated mathematical model. Thanks to this, forecasts of the Kuroshio flow path up to several months ahead have been achieved using computers (see the figures). In recent years, research has advanced by using newly observed facts accumulated in this way, along with computers, and the mystery of Kuroshio meander is gradually being unraveled.

The conditions for Kuroshio meander to be stable are determined by the equilibrium between two effects – one whereby the meander is forced to flow eastwards by the flow of the Kuroshio itself, and the other whereby the meander tries to head westwards as a wave. Of course,

■ The Kuroshio in 2013

— Analysis and forecast results from JAMSTEC's numerical current forecasting system JCope2



the flow sometimes stabilizes in a state of forward motion without meandering. This is a state in which neither meander nor non-meander is abnormal, but both are stable (a state of multiple equilibrium). The two stable states can interchange if some kind of disturbance occurs. In the case of the Kuroshio, eddies that exist everywhere around it serve as disturbance. Eddies are generated by the instability of various ocean currents including the Kuroshio. If the Kuroshio flow path were always in a state of multiple equilibrium, meander and non-meander would merely switch to each other's opposite state as a result of chance disturbance. This makes long-term forecasts difficult. At present, we know that fluctuation in the Kuroshio flow path due to disturbances (eddies) can be forecast up to about two months ahead. This compares favorably to the fact that atmospheric

weather forecasts arising from interchange between high and low pressure can be made about one week in advance. In the case of the sea, this is because the speed of ocean currents, and the waves related to them, is smaller than that of the atmosphere, and changes in “weather” are also more gentle than those in the atmosphere.

The generation and dissipation of the Kuroshio meander that occurred in 2004 were the first to be investigated in detail using satellite observation and a realistic mathematical model. Research has shown that this meander arose when small meanders (trigger meanders), as “seeds” for the large meander, were caused by a combination of warm eddies propagated to the east of Taiwan, converging with the Kuroshio and flowing downstream of it, and cold eddies advancing westwards near 30°N, both interacting with the Kuroshio to the east of Kyushu. A similar trigger meander can be seen in Fig. 1, showing the situation in 2013. Even more interestingly, the degree to which trigger meanders are generated by warm and cold eddies varies according to large-scale fluctuation in ocean winds in the center of the Northern Pacific. Also, once a meander has been generated along Japan’s south coast, it tends to become unstable through interaction with eddies of various sizes coming from downstream (the continuation of the Kuroshio). The stability of the meander will be influenced by whether or not the downstream area is stable. This stability of the downstream area, in turn, is determined by large-scale fluctuation in ocean winds in the center of the Northern Pacific.

Bearing the above three points in mind, if we create a time series of factors to determine how easily a Kuroshio meander can occur, the timing of meanders that have occurred in the past can be more or less explained by these factors (Usui et al., 2013). Although Kuroshio meander is a relatively small phenomenon in terms of the Northern Pacific as a whole, it does not occur completely by chance, but could be seen as an indicator of climate change in the Northern Pacific as a whole.

The Kuroshio from now on

Recent research has shown that, if the Kuroshio flow rate (flow volume) along Japan’s south coast were too large, the dynamic equilibrium mentioned above would be broken, the tendency to be forced eastwards would increase and the meander would become less stable. The flow volume of the Kuroshio is determined by the strength of winds over the Pacific as a whole. At present, the strength of ocean winds over the North Pacific is said to be close to the upper limit for stability of the Kuroshio meander. Forecasts based on several global warming models suggest that, 100 years from now, the Kuroshio flow rate along Japan’s south

coast will have increased. It is also suggested that, if the surface warms and stratification grows stronger, the range of Kuroshio flow that tolerates meander will narrow. From these points, the outlook might be that a stable Kuroshio meander will become less prone to occur as global warming progresses further. In fact, although the connection with warming is unknown, we know from satellite observation over the last 20 years that the Kuroshio flow rate along the surface of Japan’s south coast is continuing to increase. The only meander to occur in the last 20 years was the one that lasted a year in 2004-2005; the Kuroshio southward flow path of summer 2013 (Fig. 4) is not stable and its amplitude is gradually shrinking.

In recent years, the development of solar power, wind and other renewables has started in earnest. In the oceans, the search is on for ways of using the vast kinetic energy of major ocean currents, in addition to offshore wind, wave power and tidal currents. On the continental west coast where Japan is located, major ocean currents like the Kuroshio always exist (as evidenced by the name “western boundary current”). In a geopolitical sense, the Kuroshio could be described as Japan’s leading energy resource. In particular, if we assume that the kinetic energy of the Kuroshio has increased as a result of warming caused by human activity, as stated above, it would make sense to re-use that increase as energy for human activity, as well as reducing the use of fossil fuels and emissions of greenhouse gases.

However, if the kinetic energy of the Kuroshio were over-absorbed, the flow volume of the Kuroshio could decrease and the Kuroshio flow path and various other physical fluctuation characteristics would change. Kuroshio power generation is being planned to the east of Taiwan, located upstream from Japan. If kinetic energy is excessively absorbed upstream, not only will the Kuroshio flow path in Japan downstream fluctuate greatly, but the energy may also be lost. In future, when using the energy of the Kuroshio, we will need to evaluate environmental impact from these viewpoints. It is expected that the debate to this end will be stepped up scientifically and internationally, with the participation of society and industry. ■

A Floating Island Type Offshore Energy Farm

— Use of Integrated Natural Energy Using Wind Lens Technology —

[KEYWORDS] lens wind turbine / offshore floating platform / fishery collaboration

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(Ocean Newsletter No.324, February 5, 2014)

We have developed a new type of wind power generation system that dramatically improves efficiency by concentrating wind energy. This is the small (1-5kW) or medium (100kW) lens wind turbine, which has achieved a 2-5 fold increase in power output compared to conventional wind turbines.

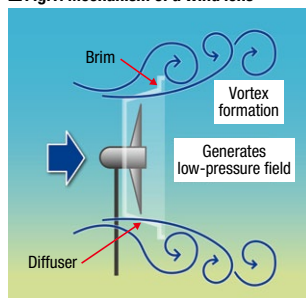
Aiming at marine energy development to wind power energy, we installed a hexagonal floating platform with a diameter of 18m in Hakata Bay, Fukuoka, to create a floating island type energy farm mounted with two 3kW lens wind turbines and a 2kW solar panel.

What is a lens wind turbine?

The power generated by a wind turbine (water turbine) is proportional to the cube of the flow speed. In wind power (hydropower) generation, if the flow can be accelerated and fluid energy can be concentrated locally by taking advantage of the hydrodynamic properties of topography and structures, the volume of power generated increases dramatically. “Lens wind turbine” is the name given to symbolize the object of this new research, incorporating the sense of concentrating or focusing wind flow.

Fig.1 is a sketch showing the concept and mechanism of a lens wind turbine (lens water turbine). A vortex formation plate called a “brim” is attached around the exit side of a ring called a diffuser surrounding the wind turbine blades. The resulting strong vortex formation causes a low-pressure region to be generated at the back. The wind flows into this region, producing a large acceleration effect near the diffuser entrance. This is how the “diffuser with brim” (wind lens) was conceived as a wind concentrating and accelerating device. The advantages of the lens wind turbine can be listed as follows:

■ Fig.1: Mechanism of a wind lens



(1) 2-5 times greater power output (using the “wind lens effect” to concentrate wind energy).

(2) Brim-based yaw control (like a weathervane, the brim at the exit end causes the wind lens turbine to rotate according to variations in wind direction, and ensures that the turbine is always directly aligned against the direction of the wind).

(3) A vast reduction in turbine noise (the hydrodynamic mechanism, whereby the blade-tip vortices interfere with the internal boundary layer of the diffuser and are controlled, means that aerodynamic sound is vastly reduced and noise is not a concern).

(4) Improved safety (the rapidly rotating turbine is covered by the structure).

(5) Bird strike can be avoided.

(6) Has a lightning conductor at the top of the wind collector (to avoid lightning damage).

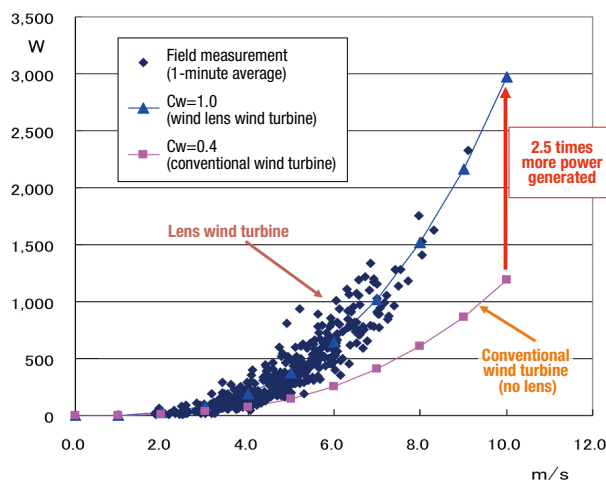
(7) Excellent scenic attributes (harmony with the landscape).

The lens wind turbine solves all environmental problems surrounding wind turbines. This wind lens mechanism works equally with water as with wind, and as a “lens water turbine”, can be applied to river and tidal current power generation. An output 2-5 times that of a conventional water turbine can be achieved.

Development of a compact lens wind turbine – aiming for actual use

Fig. 2 shows an example of the results from a test of power generation performance in the field. $C_w=1.0$ is based on the swept area of the rotor. Of the kinetic energy provided by the approaching wind, C_w is the proportion used by the wind turbine for its own rotation energy. Taking the outer diameter of the lens as the reference area (*), $C_w^*=0.54$. Even a large, high-performance conventional

■ Fig.2: Field experiment using 3kW lens wind turbine



wind turbine only has $C_w=0.4$, so this is 30% higher. What this means is that, even if a normal wind turbine were made as large as the outer circumference of a wind lens, it still could not match the output of a lens wind turbine.

Aiming for a floating island type offshore energy farm

(1) The floating island concept

In Japan, where coastal waters quickly descend to considerable depths, there are limited opportunities for bottom-mounted offshore wind power, as found in Europe. Instead, floating wind power generation is being planned. As will be introduced here, this involves installing a fully-fledged floating platform, with wind turbines and solar power generation, as well as wave power, tidal current power generation and others below sea level, creating an integrated renewable energy farm. The floating platform could also be used for multiple purposes in collaboration with fisheries, including mariculture and marine product processing, and as a battery charging base for electric ships. In other words, it will be entirely different from the concept of large-scale concentrated floating wind power generation, as found off Fukushima and elsewhere. This is a “floating island” concept in the truest sense. It will be established as a medium-scale distributed type independent power source. The rating of power generation from here will be in the several MW class.

(2) Demonstration experiment using the Hakata Bay offshore floating wind power facility

From March 2011, we conducted a model experiment in a large water tank at the Research Institute for Applied Mechanics, Kyushu University. Then, on December 4, 2011, we installed a floating platform with a diameter of

about 18m in Hakata Bay, and created a floating platform-type, compact, integrated energy farm mounted with two 3kW lens wind turbines and a 2kW solar panel (Fig. 3). We are currently gathering various data on wind power, waves, pitching of the floating platform, etc. We compared the total annual power output of the floating platform lens wind turbine with that of the same type of lens wind turbine installed in a coastal area 3km from the floating platform. As a result, even with a floating platform just 700m offshore, the annual average wind speed was about 25% faster and the total power output was double. Meanwhile, the small floating platform with a diameter of around 20m is turning into a splendid fishing reef.

(3) Fully-fledged floating island offshore energy farm (co-existing with fisheries)

We are planning a floating platform-type renewable energy farm on a practical usage scale. This will be a fisheries-friendly type, with aquaculture pens arranged around the platform. The basic type will be a triangular shape formed by linking individual floating platforms with a length of about 100m. On top of this, we will install three 350kW-class lens wind turbines and a 0.2MW-class solar panel, creating a 1.25MW-class floating platform-type energy farm. If possible, we would like to create a multiple linked type in future. The output power would be used for aquaculture industry, processing plants on the platforms, and electric ships, with the surplus power going to households on islands and in fishing ports. Energy would thus be produced locally and consumed locally.

Conclusion

I believe that the smart communities of the near future will be created from farm villages, fishing villages and similar groupings in provincial areas. In areas where agriculture, forestry and fisheries are the main industries, they are surrounded by an abundance of natural energies. Our concept is ecofarming and eco-fisheries, where these are used as clean energies and no fossil fuels are used at all. We are now striving for research and development to that end.

While I have discussed the future potential of the newly developed lens wind turbine and lens water turbine, I feel that, more than anything, a landscape in which pointed blades are turning will create a harmony that is more in tune with the surrounding scenery, thanks to the “circle” of wind lenses around them. I would like to create this “circular” structure to bring an environmentally friendly harmony into the scenery of Japanese agriculture and fisheries. ■

■ Fig.3: The Hakata Bay Project



An energy farm totaling 8kW, comprising an 18m-diameter floating platform, two 3kW lens wind turbines and a 2kW solar panel, installed on December 4th, 2011.

Disaster Revitalization in Fukushima Prefecture

— Efforts Aimed at Accumulating Renewable Energy Industries —

[KEYWORDS] damage caused by the Great East Japan Earthquake disaster / Vision for Promotion of Renewable Energies / floating offshore wind power

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(Ocean Newsletter No.326, March 5, 2014)

Now that nearly three years have passed since the Great East Japan Earthquake disaster, I would like to introduce the state of current efforts aimed at the revitalization of Fukushima Prefecture, and, of the efforts undertaken so far, projects aimed at accumulating related industries by promoting renewable energies in particular. Symbolic of these efforts is the demonstration research project on floating offshore wind power.

Disaster damage and efforts towards revitalization

It will soon be three years since the Great East Japan Earthquake disaster. In Fukushima Prefecture, as in Iwate and Miyagi Prefectures, the earthquake and tsunami wrought immense damage. They caused 3,461 deaths (including secondary fatalities), and five people are still unaccounted for. As for damage to housing, 21,225 homes were totally destroyed and 73,295 homes partially so (as of Feb. 4, 2014). In monetary terms, the earthquake and tsunami caused damage to the tune of 951.2 billion yen, this being the combined total for civil engineering facilities, agriculture, forestry and fisheries, commerce and industry (as of April 27, 2011).

Actually, Fukushima Prefecture is in a very different situation compared to the other disaster-affected prefectures. This stems from the additional damage following the accident at the TEPCO Fukushima Daiichi nuclear power plant. The impact of the nuclear power accident extended into various fields of activity all over the prefecture, and even today it is still difficult to get an overall picture of the damage. The prefecture's residents have also suffered a huge psychological burden as a result of their evacuation, etc. Altogether, 137,306 residents have been displaced, including 88,884 evacuees within the prefecture, 48,364 outside it, and 58 whose place of evacuation is unknown (as of January 2014).

The disaster had a major impact on industry and employment in the prefecture, the number of businesses decreasing from 100,000 before the disaster to about 90,000 after it, and around 29,000 people (3.1% of the prefecture's working population) lost their jobs. This situation has yet to be remedied.

In view of the above, Fukushima Prefecture drew up a "Vision for Revitalization in Fukushima Prefecture" (August 11, 2011) to indicate overall directions for revitalization and a "Plan for Revitalization in Fukushima Prefecture" (December 28, 2012), outlining detailed measures for revitalization, thus embarking on its priority projects.

Thanks to concerted efforts so far by the people in Fukushima, production and shipments of rice and a succession

of other agricultural products have recently been resumed. Moves towards revitalization are beginning to take physical shape in the revival or rebuilding of commerce and industry, new and extended construction of factories, etc., signs of a recovery in visitor numbers at tourist sites, and the start of building work on Fukushima Prefecture Revitalization Public Housing, among others.

On the other hand, many problems still remain, including delays in the application of measures, issues not sufficiently dealt with, etc. In terms of the revival of agriculture, forestry and fisheries, besides accumulating related industries and creating employment through the use of special agriculture, forestry and fishery zones, we will strive to expand sea areas for trial operations and increase targeted fish species, and regain trust in the prefecture's agriculture, forestry and fishery products by reinforcing the inspection system and implementing appropriate inspections. Meanwhile, as the biggest issue facing the revitalization of Futaba-gun and other evacuated areas, we will promote measures aimed at the return of evacuees as well as measures to reconstruct and stabilize their lives.

We plan to position this year, the 3-year milestone since the disaster, as the "Year of Fukushima's Green Shoots of Revival", to shape the new Fukushima and make further advances in the right direction.

To promote the introduction of renewable energies

The priority projects mentioned above include a "Renewable Energy Promotion Project". This aims at a vision in which "action to build a safe, secure and sustainable society free from nuclear power through dramatic advances in renewable energy" are taken.

Meanwhile, the "Vision for Promotion of Renewable energies" (revised in March 2012) sets ambitious targets for the introduction of renewable energies in the prefecture – namely, as a percentage of the energy required, growing from an actual figure of about 20% in FY2009, to about 40% by 2020, about 60% by 2030, and 100% or more by around 2040.

Initiatives aimed at accumulating renewable energy-



Renewable Energy Industrial Fair 2013 (REIF Fukushima 2013)
Dates: Nov. 6-7, 2013 / Venue: Big Palette Fukushima

related industries in Fukushima Prefecture follow the six stages of “diffusion and PR, human resource development”, “forming networks”, “R&D and technology support”, “demonstration trials”, “expanding transactions”, and “information transmission”. We are aiming to promote these in unison based on cross-sector collaboration among industry, academia, and government, thus encouraging the participation of companies and research institutes from inside and outside the prefecture to form a giant agglomeration that would lead to the growth of an advanced research and development center for related fields.

More specifically, the principal initiatives will involve establishing the Fukushima Renewable Energy-related Industry Promotion Research Society (some 480 organizations at the end of 2013), developing the Fukushima Renewable Energy Research Institute, AIST (National Institute of Advanced Industrial Science and Technology), implementing the Regional Innovation Strategy Support Program, developing next-generation technology for renewable energies, supporting the Floating Offshore Wind Farm Demonstration Project, implementing sales route expansion support projects, and holding the Renewable Energy Industrial Fair (REIF Fukushima).

The Floating Offshore Wind Farm Demonstration Project

This project, commissioned by the Ministry of Economy, Trade and Industry since FY2011, is being implemented by a consortium consisting of one Japanese university and ten Japanese companies. Marubeni Corporation is acting as project integrator and the University of Tokyo as technical advisor for the project.

Unlike in Europe, where beaches tend to be broad and seas relatively shallow, Japan is an oceanic state surrounded by deep coastal waters in many areas. Due to this topographical constraint, in Japan research has been underway

on a new type of wind power generation to succeed the on-shore type. This is the floating platform type of wind power generation. Out at sea, where the winds are more stable and stronger than on land, wind turbines can be made much larger. There are thus great expectations both domestically and abroad for the project as something that will put these advantages to use in materializing high-efficiency offshore wind power.

In the demonstration project, the plan is to divide the installation of power generation facilities into Phase 1 (2011-2013) and Phase 2 (2014-2015). This fiscal year, a 2MW downwind floating offshore wind power facility (“Fukushima Mirai”) and 25MVA floating offshore substation (“Fukushima Kizuna”) were installed, along with seabed cables, with operation starting on November 11, 2013. Power sales to Tohoku Electric Power started on December 1, and the capacity factor for the month of December was 43.6%. A factor generally deemed suitable for terrestrial wind turbines is 20%, thus very good results have already been achieved. In Phase 2, the plan is to install two 7MW floating offshore wind power facilities with a height of around 200m.



2MW downwind floating offshore wind power facility
(Photo source: Fukushima Offshore Wind Consortium)

In this project, as well as taking on the challenge of such technical issues as the floating platform concept, observation and forecasts, and high-performance materials, etc., we will also establish co-existence with fisheries, which is indispensable for materializing large-scale offshore wind power in future, and undertake to achieve navigational safety, environmental impact assessments, and a social consensus that includes dialogue with the public on science and technology. Spurred by this demonstration research project, we aim to accumulate new industries and create employment centered around renewable energies in Fukushima Prefecture, and thus form a major agglomeration of wind power industries. My hope is not only for this to contribute to the revitalization of Fukushima, but also that the establishment of this business model for power generation and the accumulation of knowhow will lead to expansion overseas. ■

The Expansion of Nishinoshima and the Seas around Japan

[KEYWORDS] Nishinoshima / volcano / EEZ

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(Ocean Newsletter No.327, March 20, 2014)

In 2013, a new island was created by volcanic activity near Nishinoshima. The island continued to grow due to the outflow of lava, and after connecting with the original Nishinoshima, it expanded up to a point where the Exclusive Economic Zone (EEZ) extends to the west of the island. This means that, once volcanic activity on Nishinoshima subsides in future, we can carry out surveying and revise nautical charts to expand the sea area around Japan.

Japan's oceans are supported by volcanic islands

Japan's Exclusive Economic Zone (EEZ) covers an area of about 4.05 million square kilometers, making it one of the largest in the world. These vast oceans contain abundant fishery resources, while undeveloped resources of minerals and energy lie dormant there. Japan's latent potential as an ocean nation is an unknown quantity. However, did you know that a considerable part of this vast EEZ is supported by volcanic islands? Many of Japan's islands, like the Izu-Ogasawara and Nansei Islands, are volcanic islands originally formed as a result of volcanic activity in the past. What would happen if these islands did not exist? The islands form base points for the EEZ, and if they were to disappear from the map, Japan's EEZ would only consist of the seas around Honshu, Hokkaido, Shikoku and Kyushu. In that case, the EEZ would cover an area of around 1.60 million square kilometers, less than 40% of the present one,

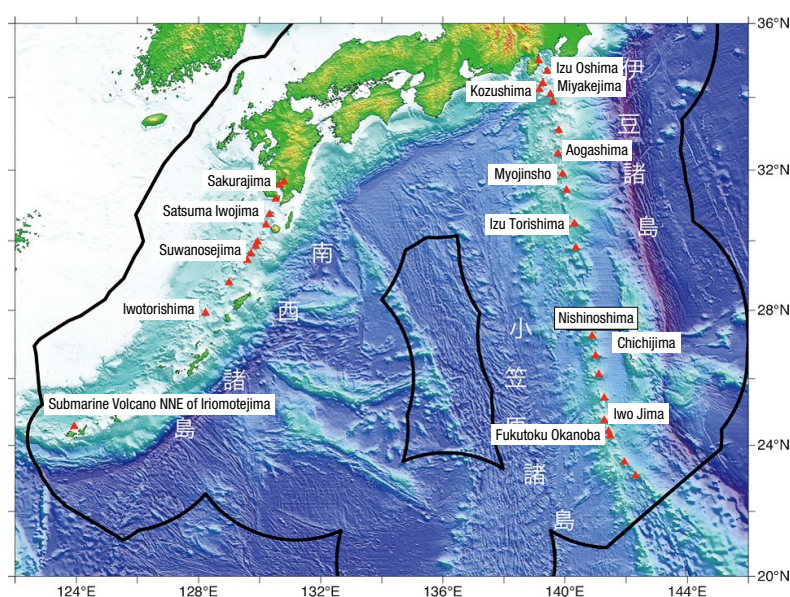
and would fall to about the 30th largest in the world.

The fact that we have such a vast EEZ is thanks to the existence of volcanic islands.

Marine volcanoes around Japan

Japan is one of the world's most volcanic countries; more than 100 volcanoes including Sakurajima and Mount Unzen are still active today. Although many of these are on land, there are also many active volcanoes in the seas. The map above shows the distribution of active volcanoes in Japan's sea areas. This shows how active volcanoes (marked by red triangles) form two lines. One is a chain of volcanoes extending southwards from the east of the Izu Peninsula. It includes volcanic islands such as Izu Oshima, Miyakejima, Izu Torishima, Nishinoshima, and Iwojima, as well as many seabed volcanoes. The other line is a chain of volcanoes that extends southwest from Sakurajima, and includes lively volcanoes such as Sakurajima, Satsuma Iwojima and Suwanosejima.

In the eruptions of Izu Oshima (1986) and Miyakejima (2000), the fact that the islanders all had to evacuate from the island due to the scale of damage is still fresh in the memory. On the Myojinsho volcano located south of Aogashima, an island was formed by volcanic activity in 1952. However, it later disappeared in a massive explosion, wrecking the Japan Coast Guard observation vessel "Dai-go Kaiyo Maru" (which was on its way to conduct a survey there) and claiming the lives of 31 employees. On Izu Torishima, a huge eruption in 1902 killed all 125 villagers, and volcanic activity continued thereafter. On Fukutoku-Okanoba to the south of Iwojima, a new island appeared in 1986, but it only lasted just over two months before it disappeared due to erosion by waves. On Satsuma Iwojima in



■ Fig.1:
Volcanic islands and seabed volcanoes (▲) monitored and observed by the Japan Coast Guard.
The black line is the approximate perimeter of the EEZ.



■ Fig.2:
View of the eruption on Nov. 21, 2013. It is causing a violent phreatomagmatic explosion.



■ Fig.3:
View of the eruption on Jan. 20, 2014. At the back is the original Nishinoshima.

the Nansei Islands, volcanic activity produced a new island in 1935, and it still exists today (Showa Iwojima). In this way, volcanic activity in the seas around Japan is extremely lively, and so ensuring the safety of residents as well as vessels in mid-navigation is an important task.

Volcanic activity on Nishinoshima – Formation of a new island and connection with the main island

On November 20th, 2013, we received information from the Marine Self-Defense Force that a plume had been confirmed on Nishinoshima. The aircraft “Umiwashi 2-go” of the 3rd Regional Coast Guard Headquarters was on its way to confirm the information when it discovered that a new island had been born in the sea, about 500m south-southeast of the center of Nishinoshima. It was the first eruption activity on Nishinoshima in about 40 years, since 1973-74.

When the eruption activity first started, it was an explo-

sive eruption called a phreatomagmatic explosion (an explosive eruption occurring when magma comes into direct contact with water). However, the style of eruption quickly changed to a magma eruption (an eruption without direct involvement of water), and as the result of a Strombolian eruption, magma was intermittently spewed out while lava started to flow from the base of the volcano. Lava flowed out from the foot of Higashiyama and Nishiyama, with particularly large volumes of lava flowing from the outlet on the west side, and activity is still continuing today. Because the volcano body formed by the phreatomagmatic explosion is extremely fragile, there were fears that it would disappear due to wave erosion, but the new area of land formed since the lava flow is covered with hard lava, which is thought to resist erosion by waves.

In future, unless a large-scale explosive eruption or something similar occurs, it is highly likely that the new land area will remain in existence for a long time. The new island has steadily grown, and was confirmed to have connected with Nishinoshima itself on December 26th. On January 20th, 2014, it was confirmed that the area of the new land had exceeded that of the original Nishinoshima and was about ten times the size of Tokyo Dome (as of February 11), and that it had expanded as far as the Exclusive Economic Zone (EEZ) to the west of the island. The speed of the island’s expansion has remained more or less constant since the beginning of the eruption, and with continuing plumes, volcanic gas, and discharge of discolored water, no sign of the eruption subsiding can be seen at the moment.

Nishinoshima and Japan’s seas

In future, when volcanic activity on Nishinoshima has subsided and safety can be confirmed, we will conduct surveys and amend nautical charts and maps. Japan’s territorial waters and EEZ must be 12 nautical miles and 200 nautical miles, respectively, from the low-tide line marked on Japan’s nautical charts (the coast line when the sea level is at its lowest at low tide), as prescribed by domestic law and the United Nations Convention on the Law of the Sea. If the new land area is marked on nautical charts in future, Japan’s seas will inevitably expand.

However, as stated above, new islands that have formed due to volcanic eruptions in the past have later disappeared, and so we must continue watching trends in activity.

When a land volcano erupts, massive damage and volcano disasters occur around it, but no one has been hurt by the Nishinoshima volcano. I hope volcanic activity on Nishinoshima will continue in future, and Japan’s territorial waters and EEZ will expand further. ■

The Man Who Knocked on the Door to End National Isolation from the Outside

— The late Edo castaway, Otokichi

[KEYWORDS] Late Edo castaway / the door to end national isolation / cosmopolitan

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(Ocean Newsletter No.328, April 5, 2014)

182 years ago, a boat carrying a man called Otokichi and his companions ran off course after leaving Onoura in Bishu. Otokichi spent five years abroad before at last returning to Japan, only to be refused permission to land and forced to live elsewhere. Otokichi then worked for a British trading company while based in China, assisted in the world's first Japanese translation of the Bible, and through his wide network of connections including British and American missionaries, knocked on the door to end national isolation from the outside. This fact was not mentioned in Japanese history.

Departure from Onoura, blown off course in a storm

In 1832, the 1,500-*koku* ship *Hojun Maru* departed from Onoura in Bishu (today, Mihama-cho, Chita-gun, Aichi Prefecture) bound for Edo, carrying rice, salt and ceramics. One of the 14-strong crew was a 14-year-old boy named Otokichi. To their misfortune, the ship was caught in a storm off Enshu Nada and blown off course across the Pacific. After drifting for a grueling 14 months, the three survivors Otokichi, Kyukichi and Iwakichi were washed ashore in Cape Alava, Washington, USA. Though the sea was bitterly cold, the place where they landed was a settlement of the native American Makah people. The castaways were quickly found and looked after, and thus became the first Japanese to set foot on American soil. They were taken into the care of Dr. John McLoughlin, Chief Factor of the Hudson Bay Company, who had heard of their shipwreck, and they received education in English together with native American children at a school inside a fort.

To digress a little, these events led to a connection with Ranald McDonald (then aged 10), son of a Chinook chieftain's daughter and a British man, and caused McDonald to enter Japan illegally at Rishiri Island, Hokkaido in 1848 at the age of 24. Until he was sent back to America, McDonald taught English to Einosuke Moriyama and others in Nagasaki. Later, Moriyama was to serve as Chief Inter-

preter on the Japanese side in the negotiations with Commodore Perry, while McDonald himself is known as the first English teacher in Japan.

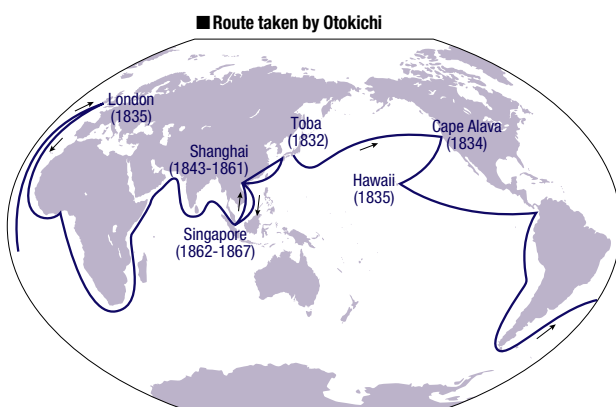
Learns English during the long journey home

Two years after departing from Onoura, on November 25th, 1834, Otokichi at last boarded a ship for the journey back to Japan. On the way, he stayed at the Hawaii Branch of the Hudson Bay Company for 17 days, then arrived at the Port of London six months later. He was only permitted to land at London for one day, which he used to visit the city, the first Japanese person to do so. After another journey of six months from England, with stops in Africa and India, he arrived at Macau, China, in 1835. There, he was looked after by Karl Gutzlaff, a missionary with the Netherlands Missionary Society. Otokichi's year in Macau was spent helping Gutzlaff to translate the Bible. Then, in Singapore, the world's first Japanese translation of the Bible (The Gospel of John, Parts 1, 2 and 3) was printed and published.

In July 1837, thanks to the efforts of Charles King and others working for the American trader Olyphant, Otokichi was to board the *SS Morrison* and return to Japan after an absence of five years. His companions on board were four castaways from Kyushu and the American missionary S.W. Williams. Williams would later serve as interpreter on the US side at the negotiations with Japan when Perry visited, and together with the Japanese-side interpreter Einosuke Moriyama, was to draw up the historic Convention of Kanagawa (March 1854). Curiously, both of these men knew Otokichi quite well.

The SS Morrison incident

On July 30th, 1837, Otokichi finally arrived back at the port of Uruga in Japan for the first time in five years, traveling on the *SS Morrison* owned by the American Olyphant company. However, owing to the Edict to Repel Foreign Vessels issued by the Tokugawa shogunate, the ship was fired upon by cannon and forced to withdraw without the slightest chance of dialog. They again attempted to land at



The Man Who Knocked on the Door to End National Isolation from the Outside — The late Edo castaway, Otokichi

Kagoshima in Kyushu but were again repelled by cannon fire. The seven castaways, with their homeland before them, had to give up hopes of returning, and left Japan once more with heavy hearts. Eventually, this incident was to result in the *Bansha no Goku* ("Indictment of Society for Barbarian Study"), in which Kazan Watanabe and Choei Takano took their own lives.

Rejected by their homeland, the seven castaways now resolved to live abroad, each going his separate way. Otokichi acquired plentiful experience in America and Europe for 7 years before taking employment with the British trading company Dent & Co. in Shanghai (1843).

Helping many other castaways in Shanghai to return home

Otokichi was notably active with Dent & Co. in Shanghai, helping many castaways from Japan to return home, using the strong ties he had built up with Britain, stoutly resisting Commodore Perry's demand that he hand over the castaways from the *Eiriki Maru* of Settsu¹⁾, and safely returning them to Japan. There were at least six cases in which Otokichi looked after castaways and returned them to Japan. But although he deserves praise for continuing to help these people, remembering the bitterness of his own failure to return home, it is strange that for some reason no mention of this was made in the reports by the returning castaways.

Five months after the Convention of Kanagawa was signed, Otokichi visited Japan with the British fleet of Admiral Stirling, and assisted in the signing of the Anglo-Japanese Friendship Treaty (1854) as the British interpreter. By this time, Otokichi was proudly cosmopolitan, cultivated amid more than two decades of life abroad after being cast away. Articles in the *Illustrated London News* of January 13th and April 28th, 1855, report on the arrival of the British fleet in Japan. The articles are accompanied by a sketch of a Japanese ship drawn by Otokichi, as well as introductions to Japan's emperor system, the administrative structure of the state, the three major religions of Japan (Shinto, Buddhism and Confucianism), and the obedience of the people to their teachings. When we read the lengthy content of this article, we are amazed at the high level of education in Japan at that time, bearing in mind that Otokichi lived outside the country from the age of 14.

Receiving the European embassy at Singapore

When Otokichi visited the quarters of the shogunate's

European embassy, which called at Singapore in 1862, he was in his 40s and in the prime of his working life. This was in the 8th year after his visit to Japan for the Anglo-Japanese Friendship Treaty. It is said that he would occasionally discuss his own situation, the wars between China and Britain, the Taiping Rebellion in China and other overseas situations with the embassy. One of its members was Yukichi Fukuzawa, who mentioned some of this in his *Saikoki* (Record of Western Travels). Others who visited, including Einosuke Moriama and Rentaro Tanaka, were also invited to Otokichi's residence.

In his latter years, Otokichi settled permanently in Singapore, where he became the first Japanese person to become a naturalized British citizen. He even established a trading company with his relatives, but sadly his health failed him due to the hardships of living overseas, and on January 18th, 1867, he passed away at the young age of 49. One cannot help but think that his dream must indeed have been to settle permanently in Singapore, bearing in mind the convenience of the location, as a stepping stone for travel to Asia, Europe and America but close to Japan, with an eye on the opening of the Suez Canal two years later.

Conclusion

It has been 26 years since the author started a project in honor of Otokichi²⁾. Thanks to the assistance of many people, Otokichi's footsteps have been revealed one by one, and today we have a clearer picture of Japan at the end of the Tokugawa shogunate, the people who strove to end Japan's isolation, and the personal connections surrounding Otokichi. One can well imagine the feelings of Otokichi, who went overseas, believed that his homeland Japan would become a peaceful country open to the world, and urged his son John W. Ottoson to return to Japan after his death. ■



Friends of Otokichi attempts to retrace Otokichi's footsteps and engages in grass roots exchanges with local people. A stone plaque in Vancouver and the beach at Cape Alava, Washington where he was washed ashore.

1) Drift of the *Eiriki Maru*: Blown off course in seas off Kishu Kumanoura in October 1850; 11 of 17 crew members returned home.

2) Friends of Otokichi website <http://www.otokichi-i.com/>

Aomori Prefecture Logistics Strategy

— Growth Strategy with an Eye on Logistics Dynamism —

[KEYWORDS] Omnidirectional maritime approach / Northeast Asian global logistics center / contribution to Japan as an Oceanic State

Shingo MIMURA

Governor of Aomori Prefecture

(Ocean Newsletter No.329, April 20, 2014)

In Aomori Prefecture, we were reminded once again, through our experience of the Great East Japan Earthquake disaster, of the benefits of an omnidirectional maritime approach and the major advantage of our potential as a logistics center. We have formulated an “Aomori Prefecture Logistics Strategy (January 2014)” as a new scenario for economic growth drawing on this strength, with a view to creative reconstruction from the disaster.

We will aim to contribute to the sustainable growth of this prefecture by maximizing this advantage, and to contribute to economic growth in the whole of Japan as an Oceanic State.

Benefits of an omnidirectional maritime approach – Potential of Aomori Prefecture –

15,000 years ago, our ancestors built up a highly developed and mature culture, as witnessed by the numerous Jomon sites that remain between Hokkaido and northern Tohoku. The most notable of these is the Sannai Maruyama Site in Aomori City, the largest Jomon settlement site yet discovered anywhere in Japan. The Jomon culture, which lasted around 10,000 years, was supported by many exchanges of information and technology brought about through a rich natural environment and maritime trade. Then, as we enter the Mediaeval period, Tosaminato (Jusan, Goshogawara City) on the Japan Sea side saw great prosperity as a port and harbor city, even to the point of rivaling Hakata in the west. Tosaminato etched its name in the history of Japanese marine transportation, along with many ports along the Japan Sea coast. In the Edo period, ports of call for the Kitamae ships played an important role in logistics around the Japan Sea, and from the Meiji to Showa periods the Seikan Ferry handled logistics between Hokkaido and Honshu. Today's ferry routes also function as major arteries supporting the lives of the people, and Aomori Prefecture has continued to develop and accumulate history together with maritime logistics.

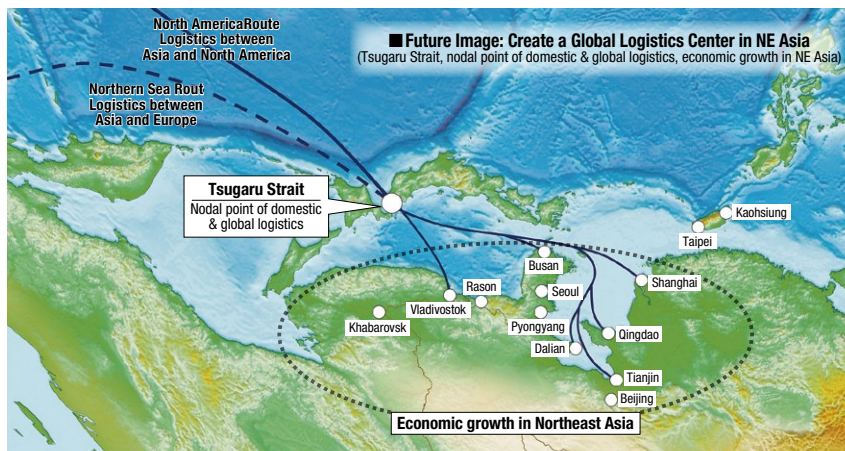
When fulfilling my biggest mission as Governor, i.e., that of protecting the lives of the people following the Great East Japan Earthquake disaster, I felt most keenly that logistics truly represent a lifeline. Hachinohe Port, a logistics center for northern Tohoku, suffered immense damage, causing many logistical difficulties in disaster-stricken areas. On the other hand, until the functions of Hachinohe Port had recovered to a certain extent, Aomori Port collaborated with Hakodate Port, facilitating the concentrated input of relief supplies, personnel, and vehicles from Hokkaido and functioning as logistics backup. As a lesson learnt from the disaster, we reaffirmed the importance of logistics risk hedges inside Japan, and, more than anything, the benefits and strong potential of an omnidirectional maritime approach by Aomori Prefecture, surrounded on three sides

by sea (the Pacific, Japan Sea, Tsugaru Strait) and acting as a nodal point between Hokkaido and Honshu.

Today, the advance of globalization is expanding international logistics, and ports in East Asia are enjoying particularly dramatic growth. Thirty years ago, Kobe, Yokohama and Tokyo were among the top twenty ports in the world, but now they have fallen behind, and Shanghai, Singapore and Busan have risen sharply in their place. Centralizing procurement logistics and product logistics will encourage high-level integration of manufacturing, warehousing, distribution and industries related to these, and strengthening the competitiveness of ports will attract further investment. The fact that East Asian megaports have come to benefit from these effects must be because they are supported by economic growth in emerging Asian countries, and were able to turn the global increase in cargo volumes and geographical conditions to their advantage. Looking at Aomori Prefecture from a global viewpoint, 30% of cargo navigation routes linking North America with Asia are currently concentrated in the Tsugaru Strait. Meanwhile, global warming has thrown up the possibility of a Northern Sea Route. Looking 20 or 30 years ahead, in conjunction with the emerging potential of the Northeast Asian economic zone, a gateway linking Europe and North America with Asia would indeed be the Tsugaru Strait, and here the dynamism of global logistics is expected to manifest itself.

Towards a Northeast Asian global logistics center

We have formulated an “Aomori Prefecture Logistics Strategy (January 2014) ¹⁾” as a new scenario for economic growth, with a view to creative reconstruction from the Great East Japan Earthquake disaster, and also to build a sustainable society in this prefecture faced with problems such as population shrinkage, declining birth rate and progressive aging. Rather than setting the single target of enhancing tangible development such as roads and harbors, the aim of this strategy will be to surmount barriers of time, distance, cost and information, to nurture and develop a



logistical base (smooth distribution environment and optimal logistics environment) from a medium- to long-term perspective as environmental preparation in which supply and demand are smoothly linked, and to expand economic exchanges both domestically and globally.

In the Strategy, the creation of a global logistics center in Northeast Asia is raised as the future vision (target vision for 2030), with the stated perspectives of: “1. A logistics center supporting agri-business (a center that ships agricultural, forestry, fishery and other products from northern Japan to domestic and global markets)”, “2. A global logistics center directly linked to international logistics arteries (a logistics center supporting globalization of industry in northern Japan)”, and “3. A logistics center related to food, resources and energy (a logistics center and relay bases facilitating stable procurement and supply in bulk)”. Besides this, as short-term initiatives (5 years from FY2014), while targeting this prefecture’s biggest strength, i.e., agricultural, forestry and fishery products, etc. (the agri sector), the Strategy presents eight specific initiatives from the aspect of both strengthening industrial competitiveness and centralizing logistics. These are based on perspectives such as how to retain the competitiveness of this prefecture’s produce and products while distributing them, and how to best integrate cargoes. Fortunately, this prefecture has always had a strong track record in the production and distribution of high-quality and high added-value agricultural, forestry and fishery products, such as its exports of

apples. While making these our basis, I would like to start afresh by trying to improve issues in logistics through further knowhow and ideas, while taking steps for full exchanges of views with producers and businesses.

Contributing to Japan as an Oceanic State

Finally, I shall return to global logistics as envisioned by the Strategy’s future image. The Tsugaru Strait will surely rise in importance

as time goes on. Aomori Prefecture is capable of aiming for omnidirectional maritime logistics, and the Tsugaru Strait in particular could become a gateway for Northeast Asia. On reflection, this may not only be a question of presenting possibilities for local industry and logistics in this region, but would also signify the response in terms of security, such as sea lanes through the opening of the Northern Sea Route in future. When returning to the starting point of Japan as an Oceanic State, I think the future potential of this country may lie precisely in “nation building” in the dynamism of these global logistics. I would like to propose that the central government and various research bodies verify their own standpoints on the strategic importance of the Tsugaru Strait, through research and debate that are as open as possible.

I must create a mechanism to support sustainable growth in Aomori Prefecture and take responsibility for the Aomori Prefecture of the future, so that the next generation can live here in confidence. Of course, I strongly hope that this would contribute to the growth of Japan as a whole. If we turn a map of Japan upside down, we see the giant and growing Asian market spread out behind it. As well as big changes in global logistics, the geopolitical importance of Aomori Prefecture will grow still further. Seeing this occasion as an opportunity, I would like to aim for the new growth of Aomori Prefecture and Japan, and move head on towards realizing this logistics strategy based on a medium- to long-term outlook.

■ Specific measures for short-term efforts (FY2014-2018)

Strengthen industrial competitiveness	Objective 1. Support domestic expansion of agricultural and other products by improving logistics issues	(Short-term targets) Expand agriculture, forestry and fishery products
	Objective 2. Support overseas expansion of agricultural and other products by improving logistics issues	
Create logistics center	Objective 3. Integrate cargoes by improving port convenience	Integrate cargoes, enhance routes
	Objective 4. Study mother ship ports of call in awareness of North America route and Northern Sea Route	

1) Aomori Prefecture Logistics Strategy (formulated January 15, 2014) <https://www.pref.aomori.lg.jp/soshiki/soumu/seikatsusaiken/logistics.html>