



Japan and the World's Ocean Initiative



1 The UN Decade of Ocean Science Goes into Motion

One Planet, One Ocean — the oceans connect the world, and international co-operation is critical to protect ocean environment. Under the international framework, Japan recognizes its rights and duties as a maritime nation to “understand the oceans,” and is called upon to advance sustainable ocean development both nationally and abroad, with the findings of ocean science research as its basis.

In the 72nd session of the United Nations General Assembly held on December 2017, the period of 2021–2030¹ was proclaimed and established in the Resolution on Oceans and Laws of the Sea as an International Decade of Ocean Science for Sustainable Development (hereafter the “Decade”). Japan was a co-sponsor of the Resolution.

The Decade was drafted by the Intergovernmental Oceanographic Commission (IOC) of UNESCO² and proposed to the General Assembly. The UN Sustainable Development Goals (SDGs) were adopted in 2015. As SDG-14 set out the goal to conserve and sustainably use the oceans, seas and marine resources for sustainable development, the IOC, as the UN body specialized in ocean issues, started to explore ways to help to achieve the SDGs, especially SDG-14.

The IOC, about to mark its 60th anniversary since its establishment in 1960, was expected to lead international cooperation in the area of ocean science. Comprehensive discussions were conducted on measures to appropriately respond to requests from the international community. A working document, the *Future of the IOC Executive Roadmap*³, was submitted to the 49th session of the IOC Executive Council in June 2016, and became the groundwork for the Decade. At the 29th Session of the IOC Assembly in 2017, Resolution : UN Decade of Ocean Science for Sustainable Development⁴ was adopted and proposed to the General Assembly.

This chapter provides an overview of international developments, highlights Japan’s efforts related to the Decade, and maps out a vision for the decade to come.

1 Formulating the Implementation Plan for the Decade

In preparation for the Decade, the Interim Planning group started discussions to develop an implementation plan in early 2018. The Implementation Plan was to provide guidelines for scientific action, capacity development, operations, monitoring, reporting, communications, and other issues. An Executive Planning Group (EPG) comprising 19 global leaders in ocean science was established in 2018, and held a series of discussions for the development of the Plan.

The EPG met twice at UNESCO Headquarters in Paris in December 2018 and again in January 2020. Between June 2019 and May 2020, global, thematic, and regional planning meetings convened over 1900 participants from the scientific

¹ A/RES/72/73

² United Nations Educational, Scientific and Cultural Organization

³ IOC/EC-XLIX/2 Annex 9 Rev.

⁴ Resolution XXIX-1

community, governments, UN entities, NGOs, private sector, and donors across ten ocean basins. These meetings provided important input to the Implementation Plan on scientific priorities and capacity development needs, as well as information on existing and future partnerships to implement the Decade Actions. In late 2019, over 50 leading ocean institutions provided written submissions to inform the development of the scientific priorities of the Decade.

The year 2020, which should have been a commemorative year as the 60th anniversary of the IOC, saw the global pandemic of COVID-19. The draft implementation plan was revised through multiple teleconferences for content and schedule, taking the post-pandemic social and economic environment into account.

Over 230 written submissions were received in response to the peer review of the zero draft of the Implementation Plan in March and April 2020. The Implementation Plan version 1.0 and the version 2.0 were subjected to a comprehensive review by the Member States of the IOC and members of UN-Oceans in June 2020 and July 2020 respectively. Upon approval of the Member States of the IOC, it was submitted to the General Assembly in August 2020. Despite a delay in the 75th session of the General Assembly adoption of the resolution, the Omnibus Resolution on Oceans and Laws of the Sea was ultimately adopted on December 31, 2020. The Decade was to begin in January 2021 as planned, under the COVID-19 pandemic, as a new movement to support the ocean.

The scientific action plan of the Implementation Plan has four objectives :

1. Promotion of transformative ocean science, capacity development, and enhancement of ocean literacy
2. Expansion, innovation, and integration of an ocean observation and knowledge system
3. Enhancement of comprehensive ocean knowledge and predictive capability
4. Development and deployment of an integrated assessment and decision support system

The Implementation Plan describes seven desired societal outcomes for the end of the Decade (See “Our Challenge : To Sustainable Ocean” on Page 8-9) :

1. **A clean ocean** where sources of pollution are identified and reduced or removed.
2. **A healthy and resilient ocean** where marine ecosystems are mapped and protected, multiple impacts, including climate change, are measured and reduced, and provision of ocean ecosystem services is maintained.
3. **A predicted ocean** where society has the capacity to understand current and future ocean conditions, and forecast their change and impact on human wellbeing and livelihoods.
4. **A safe ocean** where human communities are protected from ocean hazards and where the safety of operations at sea and on the coast is ensured.
5. **A productive ocean** supporting sustainable food supply for people in the future.
6. **An accessible ocean** where all nations, stakeholders, and citizens have access to ocean data and information, technologies and have the capacities to

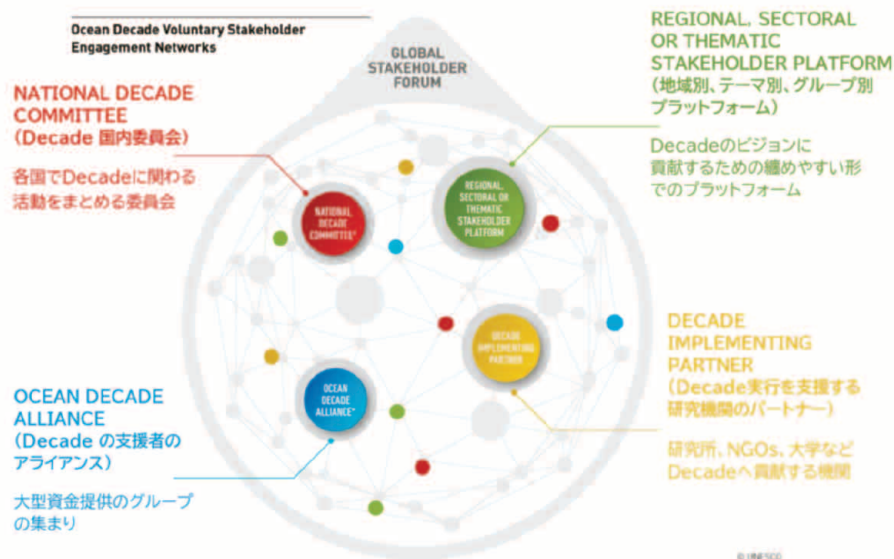


Figure 1-1 The Framework of Global Stakeholder Forum

(Originally from Figure 2.4 of United Nations Decade of Ocean Science for Sustainable Development 2021–2030 Implementation Plan v2.0)

inform their decisions.

7. An inspiring and engaging ocean where society understands and values the ocean in relation to human wellbeing and sustainable development.

To achieve the Decade's vision, public invitation for action plans was discussed at the EPG in August 2020, and the first Call for Decade Actions was launched on October 15, 2020. It focused on two of the four action plan categories presented in the Implementation Plan: large-scale, multi-country, transformative Decade programmes and in-kind or financial resources in the form of Decade contributions. This was to establish programs which would serve as a framework, as well as to build the operational foundations for the Decade.

The vision of the Decade will not be implemented by ocean scientists alone; a diverse range of stakeholders are expected to engage and collaborate through the process of co-design, co-production, and co-delivery. Therefore, the Call for Decade Actions needs to be disseminated beyond scientific communities, and it is also important to establish a system to coordinate the proposed actions.

Figure 1-1⁵ shows the framework of the Global Stakeholder Forum, and the possible opportunities for Japan's participation and contribution. Japan must also engage in capacity building to nurture individuals who can contribute both domestically and abroad, for the upcoming decade and beyond.

(Mitsuo Uematsu)

2 Japan's Involvement

The UN Decade of Ocean Science (hereafter the Decade) was proclaimed at the 72nd session of General Assembly of the United Nations in December 2017. Around that time, the Japanese government was in the process of reviewing the nation's Basic Plan on Ocean Policy for revision. In the spring of 2018, the draft

⁵ Figure 1-1: The Framework of Global Stakeholder Forum

Third Basic Plan on Ocean Policy was released for public comment. 195 comments were submitted, and revisions and corrections were made to the draft. The draft was revised to reflect recommendations suggesting Japan should more actively participate in and contribute to the Decade. As a result, the more specific language, “in the light of the declaration of the UN Decade of Ocean Science for Sustainable Development, we will participate in formulating and implementing the action plan for the Decade, and as a nation, we will contribute to the achievement of the SDGs” was included in the final Basic Plan.

This section highlights Japan’s involvement in the Decade under the Third Basic Plan, and outlines Japan’s efforts and vision for the future.

1 National Developments

① The Headquarters for Ocean Policy

The Study Group on Sustainable Development Goal 14 (Chair: Atsuko Kanehara) was launched under the Advisory Council/Councilors’ Meeting in autumn 2019. From December 2019 to February 2020, four meetings were held. The major subjects of discussion were Marine Plastic Debris, IUU Fishing⁶, and Small Island States. While the meetings were not about the Decade itself, recommendations were made incorporating the perspective of Japan’s contribution to the Decade. An Advisory Council’s Report on SDGs was prepared incorporating the findings of the meetings, and Akihiko Tanaka, the Chair of the Advisory Council, handed the report to then Prime Minister Shinzo Abe in June 2020.

② The Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Japanese National Commission for UNESCO (JNCU)

The Director-General for International Affairs of MEXT, who serves as the Secretary-General of JNCU, coordinated the response to the discussions in the IOC through the IOC sub-committee within the JNCU. Since the declaration of the Decade at the UN General Assembly, MEXT and JNCU have been actively involved in the preparation for the Decade.

The 25th Session of the International Oceanographic Data and Information Exchange (IODE-25) was held in Tokyo in February 2019. In talks held with Mami Oyama, the then Director-General for International Affairs of MEXT, and Vladimir Ryabinin, Executive Secretary of the IOC and Assistant Director General of UNESCO, Japan’s commitment to actively contribute to the Decade was announced ahead of other countries.

In October 2019, JNCU’s proposal was submitted to the Minister of MEXT and the Minister of Foreign Affairs. One of the necessary measures proposed to promote UNESCO activities was to jump start Japan’s activities in preparation for the Decade. It called for the “dissemination of the importance of science in sustainable ocean protection and utilization” and “cross-disciplinary collaboration in order to contribute broadly to the achievement of SDGs, including cooperation with educators to attain synergy with Education for Sustainable Development (ESD).”

Meanwhile, reports on the progress of preparations for the Decade were made to the JNCU at its General Assembly meetings⁷.

⁶ Illegal, Unreported, and Unregulated Fishing

⁷ The 146th General Assembly meeting was held in February 2000 and the 147th JNCU General Assembly in August 2000.

③ Academic Conferences

The following are selected academic conferences related to the Decade since autumn 2019, in chronological order.

The Oceanographic Society of Japan held its fall meeting on September 28, 2019, in Toyama City, and a night session titled “The State of Preparations for the Decade (2021–2030) and Thereafter” was convened. It was organized to address the concern that the members of the Society were not necessarily familiar with national and international developments after the UN General Assembly adoption of the Decade. Persons involved in the Decade’s preparatory process were invited to present the current situation.

A symposium, “The UN Decade of Ocean Science for Sustainable Development : Working Towards One Ocean”, was co-hosted by the Science Council of Japan’s Subcommittee on Marine Life, the Scientific Committee on Oceanic Research (SCOR), and The Sasakawa Peace Foundation on November 5, 2019, in Tokyo. Researchers from a broad range of fields provided talking points to the forum, and discussions were held on how academic communities should promote multi-disciplinary efforts, using the Decade as an opportunity. The conclusion is reported in the *Gakujutsu no Doko (Trends in the Sciences)* published in January 2021.

The Japan Society of Ocean Policy and The Sasakawa Peace Foundation co-hosted a forum, “The UN Decade of Ocean Science and Ocean Policy : Towards Designing a Decade of Ocean Policy”, on January 27, 2020, in Tokyo. The forum was organized under the premise that it is impossible to achieve the seven desired societal outcomes of the Decade solely by a scientific approach, and that it is vital to address them from the viewpoint of ocean policy. A networking session was held after lectures, and a broad range of stakeholders held discussions.

From fiscal year 2020, many meetings and conferences were held remotely, and the Oceanographic Society of Japan held a conference in tandem with the Japan Geoscience Union (JpGU) in spring and another conference in fall, where sessions on the Decade were held and more specific contents of research were discussed.

2 Major Contributions of Japan to Date

① The IOC’s Planning Group

In accordance with the Resolution of the United Nations General Assembly on the Decade, the IOC was called upon to prepare an implementation plan. An Executive Planning Group (EPG) comprising 19 global leaders in ocean science was established in mid-2018. Mitsuo Uematsu, emeritus professor at the University of Tokyo, joined the EPG as a member from Japan. The EPG held a series of discussions both in-person and online, and the Implementation Plan version 2.0 was released in July 2020.

② North Pacific Regional Planning Workshop

To develop the Implementation Plan, regional workshops were held to identify regional specific priorities and resources. The Regional Planning Workshop for the North Pacific and Western Pacific Marginal Seas towards the Ocean Decade was

held from July 31 to August 2, 2019, in Tokyo. It was co-hosted by WESTPAC (IOC Sub-Commission for the Western Pacific) and PICES (North Pacific Marine Science Organization) with the financial support of MEXT. More than 160 stakeholders from 18 countries in the Pacific Rim participated, and discussions were held for each social outcome envisioned. The result was reflected in the development of the Implementation Plan.

③ Global Ocean Science Report 2020

While developing the Implementation Plan, the IOC was concurrently preparing for the publication of the *Global Ocean Science Report 2020*. It was the revised version of the *Report* released in 2017. Though it was not originally a project with the Decade in mind, since the revision coincided with the development of the Implementation Plan, it was expected to provide information on the current status of ocean science which could be used as a baseline for the implementation of the Decade. The *Report* was completed by the autumn of 2020, and released at the IOC's 60th Anniversary event held online in December 2020. Yoshihisa Shirayama of the Japan Agency for Marine Earth Science and Technology (JAMSTEC) contributed as an author and a member of the editorial board⁸.

3 Looking Forward

The Decade is a guidepost which will become the foundation of ocean policy for Japan as a maritime and science/technology-oriented nation. Japan is expected to show its leadership in science and technology diplomacy through the Decade. As the Decade commences internationally, Japan needs to contribute by leveraging its strengths, and develop strategies by analyzing comprehensively the current situation and developments nationally and abroad. In order to enhance cooperation among government, industry, and academia, make the Decade meaningful in Japan's ocean related fields, and contribute widely through international collaborations, the Japan Society of Ocean Policy and The Sasakawa Peace Foundation Ocean Policy Research Institute jointly launched a panel on the Decade in September 2020. As the vision of the Decade inherently requires a marriage of the humanities and sciences, i.e. an interdisciplinary approach, the panel invites specialists from a broad range of fields. The panel met multiple times with the participation of people in politics, the private sector, government, education, and mass media.

The Implementation Plan of the Decade requires each country to establish a national committee on the Decade as an entity to lead its effort. As of January 2021, discussions were going on in the aforementioned panel about the role and characteristics of the national committee. The panel is looking to launch Japan's national committee in early 2021, which will oversee the efforts of various national stakeholders to work toward achieving the vision of the Decade and help strengthen cooperation between ocean-related ministries and agencies, such as the National Ocean Policy Secretariat, MEXT, and the Ministry of Foreign Affairs. Prime Minister Yoshihide Suga attended the High Level Panel for a Sustainable Ocean Economy as one of the leaders of 14 member countries in December

⁸ Beside Mr. Shirayama, Yutaka Michida contributed as a lead author of the Ocean Data section, and Norio Baba (Japan Coast Guard) participated as a peer reviewer.

Our Challenge: To Sustainable Ocean

A Clean Ocean

where sources of pollution are identified and reduced or removed.

Pollutants flowing into the sea affect ecosystems and human health. We also study well-balanced marine environments where organisms can thrive.

marine debris hazardous chemicals excess nutrients



A Healthy & Resilient Ocean

where marine ecosystems are understood, protected, restored and managed.

Marine ecosystems are resilient and can recover from natural and human impacts, but recent rapid environmental changes have caused irreparable damage to marine ecosystems, requiring detailed study.

Information and data collection and dissemination

Warning system to ensure safety

Preservation of rich ecosystems

Warning system to ensure safety

where life and livelihoods are protected from ocean-related hazards.

We develop disaster warning systems utilizing innovative technologies to protect people from tsunamis, storm surges, and tidal waves, and also marine heatwaves and red tides which cause damage to fisheries.

A Safe Ocean

Tsunami • Storm Surges



Red Tides

Marine Heatwaves

supporting sustainable food supply and a sustainable ocean economy.

Catches of fish and shellfish have declined due to overfishing and environmental changes. How to improve the situation and ensure the supply of sustainable fisheries products is our focus.

An Inspiring & Engaging Ocean

where society understands and values the ocean in relation to human well-being and sustainable development.

The ocean is an inspiring frontier, but it is more important than ever to communicate its appeal. We envision a society where people understand its appeal through a variety of dialogues, and act to use and protect it.



A Predicted Ocean

where society understands and can respond to changing ocean conditions.

Accurate predictions of various ocean phenomena will be made utilizing observation data on seabed topography and marine ecosystems and advanced computer simulation technology. Oceanographic research for better predictions will also be conducted.

storm surges

rising sea temperature



Kuroshio meander



migratory movement of fish

Mitigation of natural disasters caused by the ocean

Monitoring of ecosystems

Prediction of the risk of tsunami from eruptions

Data collection through a variety of oceanographic surveys

Identify habitat range of each fish species

A Productive Ocean

Monitor resources and preserve ecosystems

Prevent overfishing through fishing vessel management



Establish environmentally friendly aquaculture

with open and equitable access to data, information and technology and innovation.

We are establishing a framework to provide open and equitable access to data acquired through oceanographic research, and helping developing countries build capacity to utilize ocean information properly.

An Accessible Ocean



2020. In the policy recommendations which were released as a leadership document, the “enhancement of ocean literacy through the Decade” was included as one of the “14 outcomes to be achieved by 2030.” There are high expectations for Japan as a whole to contribute to the Decade, and as a result, strategically develop its own ocean policy.

(Yutaka Michida)



2 COVID-19 Pandemic and Cruise Ships

1 The Number of Cruise Passengers and Port Calls in Japan

According to the Ministry of Land, Infrastructure, Transportation and Tourism (MLIT), the number of Japanese cruise passengers was 357,000, increasing 11.3% from 2018 and setting a new record. The number of port calls was 2,866. While this was a decrease of 2.2% from 2018, it marked the second largest number to date and further growth in the future was expected.

An increased number of relatively affordable cruises on foreign flagged cruise ships originating in Japan contributed to the passenger growth. Foreign cruise lines saw the Japanese market as a growth opportunity and had been expanding sales outlets that cater to Japanese clientele.

A decrease in cruises originating from China resulted in fewer port calls. American and European cruise lines assigned too many cruise ships too rapidly to the Chinese market and so adverse effects have been felt for several years. Cruise fares collapsed and the commercial value of cruises deteriorated. When American and European cruise lines responded by decreasing the number of cruise ships assigned to the Chinese market, the number of port calls in Japan also decreased. Cruise lines addressed the issue by changing their sales models. They were set to lead their recovery by assigning new ships and increasing the number of the ships in the Chinese market from 2020 on.

2 Outbreak of COVID-19

The Wuhan Municipal Health Commission reported to the World Health Organization (WHO) a cluster of cases of pneumonia of unknown cause in Wuhan, Hubei Province, China. A novel coronavirus (hereafter “COVID-19”) was eventually identified. The number of cases in China increased and human-to-human transmission was confirmed in 19 countries including Japan. On January 30, 2020, WHO declared that the outbreak constituted a Public Health Emergency of International Concern (PHEIC), defined according to the International Health Regulations (IHR). Japan started to send chartered planes to evacuate Japanese nationals from Wuhan on January 29, 2020. At the end of January, no community outbreak was reported in Japan, except for about 10 cases among people returning to or entering Japan from Wuhan, including passengers on the chartered flights.

Under these circumstances, the *Diamond Princess* arrived at the Yokohama Port on February 3 with 2,666 passengers and 1,045 crew from 57 different countries on board. On February 6, it was reported that tests revealed infections in 41 out

of 171 people whose test results were known. At the time, only 20 cases were reported in Japan and the report of 41 confirmed cases shocked the nation. As the number of confirmed positive cases on board increased every day, the non-stop coverage of the situation on board and on shore evoked a nationwide sense of threat from COVID-19. A timeline of major development is as follows :

1. The *Diamond Princess* departed from Yokohama Port, Japan, on January 20, 2020, and proceeded to Kagoshima, Hong Kong, Vietnam, Taiwan, and Naha, Japan and was scheduled to return to Yokohama on February 4, 2020. On February 1, during its 16-day voyage, a passenger on the *Diamond Princess* who had disembarked on January 25 at Hong Kong was tested confirmed to be COVID-19 positive.
2. The ship was notified of the positive case while at sea. The ship arrived at the quarantine anchorage off the Daikoku Pier on the evening of February 3, ahead of the scheduled arrival date of February 4. Quarantine officers conducted medical examinations of the passengers and crew. Individuals with symptoms and people who may have had close contact with the infected passenger were tested for COVID-19.
3. On February 5, test results confirmed infections in 10 people. The authorities decided to isolate COVID-19 negative passengers in their cabins for 14 days. The ship was docked at the Daikoku Pier in the morning of February 6.
4. After the end of a 14-day quarantine period, on February 19, passengers with negative test results began to disembark and all the 3,711 passengers and crew members had disembarked by March 1.
5. The ship's interior space was disinfected, and wastes were treated. Upon completing the appropriate disinfectant treatment, a quarantine certificate was issued on March 25 and the ship departed from the Daikoku Pier.

Concerned by the alarming level of global spread, WHO made the assessment that COVID-19 could be characterized as a pandemic on March 11. Operators of three Japanese flag cruise ships—the *Asuka II*, the *Pacific Venus*, and the *Nippon Maru*—announced cancellation of all voyages, including a scheduled cruise around the world, and laid up ships while waiting for containment of the infection to restart cruise voyages.

In the end, 712 people were infected on the *Diamond Princess* and 13 people died. After the ship left Japan, a group infection was reported aboard another cruise ship, the *Costa Atlantica*, when it was docked at Nagasaki Port for schedule coordination. 148 (24%) out of 623 crew members tested positive.

Both the *Diamond Princess* and the *Costa Atlantica* sailed on popular voyage routes originating from Japan and were well known in Japan. These incidents caused a sense of apprehension about cruise ships. People avoided taking cruises and some ports were disinclined to accept cruise ship calls.



Figure 2-1 The *Diamond Princess* (left) and the *Costa Atlantica* (right)

The *Diamond Princess* : Gross Tonnage : 115,875, Guests : 2,706, Crew : 1,238

The *Costa Atlantica* : Gross Tonnage : 85,619, Guests : 2,112, Crew : 920

(Photo courtesy of Princess Cruise, and others)

3 Infection Control for International Cruise Ships

International Health Regulations (IHR 2005) require a vessel on an international voyage to be maintained in a sanitary condition. Quarantine at a port of entry is one of the measures to prevent infectious disease pathogens that are not endemic from entering a country.

The master of a cruise ship sailing from abroad is required to conduct quarantine and public health operations according to the Quarantine Act of Japan. The master must submit a Maritime Declaration of Health describing the health conditions on board during the voyage and the health status of passengers and crew at a quarantine port located in major seaports in Japan. A quarantine station chief confirms the presence or absence of individuals with an infectious disease (including suspected cases), conducts a quarantine inspection, and issues a quarantine certificate if he/she finds no risk of pathogens.

As no individual with an infectious disease had been reported at the time of entry into Naha Port on February 1, the master of the *Diamond Princess* submitted a Maritime Declaration of Health with no report on cases of infectious disease to the Naha quarantine station. After a quarantine inspection, the station chief found no risk of pathogens introduced into the country and issued a quarantine certificate. The cruise ship was allowed to dock at the port of Naha and disembark the passengers and crew to enjoy the city. Then the ship left Naha for its final destination, Yokohama, with the passengers returned from excursion. On the way from Naha to Yokohama, the master of the ship was informed that a passenger who had disembarked at Hong Kong tested positive for COVID-19. On February 3, a re-inspection was conducted at the port of Yokohama. It was 51 days later, on March 25, that the quarantine and disinfection were completed⁹.

4 Cruise Ship Health Management

The WHO *Guide to Ship Sanitation* was first published in 1967 to prevent out-

⁹ Criteria for disembarkation included 1) completion of a 14-day quarantine period without sharing a cabin with a confirmed case; 2) a negative result for a COVID-19 by PCR on the final day of the quarantine period; and 3) no relevant symptoms identified during a medical screening on the final day of the quarantine period. <https://www.niid.go.jp/niid/en/2019-ncov-e/9417-covid-dp-fe-02.html>

breaks and the spread of infectious diseases on board. It set forth globally standardized health requirements for ship construction and operation. International cruise ships implement appropriate sanitary management in accordance with the *Guide*.

Since about 2000, outbreaks of norovirus infection on cruise ships were reported time and again and measures to prevent viral gastroenteritis infection on board were reinforced. Under such circumstances, WHO published the *Third Edition of Guide to Ship Sanitation* in 2011, reflecting the changes in construction, design and size of ships and the emergence of new infectious diseases such as legionellosis and viral gastroenteritis. It provides requirements for water, food, waste management, and disease vector control. It also provides infection control measures to prevent acute infectious gastrointestinal illnesses such as those caused by norovirus and acute respiratory illnesses such as influenza, although the focus is on the former.

Japanese flag cruise ships are under health control in accordance with the Shipboard Health Code as defined in the Mariners Safety and Health Regulations, which was set forth to prevent illnesses and injuries of mariners. To prevent the spread of infectious diseases, it requires operators to take measures such as patient isolation, disinfection of the area, clothing and equipment the infected used, and restriction of unboiled water and uncooked food consumption when a case or a suspected case of infectious disease is recognized. An operator of a ship is required to establish a shipboard safety and health committee with the master of the ship as its chair. The ship's doctor must be included as a member. The committee holds a monthly meeting to discuss safety and health management on board.

In the United States, the Vessel Sanitation Program (VSP) at the Centers for Disease Control and Prevention (CDC) of the United States Public Health Service (USPHS) sets public health standards for cruise ships. It also offers training seminars for the cruise ship industry to address public health practices to protect cruise ship passengers and crew. The CDC sends VSP inspectors to cruise ships at berth in U.S. ports to conduct unannounced operational sanitation inspections to find out how well cruise ships meet health standards in the *VSP Operations Manual* for pest and insect management, food contamination issues, potable water systems, and other public health conditions to prevent introduction, transmission, and spread of infectious diseases.

Inspection results are rated on a scale of 100 points. Cruise ships scored 85 and below are responsible for correcting all violations and are subjected to reinspection. CDC publishes inspection reports and scores on the VSP website. Since it influences people's opinion of the cruise ship, each cruise line is keen about getting a passing score. Cruise operators are committed to implementation of sanitary management on board, such as improvement of equipment on board to meet standards and training and awareness raising of crew members for sanitary practices on a day-to-day basis.

5 Cruise Lines' Strategy for Preventing Infectious Disease in the Era of COVID-19

Despite sanitary standards and cruise lines' best efforts, the CDC reported more than 20 cases of group infections by COVID-19 on board cruise ships. It is estimated that group infections occurred on more than 40 cruise ships globally.

Since COVID-19 is generally transmitted through droplets and contact, it is important to maintain social distancing. On board a cruise ship, where many people congregate in confined spaces for several days, that is difficult to do. It is an environment which fosters group infections. At the same time, it could be a contained environment, where passengers do not have contact with the outside. The cruise industry is moving toward a new model of cruises in the era of COVID-19, creating a safe environment by implementing ever higher levels of sanitary control to prevent infectious diseases.

Each cruise line has developed an infection control protocol in consultation with infectious disease specialists and received certifications of COVID-19 infection prevention from third-party classification societies. Some countries have restarted operation of cruise ships after numerous consultations with concerned parties at ports of call, including health officials.

New protocols are based on three principles: 1) prevention of introduction of infectious diseases on board; 2) mitigation of infection risk on board; 3) counter-measures to address infection on board. Infection control practices are set forth to protect passengers from the time of reservation, pre-boarding checking in, while onboard, during shoreside activities at way ports, and at disembarkation. Embarkation and disembarkation control of crew and crew education and training requirements are prescribed in detail.

6 Reactivation of Domestic Cruises on Japanese Flagged Vessels

With regard to guidelines for domestic cruises on Japanese flagged vessels, the Japan Oceangoing Passenger Ship Association published the *Guideline to Prevent COVID-19 infection for Oceangoing Cruise Lines: the First Edition* (the *Ship Guideline*), and the Ports & Harbors Association of Japan published the *Guideline to Prevent Outbreaks at Cruise Passenger Terminals: the First Edition* (the *Port Guideline*) concurrently on September 18, 2020.

Three Japanese cruise operators, NYK Cruises Co., Ltd., Japan Cruise Line, Ltd., and Mitsui O.S.K. Passenger Line Ltd., developed measures to prevent infections respectively in accordance with the *Ship Guideline*, had them reviewed by ClassNK, and received certifications. After a series of consultations with ports of call, they restarted cruise operations. During a certain period, they will conduct pre-boarding PCR tests of all passengers, limit number of passengers to about 50% of maximum capacity, set certain percentage of the number of passenger cabins set aside for isolation, and limit the length of cruises to no more than three



Figure 2-2 A drill to transport an infected passenger on board the *Asuka II* to a hospital on shore, conducted at the Kobe Port on October 20, 2020 in preparation for resuming operation on November 2, 2020.

nights. By doing so they offer safe and secure cruises.

Only domestic cruises on Japanese flagged vessels restarted operation by the end of 2020. Now the industry is committed to restart international cruises on Japanese and foreign flagged vessels. However, as international cruises involve tourist traffic to and from other countries, they need to follow the national policies of way port countries as well as Japan, leaving no prospects for operations to be restarted anytime soon.

7 The Way Forward for the Post-Pandemic Cruise Industry

Relatively inexpensive “casual cruises” on mega cruise ships in the Caribbean have greatly contributed to the expansion of the cruise market. It is estimated that global cruise passengers reached about 30 million before the outbreak of COVID-19 and was expected to reach 40 million in 10 years. Mega cruise ships of more than 220,000 GT and with maximum passenger capacity of more than 9,000 were scheduled to call at Japanese ports in 2021. In terms of prevention of the spread of infectious diseases, the last thing we want is port calls of mega cruise ships with great numbers of passengers on board. However, easy and affordable cruises on board mega ships will continue to be the mainstream, and balancing prevention of infection and economic activity will be a must-way forward.

On the other hand, more and more small luxurious cruise ships have been built. Long cruises on board ships of less than 30,000 GT or so with maximum passenger capacity of less than 500 or so are expensive. However, such cruises offer unique itineraries for specific clientele and provide easier environments for infection control. It is what repeat cruise customers are waiting for. We need to pay close attention to the development of the diversifying cruise market.

(Sabro Tanaka)



3 Toward a Blue Recovery

1 Achieving Net-Zero Emissions by 2050 —The Ocean's Contribution

This section covers issues related to the oceans and climate change while focusing on domestic and international developments towards decarbonization. The year 2020 was marked by the COVID-19 pandemic. Many international conferences on the oceans and climate change, including the 26th United Nations Climate Change Conferences (UNFCCC COP26) and the 2nd United Nations Ocean Conference, were either canceled or postponed. Under such circumstances, keeping up the momentum of the accelerating and intensifying Climate Action, along with a Green/Blue Recovery after the COVID-19 pandemic, were deemed necessary to combat climate change. The UN Secretary-General and the Executive Secretary of UNFCCC (the United Nations Framework Convention on Climate Change) both called for making the recovery from the COVID-19 pandemic an opportunity to build a sustainable and viable society. Individual governments were called upon to develop more ambitious Nationally Determined Contributions (NDCs)¹ and revise long-term strategies, and incorporate into these a Green Recovery, or policy reforms to recover from the COVID-19-induced economic crisis by cutting CO₂ emissions.

In September 2020, the Japanese government hosted the Ministerial Meeting of the “Online Platform” on Sustainable and Resilient Socio-Economic Systems in the Process of Recovery from COVID-19. The Chair’s Summary stated that redesigning the socio-economic system, through leveraging COVID-19 recovery efforts, was essential and the redesign required the transition to a decarbonized society, a circular economy, and a decentralized society. In October 2020, an important political decision was made in Japan. Prime Minister Yoshihide Suga declared in his Policy Speech to the Diet that Japan would aim to reduce greenhouse gas (GHG) emissions to net zero by 2050. Following the steps of European countries, Japan finally took the first step towards achieving decarbonization by 2050. To achieve the goal, innovative technologies will be developed with a heavy investment, in the aim for the widespread deployment of those technologies along with lifestyle change. It will be a difficult road, but things are moving forward both in Japan and abroad. In this section, the potential of the ocean’s contribution to decarbonization and the latest development of offshore wind power in Japan are discussed. Lastly, while also looking back on international events including the Race-to-Zero Dialogues in November 2020 and the Ocean and Climate Change Dialogue in December 2020, both organized by UNFCCC, this section will provide an overview on the issue of the oceans and climate change.

¹ National GHG emissions reduction targets and strategies for achieving the goals set by each Party of the Paris Agreement.

1 Toward Net-Zero GHG Emissions by 2050 Target: Move to Boost the Ocean's Contribution in Japan

1 GHG Emission Reduction Potential of Ocean-related Measures for Mitigating Climate Change

A report published by the High Level Panel for a Sustainable Ocean Economy in September 2019 found that ocean-based mitigation options, such as ocean-based renewable energy and energy efficient ocean shipping could close up to 21% of the GHG emission gap by 2050 to limit global temperature rise to 1.5°C.

Following the publication of the report, the Ocean Policy Research Institute (OPRI) of The Sasakawa Peace Foundation conducted a study to quantify the reduction potential of GHG emissions of the ocean-related mitigation measures, and found mitigation potential in Japan to be equivalent to the High Level Panel's estimate.

Ocean-based climate change mitigation (GHG emissions reduction) measures include energy conservation in the shipping industry, the fishery industry, and ports, the development of ocean-based renewable energy (offshore wind power, tidal/ocean current power, and wave-power generation, and ocean thermal energy conversion), carbon capture and storage (CCS) in the seabed, and mitigation measures utilizing coastal and marine ecosystems (e.g., blue carbon). The Plan for Global Warming Countermeasures of Japan (hereafter the Plan), an implementation plan for achieving Japan's 2030 target (26.0% reduction from fiscal year (FY) 2013 level), only lists energy-conserving and renewable energy measures that are implementable in the short to medium terms. The CO₂ emissions from ocean-related energy sources in FY 2013, the base year for Japanese reduction targets, were 15.65 million t-CO₂², which represents 1.1% of total GHG emissions (1.41billion t-CO₂) in FY 2013 in Japan.

If GHG reduction measures in the Plan are successfully implemented, ocean-related emissions could decrease by 4.49 million t-CO₂, which would be a 28.7% reduction from FY 2013 levels. It represents 0.3% reduction from the total GHG

² In this section GHG absorption / emission is expressed in weight of CO₂ including carbon and oxygen. (ton of CO₂: t-CO₂)

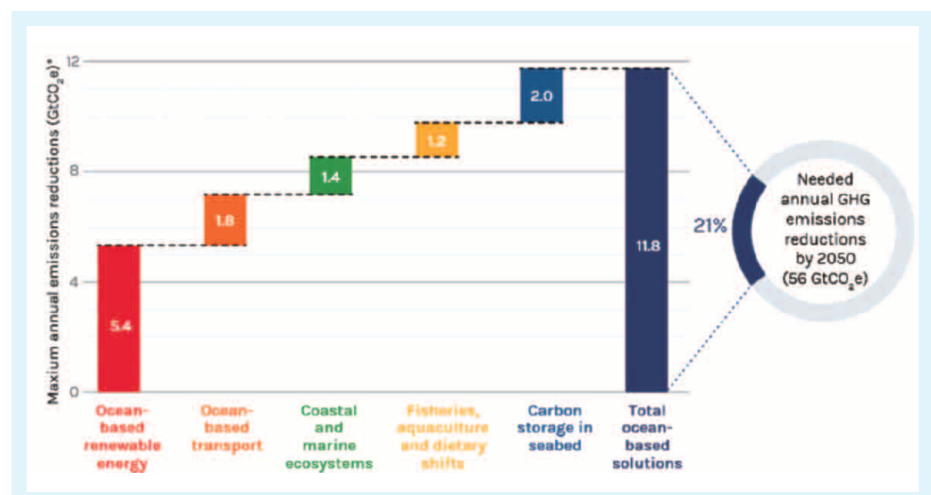


Figure 3-1-1 Potential Contribution of Ocean-based Climate Actions towards Mitigation of Climate Change³

³ Hoegh-Guldberg O. et al (2019)

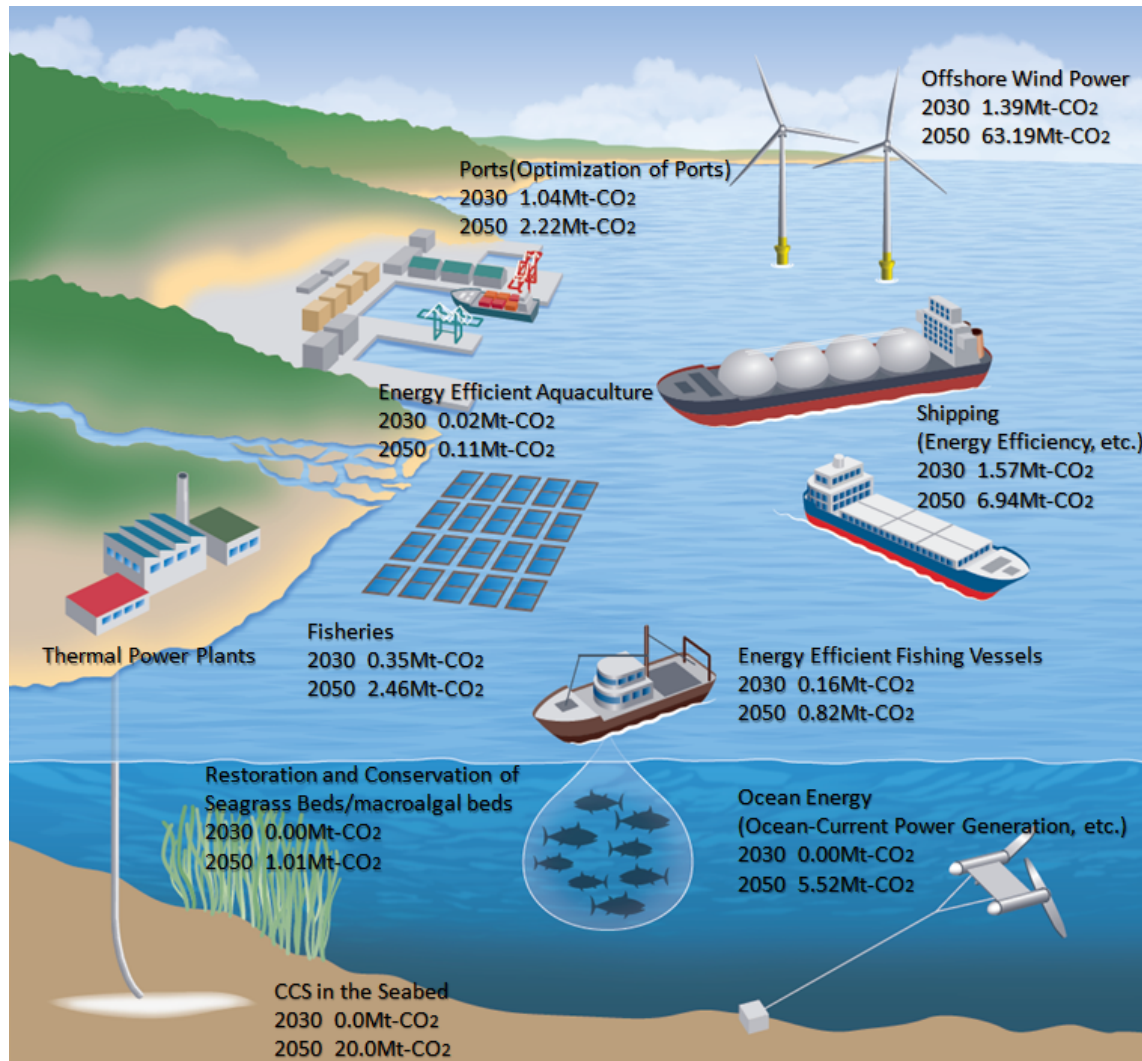


Figure 3-1-2 Ocean-based Climate Change Mitigation Measures in Japan (Official goal by 2030 and ambitious goal by 2050)

emissions in FY 2013. In other words, 0.3% of Japan's 2030 target of 26.0% reduction from FY 2013 levels could be achieved through ocean-related reduction. The most effective measures are the promotion of modal shift⁴ to waterborne shipping and promotion of the widespread utilization of fuel-efficient ships. Not included in this number is emission reduction by offshore wind power, which is the only renewable energy mitigation measure identified in the Plan, but whose emission reduction potential is not quantified.

In addition to the measures specified in the Plan, Japan's Long-term Strategy under the Paris Agreement (hereafter, "Long-term Strategy"), approved by the Cabinet in June 2019, includes mitigation measures such as CCS, ocean-related renewable energy in addition to offshore wind power, and those based on coastal and marine ecosystems. This is likely due to the fact that the Long-term Strategy covers a longer timeframe than the 2030 target of the Plan, therefore allowing more time to develop new technologies. At the same time, due to the greater uncertainty, the Long-term Strategy does not set specific GHG reduction targets for the individual measures. The reduction targets set by the Long-term Strategy is

⁴ Modal shift in freight transport means switching from surface transport mostly by trucks to transport utilizing ships (inland vessels/ferries) and/or railways, which are more environmentally friendly and can deliver a large volume.

Table3-1-1 Potential GHG Emission Reduction Compared to FY 2013 Total Emission in Percentage

| Segment | 2030 | 2050 | | |
|---|------|-------------------------------------|----------------------------------|---------------------------|
| | | 1) Continuation of Current Measures | 2) More Ambitious Climate Action | 3) Maximum Implementation |
| Total Reduction Potential | 0.4% | 5.6% | 20.2% | 10538.5% |
| % of CSS Reduction | 0.0% | 4.6% | 14.2% | 10361.3% |
| % of Offshore Wind Reduction | 0.1% | 0.2% | 4.5% | 171.1% |
| Reduction Potential (CCS & Offshore Wind Power) | 0.3% | 0.8% | 1.6% | 6.1% |
| Reduction Potential (CCS) | 0.4% | 0.1% | 6.0% | 177.2% |

Note : 1) "Continuation of Current Measures" assumes that measures based on the government's 2030 target are extended to 2050 without any buildup of ambition. 2) "More Ambitious Climate Action" is a case in which GHG emission reduction measures are implemented to a greater extent than in 1), and virtually zero GHG emissions are achieved in 2050. 3) "Maximum Implementation" is a case in which measures are introduced to the maximum extent possible.

80% reduction by FY 2050 and zero-emission as soon as possible in the latter half of 21st century. Prime Minister Suga's declaration of "net-zero emission by 2050" rendered it necessary to make a fundamental and prompt revision to the Long-term Strategy.

OPRI compiled the ocean-based mitigation measures currently implemented in Japan or expected to be implemented in the future, and made an assessment of GHG reduction potentials by FY 2030 and by FY 2050, based on the expected reduction identified in the Plan and the Long-term Strategy, as well as other literature published in Japan and overseas. Table 3-1-1 shows the reduction potentials compared to the total GHG emissions in FY 2013.

Ocean-based reduction potential in FY 2030 is 6.22 million t-CO₂. In addition to the reduction values identified in the Plan, the reduction potential of offshore wind power, which is not identified in the Plan, is assumed to be 1 million t-CO₂.

In the More Ambitious Climate Action scenario (100% reduction from the FY 2013 level), ocean-based reduction (% of the reduction from FY 2013 total emissions) is 20.2%. It suggests that the contribution of ocean-based reduction in Japan towards the total target could be almost equivalent to the aforementioned 21% contribution of the ocean-based reduction cited in the report by High Level Panel.

It should be noted that CCS and offshore wind power accounts for most of the total reduction potential of ocean-based mitigation measures. Development of CCS and offshore wind power holds the key to achieving net-zero emissions by 2050 ; in other words, ocean-based reduction could substantially help achieve the 2050 target. CCS is expected to fill the gap between reduction from other mitigation measures and net-zero emissions target. The impact of reduction measures other than CCS and offshore wind power is also considerable, and decarbonization efforts which include them should be promoted aggressively.

Japan is required to set its mid-term plan consistent with the new target of 2050 net-zero emissions. Japan's NDCs under the Paris Agreement should be revised and resubmitted by 2025 at the latest. Further advancement of reduction ef-

forts, while leveraging ocean-related reduction potential, is expected.

2 Development of Offshore Wind Power⁵ in Japan

As discussed in the previous section, among the ocean-related GHG emissions reduction measures, offshore wind power has the most potential along with CCS.

It is essential to develop offshore wind power to achieve net-zero emissions by 2050. Offshore wind power has been incorporated in many countries and is rapidly expanding in Europe and the U.S., while Japan is still in the early stages. According to the *Global Offshore Wind Report 1st half 2020* published by Global Wind Energy Council (GWEC)⁶, while the total installed capacity in the UK and Germany, the largest offshore markets in the world, are 10.4 GW and 7.7 GW respectively, the total installed capacity in Japan is only 85 MW (0.085 GW).

Legal framework necessary for the development of offshore wind power has been established on a fast track in Japan for the last several years, and the environment for its development has substantially improved. On April 1, 2019, the Act on Promoting the Utilization of Sea Areas for the Development of Marine Renewable Energy Power Generation Facilities (the Utilization of Sea Area for Renewable Energy Act) came into effect. It established uniform rules for the exclusive occupancy and use of sea areas in Japan and a framework for coordination with existing users. *Overview of the Vision for Offshore Wind Power Industry (1st)*, published by the Public Private Council on Enhancement of Industrial Competitiveness for Offshore Wind Power Generation in December 2020, set ambitious targets such as installing 30–45 GW capacity by 2040 and lowering the cost of bottom-mounted wind power generation to the levels of Europe and North America.

The Ministry of Economy, Trade and Industry (METI) started discussion on revising the Basic Energy Plan in October 2020. The achievement of carbon neutral by 2050 requires the overhaul of energy mix in the long-term energy demand outlook. Offshore wind power is expected to lead the transition to renewable energy in Japan. In offshore wind power development areas, emphasis is placed on due consideration of the impact of wind power on the marine environment and fisheries, and contribution to the local economy. When offshore wind power projects are first accepted by the local communities, they could become model cases for the rest of the country.

2 Toward Net-Zero GHG Emissions by 2050 : The UNFCCC's Efforts to Strengthen Contributions from the Oceans

1 The Marrakech Partnership

The Marrakech Partnership for Global Climate Action (the Marrakech Partnership) was launched in 2017 under the framework of UNFCCC to facilitate the participation of non-state stakeholders (NGOs, businesses, local governments, etc.) in the effort to mitigate climate change. The Oceans and Coastal Zones Group, one of the eight sectoral groups of the Marrakech Partnership, remains active in making recommendations and proposals on the relevance of the oceans and climate

⁵ See Chapter 4, Section 1.

⁶ https://wfo-global.org/wp-content/uploads/2020/08/WFO_Global-Offshore-Wind-Report-HY1-2020.pdf

change. The Marrakech Partnership also approves and participates in the Race to Zero Campaign, a global campaign to build momentum for the shift to a decarbonized economy ahead of COP26. The Campaign mobilizes various actors outside of national governments to join the Climate Ambition Alliance, which was launched at the UN Climate Action Summit 2019 under the initiative of Chile, and prompts national governments to strengthen NDCs through the zero-emissions efforts of each participant. As of the end of 2020, 454 cities, 23 regions, 1,397 businesses, and 569 universities were represented.

A UNFCCC official online event, the Race to Zero Dialogues, was convened in November 2020 to coincide with the original scheduled date of COP26, which had been postponed due to the COVID-19 pandemic. The Marrakech Partnership held multiple themed events, one of which was an ocean-themed session, “Innovating for a Sustainable Ocean: Technologies to Tackle Climate Change.” Representatives from the industrial sector, NGOs, researchers, and international organizations took the podium and presented case examples such as: GHG emissions reduction and the application of hydrogen fuel in ocean shipping, utilization of solar power and deep ocean water cold energy at a resort hotel on a remote island, food and nutrition products and compostable bio-packaging material made from seaweed, issues of separated coating film from ship hull cleaning and technology for plastics collection. At the Climate Ambition Summit convened in December 2020, the Race to Resilience Campaign, the sibling campaign to Race to Zero, was launched. The Campaign intends to mobilize non-state actors to help strengthen the resilience of 4 billion people in the groups and communities vulnerable to climate risks by 2030. Through establishing a partnership, the Campaign will focus on helping communities to build resilience and adapt to impacts of climate change in three target regions: urban, rural, and coastal.

In December 2020, the Marrakech Partnership announced Climate Action Pathways for eight thematic and cross-cutting areas. It provides a roadmap to help stakeholders to identify actions needed by 2021, 2025, 2030, and 2040, as steps to the 2050 net-zero emissions vision of limiting temperature rise to 1.5°C above pre-industrial levels. The Oceans and Coastal Zones Climate Action Pathway, for which OPRI participated in discussions, acknowledged the importance of blue carbon ecosystems as one of the nature-based solutions. It called for the incorporation of the conservation and restoration of coastal blue carbon ecosystems in countries’ NDCs by 2021, evaluation of the potentials of seaweed by 2025, and revision of the Wetlands Supplement by 2030. The Pathways are intended as living documents, to be updated periodically as the situation dictates.

2 Ocean and Climate Change Dialogue

After the UN Climate Change Conference (UNFCCC COP26), set to take place in Glasgow in November 2020, was postponed one year due to COVID-19, the UNFCCC held a virtual event, UN Climate Change Dialogue (Climate Dialogue), from November 23 to December 4, 2020. The objectives of the Climate Dialogue were to maintain momentum toward COP26, provide a platform for Parties and

other stakeholders to showcase progress made in 2020, and exchange view and ideas on COP agendas. It was not intended to be meetings for negotiation, but rather for the exchange of ideas. During the 12 days, about 80 online sessions were held, including dialogues on outstanding issues of Article 6 of the Paris Agreement and on the relationship between land and climate change adaptation.

The Ocean and Climate Change Dialogue (Ocean Dialogue) was held over two days from December 2 to 3, 2020. It was the first official event under the UNFCCC on the ocean and climate change. The dialogue was originally scheduled for June 2020 at the 52nd Sessions of the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA), in accordance with the decision of the Conference of the Parties at COP25. Subsequently, the SBSTA meeting was postponed due to the COVID-19 pandemic until 2021, and it was convened online as a part of the aforementioned Climate Dialogue. The Ocean Dialogue provided a space for Parties, non-Party states, and other non-Party stakeholders (international organizations, civil society organizations, research institutions, etc.) to promote a greater understanding of the relationship between the climate and the oceans, along with the issues around it, and to consider ways to strengthen ocean-based mitigation and adaptation actions. OPRI participated in the session on strengthening cross-cutting support for action held on the second day. Dr. Miko Maekawa, a Senior Research Fellow of OPRI, presented a proposal on developing a financial guide for ocean and climate actions

The first day of the event opened with statements from ministerial level representatives. The Minister of Foreign Affairs of Chile, the Minister of Foreign Affairs and Cooperation of Monaco, and the Minister for Pacific and the Environment of the United Kingdom took the podium. Following after, Mr. Peter Thomson, the UN Secretary-General's Special Envoy for the Ocean and Ms. Patricia Espinosa, UNFCCC Executive Secretary gave speeches. On the first day, Dr. Hans-Otto Pörtner, the Co-chair of Working Group II of the Intergovernmental Panel on Climate Change (IPCC), gave a keynote speech on the *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*, published in September 2019. On the second day, Ms. Jane Lubchenco, Co-chair of the High Level Panel, gave a keynote presentation on several reports on ocean economy published by the High Level Panel.

After the opening plenary keynotes, breakout discussions were held on 1) Strengthening action under the UNFCCC, 2) Strengthening action across the UN, 3) Strengthening action at national levels, and 4) Strengthening cross-cutting support for action. At each of these discussion groups, a panel discussion was held and participants other than panelists were also invited to contribute to the dialogue.

The Ocean Dialogue provided valuable opportunities for a variety of actors, such as government negotiators, civil society organizations, and research institutes, to share the latest information on the current status and challenges of climate change mitigation and adaptation measures and examine the issues comprehensively. As Executive Secretary Ms. Espinosa emphasized “inclusive multinational-

ism” at the High-level Opening session, diverse participants contributed to the discussions, including representatives of indigenous people and the younger generation, whose statements raised attention. The subsidiary bodies for implementation under the UNFCCC, such as the Nairobi Work Programme on impacts, vulnerability, and adaptation to climate change, the Warsaw International Mechanism for Loss and Damage, and the Least Developed Countries Expert Group, and other UN agencies, such as the UN Division for Ocean Affairs and the Law of the Sea, the UN Convention on Biological Diversity, the International Maritime Organization, and the Food and Agriculture Organization, also participated. They discussed common grounds for cooperation and challenges. It is important for each Party to incorporate ocean-based measures into the NDCs, which are required by each Party to be developed and submitted under the Paris Agreement. Discussions were held on the implementation of and support for ocean-based climate change mitigation measures, such as nature-based solutions and marine protection areas, and they were presented to the public, to the benefit of many stakeholders.

The Chair of SBSTA is required to prepare an informal summary report on the discussions at the Ocean Dialogue⁷. While it is yet to be seen how the summary report is handled, it is expected that the opportunity to present the findings will be provided at COP26, and that discussions to hold the Ocean Dialogue on a continual basis will be conducted.

3 Looking Forward

In 2020, due to the COVID-19 pandemic, global GHG emissions decreased by about 7% from the previous year. However, the short-term GHG reduction barely makes a dent in mid-to-long term global warming. The global temperature is still rising at such a pace that by the end of the 21st century, the average surface temperature will be 3°C warmer than today. However, the post-pandemic economic recovery measures implemented through the aforementioned Green Recovery/Blue Recovery could facilitate the transition to a decarbonized society. If the economic recovery efforts from the COVID-19 pandemic are used as an opportunity to accelerate decarbonization, GHG emissions would be 15Gt-CO₂ (25%) lower in 2030 than they would be otherwise⁸, and lead the world closer to the 2°C pathway⁹.

The most significant development of climate change policy is that many countries including Japan committed themselves to net-zero emissions by 2050. As of December 2020, 126 countries, which account for 51% of global GHG emissions, officially adopted and declared this goal, and more are considering its adoption¹⁰. However, it should be noted that there is a large gap between the goal of net-zero by 2050 and the current NDCs and short-term policy measures. NDCs and current policy measures should be revised to meet the net-zero by 2050 goal through the incorporation of a Green Recovery/Blue Recovery and more ambitious NDCs. It is also important to support the efforts of the business sector, as the Marrakech Partnership is committed to, and to develop and implement a sce-

⁷ UNFCCC. 1/CP.25 Paragraph 34. The report is available at: https://unfccc.int/sites/default/files/resource/SBSTA_Ocean_Dialogue_SummaryReport.pdf

⁸ IEA sustainable recovery scenario

⁹ UNEP Emission Gap Report 2020

¹⁰ If the United States under the Biden Administration adopt the goal, it will be 63%.

nario showing the practical steps society should take. Global action should be reflected in the local actions of each country. It is expected that climate actions will be further accelerated at various levels of society with the recovery from the pandemic.

(Mai Fujii and Nagisa Yoshioka)

2 Development of Countermeasures against Marine Plastics

Due to the protracted COVID-19 pandemic, single-use-plastics such as face masks, face shields, dividers, and isolation gowns are being consumed in a huge quantity globally¹¹. In Japan, increased number of eating establishments offering takeaway services has snowballed the consumption of plastic containers¹². To prevent infection spread, some local governments stopped collection of recyclable waste, or treated it as combustible waste¹³. In 2020, while the 3Rs of plastics recycling (Reduce, Reuse, and Recycle) faced a challenge, the direction of global policy mostly stayed the same.

In Japan, the Ministry of Economy, Trade and Industry (METI) released the Circular Economy Vision 2020 in May 2020 and launched the Circular Economy and Plastic Resources Recycling Finance Study Group jointly with the Ministry of the Environment. The Study Group met 5 times in 2020, inviting experts, and discussed measures to attract investment and financing to Japanese companies which commit to the 3Rs. The METI and the Ministry of the Environment also jointly launched the Plastic Resources Recycling Strategy Working Group, aiming to curb marine plastics pollution while transitioning to the circular economy. The Working Group met 7 times between May and November 2020 and released a draft plan, the Future Plastic Resources Recycling Policy Measures. The draft vows to “reduce (use of plastics) thoroughly.” In the section, the Expansion and Sophistication of Plastic Resources Recovery and Recycling, the policy direction was stated to recycle plastic household consumer products which have been disposed through incineration or landfill.

1 Charging for Single-Use Plastic Shopping Bags and its Effect

The law for retail stores to charge customers for single-use plastic shopping bags took effect on July 1, 2020. It is a policy measure based on the Plastic Resources Recycling Strategy set by the Japanese government in 2019. It essentially banned giving away single-use plastic shopping bags for free to control overuse and to encourage change in consumers' lifestyles¹⁴.

In preparation for the implementation, ministry ordinances relevant to the Recycling of Container and Packaging Act were revised on December 27, 2019. The

¹¹ <https://wedocs.unep.org/bitstream/handle/20.500.11822/33416/WMC-19.pdf?sequence=1&isAllowed=y>

¹² <https://www3.nhk.or.jp/news/html/20200908/k10012606851000.html>

¹³ https://www.env.go.jp/recycle/waste/sp_contr/infection/gaiyou.pdf

¹⁴ Excluded are bags made of plastic film thicker than 50μm, 100% marine-degradable plastics, and 25% and over biomass material.

¹⁵ https://www.meti.go.jp/policy/recycle/plasticbag/plasticbag_top.html

METI published the Guideline for instituting fees for plastic shopping bags¹⁵ to call on the general public to prepare. However, the notion of national implementation of the plastic bag fee had not necessarily permeated the general public. As it coincided with the COVID-19 pandemic, society became sensitized about hygiene. There were incidents of confusion. Commercial plastic bag products, as substitutes for free plastic shopping bags, had sold out and were on back order. Store employees refused bagging into customer-brought bags. The Ministry of the Environment set the “Shopping Bag Challenge” campaign website, where it explained the significance of reducing use of single-use plastic bags. In the Q&A section, to the question if customer-brought reusable bags could spread infection, it answered that there was no scientific evidence for it and listed ways to reduce the risk of infection.

Some grocery stores have been already voluntarily charging for plastic shopping bags for more than 10 years and a certain number of consumers are using reusable bags on a daily basis. The policy measures to charge fees boosted spread of the practice throughout the nation. The Ministry of the Environment conducted a survey in November 2020 and found that 71.9% of the those surveyed didn’t use single-use plastic bags for a week¹⁶. It is not known how much of the effect of plastics reduction was offset by increased consumption of substitution products. Nonetheless, the goal of the Campaign, to increase the percentage of people who do not use single-use plastic shopping bags to 60%, has already been achieved.

¹⁶ <http://plastics-smartenv.go.jp/rejibukuro-challenge/pdf/20201207-report.pdf>

2 Toward Realization of the Osaka Blue Ocean Vision

The Japanese government proposed the Osaka Blue Ocean Vision, aiming for realization of zero-pollution from additional marine plastics by 2050, at the G20 Osaka Summit in 2019. It is shared by 86 countries and regions. At the 2019 meeting of the Ad Hoc Open-ended Expert Group on Marine Litter and Microplastics (AHEG), established at the third session of the UN Environment Assembly, Japan was elected to the chairmanship of the Asia Pacific Region. Japan convened an online meeting on August 26 and 27, 2020, ahead of the other 4 regions. With more than 100 participants each day, representatives of Iran, Japan, Philippines, Singapore, Vietnam, and Myanmar discussed countermeasures against marine plastic debris¹⁷. The outcome was presented at the 4th AHEG meeting to 70 countries and regions in the world.

G20 was held virtually in 2020. The Ministry of the Environment of Japan hosted the G20 Workshop on Harmonized Monitoring and Data Compilation of Marine Plastic Litter on September 7th, 2020 in accordance with the G20 Implementation Framework for Actions on Marine Plastic Litter. About 160 people from 31 countries participated. Japan here proposed establishing a worldwide system for sharing monitoring data.

International on-line meetings had advantages of wider participation, wider access to supporting material and conference reports, and no CO₂ emissions from

¹⁷ <https://www.env.go.jp/press/files/jp/114750.pdf>

traveling. The Ocean Policy Research Institute of The Sasakawa Peace Foundation (OPRF) hosted a webinar titled “The High Level Panel for a Sustainable Ocean Economy’s Policy Recommendations : Promoting Sustainable Ocean Economies and International Partnership,” with the Ministry of the Environment of Japan in December 2020¹⁸ as a private-sector-led meeting. The High Level Panels (Ocean Panel) was established by the initiative of the Government of Norway in 2018 to address the ocean crisis. It consists of 14 heads of ocean states¹⁹, including Japan and the United Nations Secretary-General’s Special Envoy for the Ocean. OPRI, a member of its advisory network, brought the international webinar to realization with cooperation of the embassies of Norway and Palau in Japan. Through the webinar, OPRI publicized the policy recommendations announced by the Ocean Panel the day before. One of the “transformations” in the recommendations to be achieved by 2030 is to reduce ocean pollution, especially marine plastic debris. At the Webinar, Mr. Keiichi Ono, Director-General for Global Issues and Assistant Minister for Foreign Affairs of Japan said that Japan declared to support infrastructure development and capacity building for waste disposal management in developing countries and was moving into action. Dr. Shunichi Honda, Programme Officer, United Nations Environment Programme – International Environment Technology Center (UNEP-IETC), which is based in Osaka, Japan, said that it was necessary to transform wastes causing environmental pollution into resources.

It is also necessary to acknowledge that China’s ban on plastic waste imports in 2017, Japanese plastic waste destinations have shifted toward other Asian countries. The revised Basel Convention, which prohibits export of plastic wastes without agreement of the importing country, took effect on January 1, 2021. It is important for developed countries including Japan to accelerate formulation of 3Rs and resource circulation systems domestically as well as to contribute internationally.

¹⁸ [https:// www. spf. org / opri/ news/ 20201211_2. html](https://www.spf.org/opri/news/20201211_2.html)

¹⁹ Members include Norway, Palau, Japan, Indonesia, Portugal, Mexico, Jamaica, Canada, Ghana, Kenya, Namibia, Fiji, Chile, and Australia. These nations account for 30% of the world’s exclusive economic zones (EEZs).

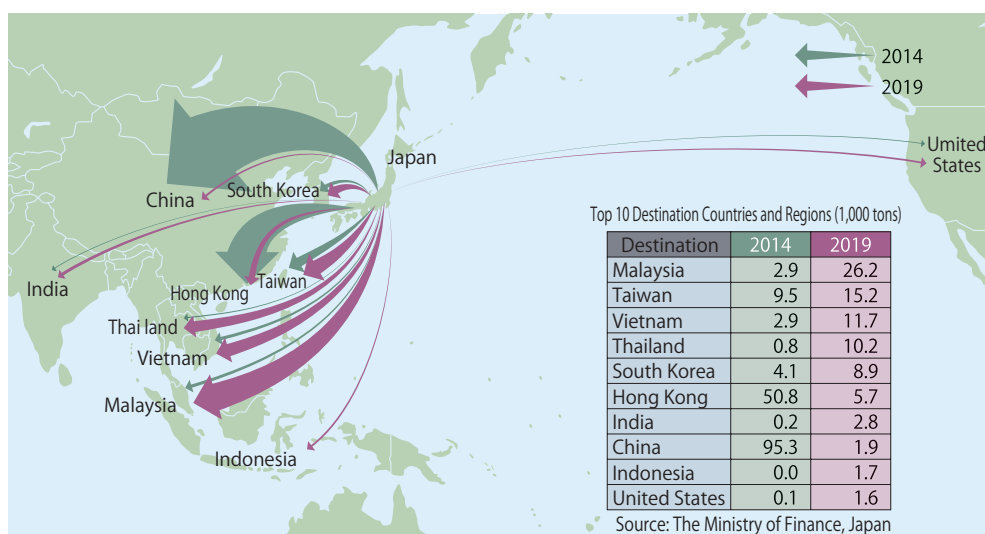


Figure 3-2-1 Effect of Chinese Plastic Waste Import Ban on Japanese Plastic Waste Exports
(Source : Created based on the data provided by the Ministry of Finance, Japan)

3 Survey and R&D

1 Microplastics Survey

While some planned surveys from vessels were canceled due to the COVID-19 pandemic in 2020, scientific study on microplastics progressed. During the 17-day event of the Japan-Palau Goodwill Yacht Race, which concluded on January 15, 2020, the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) conducted microplastic sample collection from an escort vessel, the *Miraie*. It was a collaborative project among industry, government, academia, and private sectors. JAMSTEC also collected microplastic samples on a research vessel, the *Mirai*, in the Arctic Ocean from September to November, 2020²⁰. Moreover, Mr. Kojiro Shiraishi, a marine adventurer, participated in Vand  e Globe²¹, a solo non-stop round the world yacht race, from November 2020, and the microplastic samples he collected in the Southern Atlantic Ocean are also being analyzed.

The Ministry of the Environment of Japan has been surveying microplastics since FY2014. The findings from FY2018 were published in March 2020²². 65.6 microplastic pieces were found in 1 cubic meter of sea water in Tokyo Bay's surface layer water. The report points out the sampling vessel passed through the current front where drifting debris accumulated. Even so, it was the largest number ever reported. Microplastics absorb and accumulate Persistent Organic Pollutants (POPs). In FY2018, 1.7–339 nanograms (ng) of polychlorobiphenyls (PCB) per 1 gram were detected in the microplastic samples collected from 12 seashore sites and 2 sites at sea. The largest value was 942.5ng reported in FY2015.

2 Ocean Microplastics Monitoring Methods

To standardize monitoring methods, the Ministry of the Environment of Japan published the *Guidelines for Harmonizing Ocean Surface Microplastic Monitoring Methods* in 2019. It was revised in June 2020 to facilitate its application in the Southeast Asia, where issues of plastic waste entering the oceans were especially serious. To ensure the data is recorded in a uniform format, a data input form is provided.

The Project Ikkaku is conducting a trial to demonstrate image recognition technology to monitor ocean debris of coastal areas from above using satellites and drones. The Project Ikkaku was launched by the Japan Advanced Science and Technology Organization for Education, Human Development and Research (JASTO) and Leave a Nest Co., Ltd., a human resource development enterprise, in association with The Nippon Foundation, to implement sustainable business systems to tackle the growing problem of ocean debris.

Technologies to improve efficiency are also required. JAMSTEC developed a method to automatically identify microplastics from the pattern of reflectance spectrum using imaging diagnostic technology in March 2020.

²⁰ See Column 06

²¹ The race is held every 4 years. Mr. Shiraishi participated in 2016 as the first Asian sailor. He participated again in 2020 and completed the race.

²² <https://www.env.go.jp/press/107902.html>

3 Effect of Microplastics on Ecosystems

According to the Science Council of Japan (SCJ), more than 200 organism species were found to have microplastics in their guts. In the *Recommendations: Necessity of Study on Effect of Water Pollution by Microplastics on Ecosystems and Health and Plastics Governance*²³, published by SCJ in April 2020, it found that there was little research being done on toxic effects of absorbed and accumulated harmful substances on organisms and said that environmental and health risks had not been evaluated. It called on promoting research to study preventive measures.

The University of Tokyo FSI – Nippon Foundation Research Project on Marine Plastic, a three-year programme, was launched in FY2019. It convened an on-line symposium, the Future of Marine Plastics Study, in which about 500 participated from Japan and abroad²⁴. Dr. Yasuyuki Sakai, Professor of chemical bioengineering at the University of Tokyo conducted an experiment using cultured human tissue and found plastic particles enter in lymph vessels rather than blood vessels. He said that he was planning to further study its effect on immune cells. At the symposium, a presentation about research and development of biodegradable plastics was also made. Dr. Tadahisa Iwata, Professor at the Tokyo University, gave an example of development of new material in which the timing and speed of breakdown can be controlled.

4 Survey of Lost and Discarded Fishing Gear and Enhancing Counter-measures

Lost and discarded fishing gear made of plastic such as fishing nets and ropes account for about 40% of marine debris by weight. It is imperative to prevent existing fishing gear entering the oceans, and to recover them as well as to commercialize marine degradable plastics. To address the issue, the Fisheries Agency of Japan launched a special website, Resources Circulating (Efforts in Fisheries)²⁵ in March 2020 and released the findings of a survey of plastic wastes from fisheries.

As for countermeasures, the Ministry of the Environment reimbursed fisheries managers who voluntarily recovered marine debris for the partial cost of waste disposal in FY2020 in 23 prefectures. In May, the Ministry designated seven areas for underwater debris recovery demonstrations, with the cooperation of fisheries managers, to enable the local governments to collect underwater debris. After the 3-year demonstrations, the ministry is planning to develop a manual for collection.

5 Cooperation among local governments, businesses, and communities in Japan

Single use beverage bottles account for about 40% of marine debris by number of articles. Human behavior, including businesses and individuals, must be transformed to reduce marine debris.

① Efforts of Local Governments

By the end of October 2020, 114 local governments had declared efforts to re-

²³ <http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-24-t288-1.pdf>

²⁴ <https://www.oa.u-tokyo.ac.jp/activity/078.html>

²⁵ https://www.jfa.maff.go.jp/j/sigen/action_sengen/190418.html

26 <https://www.env.go.jp/council/03recycle/20201120t2.pdf>

27 <https://setouchi-oceansx.jp>

duce plastic wastes²⁶. In particular, Kameoka City, Kyoto, declared a total ban of single-use plastic bags, held about 50 explanatory meetings, and enacted the Kameoka City Ordinance Banning Provision of Single-use Plastic Shopping Bags on March 24, 2020. The city not only prohibited providing single-use plastic bags, for fee or for free, but also prohibited offering paper bags and biodegradable bags for free from January 1, 2021, to encourage use of reusable bags.

Four prefectures facing the Seto Inland Sea – Hiroshima, Okayama, Ehime, and Kagawa – and The Nippon Foundation signed a cooperation agreement in December 2020 to launch Setouchi OceansX²⁷, which aims at a 70% reduction of waste inflow and 10% increase of recovery volume. Local governments facing the enclosed coastal sea work together on surveys and studies, collaboration of businesses and communities, awareness raising, education and activities, and development of policy measures in the 5-year plan. At the press conference, governors of the four prefectures were present on-line. Mr. Yohei Sasakawa, Chairman of The Nippon Foundation, said, “I have a great regard for your shared aspiration to make the Seto Inland Sea the world’s pre-eminent marine protected area. We expect to have tangible results after 5 years based on concrete scientific evidence.”

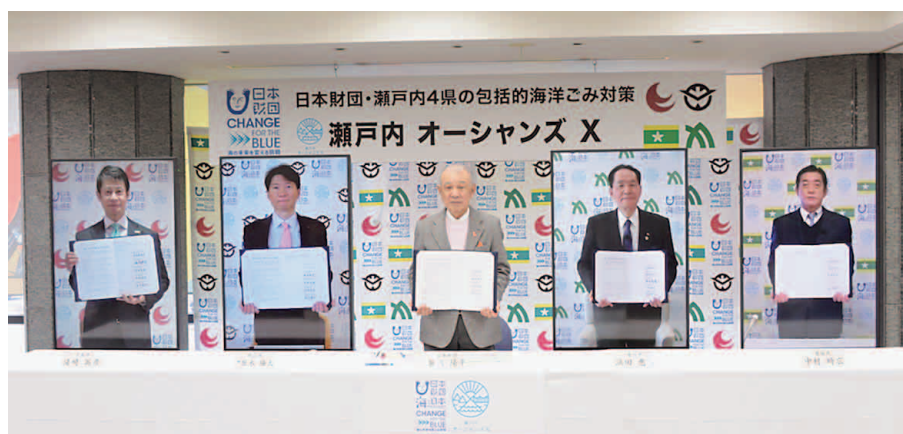


Figure 3-2-2 Signing Ceremony of Setouchi OceansX

Governors of four prefectures facing the Seto Inland Sea signed the agreement on-line at the same time (December 25, 2020). From left, Governor Yuzaki of Hiroshima, Governor Ibaragi of Okayama, Chairman Sasakawa of The Nippon Foundation, Governor Hamada of Kagawa, and Governor Nakamura of Ehime.

② Efforts of Businesses

To address marine plastic debris, companies, industry associations, and environmental organizations established the Japan Clean Ocean Material Alliance (CLOMA) in 2019. CLOMA launched the CLOMA Action Plan²⁸ in May 2020 and is promoting innovations for the 3Rs and development of alternative materials. Members of CLOMA include 390 companies and groups as of December 25, 2020.

In July 2020, The Nippon Foundation launched a platform for promoting countermeasures against marine debris, ALLIANCE FOR THE BLUE²⁹. Sixteen companies from various lines of business have come together to share information for collaborative research and product development.

28 https://cloma.net/wp-content/themes/twentyseventeen-child/data/CLOMA-ActionPlan_Eng-ver1-1-2.pdf

29 <https://www.alliancefortheblue.org>

〈Cases of Reduce〉

Asahi Group Holdings, Ltd. announced a trial sale of the “Mogu Cup” in November 2020. It jointly developed flavored and plain edible cups with Marushige Confectionary, which had developed edible chopsticks and trays, as alternatives to single-use plastic products.

Nippon Paper Industries has developed SPOPS series, paper-based replaceable containers to replace refill-type pouch containers. In September 2020, it announced that it had developed SPOPS Hygiene brand for disinfectants and reduced usage of plastics by about 70%.

〈Cases of Reuse〉

To encourage reusing containers, in June 2020, Thermos KK opened a takeaway only coffee shop, THERMOS COFFEE TO GO, in Tokyo, where customers bring their own tumblers. Lawson, Inc., a convenience store franchise, started to sell four products, including dishwashing soap and laundry detergent, by weight on a trial basis at their two Natural Lawson brand stores in August 2020. Shiseido Company, Limited, a Japanese multinational cosmetic and personal care company, launched new initiative, the Sustainable Beauty Actions (SBAS), and products in marine biodegradable plastic packages developed by Kaneka Corporation are being sold at Shiseido’s global flagship stores from November 2020. The company also started a refill service to reuse lotion bottles at their flagship stores in Ginza, Tokyo.

With the support of non-profit organizations, local governments and businesses, public bottle filling stations are becoming a common sight³⁰. The lifestyle in which individuals carry their own bottles around is gradually taking root in society.

To reduce single-use plastics, Ventforet Yamanashi Sports Club, Inc., offers beverages and foods during sports matches in 11 types of reusable containers with a deposit refund system³¹. This collaborative initiative between a business and NPO received the top-prize of the Marine Debris Zero Award co-sponsored by The Nippon Foundation and the Ministry of the Environment, and was granted 1million yen. It was the second year of the award and 314 applications were submitted

³⁰ <https://www.refill-japan.org>

³¹ A surcharge on a product when purchased is refunded when it is returned, which has an effect of increasing the collection rate.



Image of Display Fitting



Scale



Pump containers for products and free containers for customers (image)

Figure 3-2-3 Equipment for sale by weight for laundry detergent

By Weight Sale started on a trial basis at Natural Lawson stores (Jingu Gaien Nishi Store and Sibaura Kaigan Dori Store)

Source : Lawson https://www.lawson.co.jp/company/news/detail/1404450_2504.html

32 https://www.uminohi.jp/umigomizero_award2021/announcement2020.html

(254 submissions for the first year)³². From 2020, the Alliance to End Plastic Waste (AEPW), an international NPO made up of nearly fifty major global companies to address plastic wastes issues, joined as a sponsor for awards. The official website features videos to showcase activities of award-winning projects.

〈Cases of Recycling〉

Initiatives for chemical recycling of post-consumer PET (polyethylene terephthalate) beverage bottles saw advancement in 2020. Chemical recycling of PET bottles is a process by which a PET is chemically reduced to raw material form so that it can be remade into new products. First of all, 12 companies from various lines of businesses including Suntory MONOZUKURI Expert Ltd., launched a new joint venture company to develop plastic chemical recycling technology in June 2020. Mitsui & Co., Ltd., Seven & I Holdings Co., Ltd., and Veolia Japan K.K. established a joint venture for a new PET recycling factory in October 2020. Kirin Holdings and Mitsubishi Chemical announced plans to embark on a joint project to recycle PET bottles using chemical recycling in December 2020.

Seven-Eleven Japan and The Nippon Foundation, in cooperation with local governments, have placed PET bottle collection stations in front of 7-Eleven convenience stores³³. In 2020, local governments of Fujisawa City and Yokohama City of Kanagawa Prefecture joined the initiative.

Manufacturers of laundry detergents and hair care products started recycling of containers. Kao Corporation and Lion Corporation announced in September 2020 that they would partner on collecting and recycling of film packaging of refill packages.

Terra Cycle, a private U.S. recycling business, launched a shopping platform, Loop, in the U.S. and France in 2019. Loop picks up empty containers from consumers' homes for reuse, just like milk delivery service in days past. In Japan, after experimenting in six areas, Loop Japan, a subsidiary of TerraCycle, started to accept pre-registration of prospective customers³⁴.

Loop service is set to start in Tokyo in March 2021. Sixteen participating companies use reusable containers made of glass or metal for their products, ranging from cosmetics and detergents to food.

③ Public Participation

The Nippon Foundation and the Ministry of the Environment set a week from the Zero Litter Day (May 30) to the World Ocean Day (June 8) as the Zero Marine Litter Week and have been calling for national beach cleaning since 2019. In 2020 it was postponed to September. Local activity reports from around Japan were posted on its official website³⁵. The NPO Umisakura, in Enoshima, Kanagawa Prefecture, which has conducted beach cleaning since 2005, postponed its annual "Blue Santa" event to December. It is a concept in which a Blue Santa comes to the beach on Ocean Day to pick up litter. The participants are provided with blue

33 <https://www.nippon-foundation.or.jp/journal/2020/43293>

34 <https://www.loopjapan.jp/>

35 <https://uminohi.jp/umigomizero/zeroweek/>



Figure 3-2-4 Chewing gum in reusable containers

(Source : <https://loopjapan.jp/>)

Santa Claus costume, tongs and bags are provided, and anybody can participate without special preparations. More than 500 participants picked up litter on the beach while maintaining social distance in 2020. The NGO hosts events combining beach cleaning with entertainment and successfully creates an atmosphere in which anyone can begin environmental activities easily.

In 2020, the Ministry of the Environment's annual EcoLife Fair, which is usually convened in June, the Environment Month, was held online in December. The staff of the Ministry of the Environment in collaboration with the Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF)'s YouTube show for PR, BUZZ MAFF, presented the issue of marine debris in an easy-to-understand manner³⁶. This YouTube video gained 3,000 high approval ratings in a short period. It suggests the possibility of ocean advocacy in the age of online communication.

(Chiyo Setouchi)

³⁶ https://youtu.be/sUxB_2ITfh4



4 Fisheries and Blue Resource

1 The Revision of Japan's Fisheries Act and the Outlook for the Future

The COVID-19 pandemic has reminded us of the importance of food security, requiring the prompt realization of a resilient fisheries supply chain and a robust fisheries production base in Japan. In 2020, IUU (Illegal, Unreported, and Unregulated) fishing by foreign flag fishing vessels in waters surrounding Japan and unprecedented poor catches of fish heavily consumed in Japan, such as saury, squid, and salmon, became issues. Though Japan's fisheries once boasted the world's largest catches, now their catches are less than one-third of the peak volume. The number of fishermen in Japan has declined to a quarter of its peak level, and fisheries have become an ailing industry that have been dependent on government subsidies for a long time. According to projections by the Food and Agriculture Organization of the United Nations (FAO) on fisheries productivity of major fishing nations, Japan is one of the top countries for which a major drop in productivity is foreseen, while growth is expected for most other countries, advanced and developing alike.

During the COVID-19 pandemic, countries around the world, with Europe at the forefront, reaffirmed the importance of the Paris Agreement and the Sustainable Development Goals (SDGs) and made advances in Green Recovery, economic recovery policy measures which incorporate climate change mitigation and ecosystem conservation policies. Japanese fisheries are now in a critical state. To revive them, a mechanism must be created to address environmental issues such as climate change through measures that are based on scientific evidence and precautionary principles, allowing ecosystems which sustain fishery resources to recover, and utilize fishery resources in a planned and strategic manner from a comprehensive perspective. It is an area where both collaboration among various stakeholders and digital transformation (DX)¹ are highly expected to produce results. This section discusses the future outlook of Japanese fisheries under the Revised Fisheries Act

¹ The adoption of information and communications technology (ICT) to transform people's lives for the better in various aspects.

1 The Purpose of the Revised Fisheries Act and the Roadmap to the Future

The Roadmap to Promote New Resource Management

The Revised Fisheries Act holds the key to the new management of fisheries. The first major revision of the Fisheries Act in 70 years came into effect in December 2020 through an initiative of the Regulatory Reform Promotion Council that began in December 2018. The purpose of the Act is to ensure the sustain-

able utilization of fishery resources by 1) enhancing and improving accuracy of stocks survey and stock assessments, 2) promoting fisheries management using a TAC (total allowable catch) scheme based on MSY (maximum sustainable yield), an international model for fisheries management, 3) introducing the individual quotas (IQ) system in licensed fisheries, and 4) making the transition from the existing voluntary, TAC-uncontrolled fisheries management to a new fisheries management agreement system. The Fisheries Agency released the “Roadmap to Promote New Fisheries Management,” in which it sets a medium-term goal to recover Japan’s catches to the level of 10 years ago (4.44 million tons) by fiscal year 2030. To achieve this goal, it sets the following short-term goals to be achieved by fiscal year 2023.

- ① Enhancing and improving accuracy of stocks survey and fish stock assessments
 - Expand the number of species targeted for stock assessments to about 200 and conduct surveys for stock assessments.
 - Develop a framework to electronically collect data on volume of landings from major fishing cooperatives and local markets, aiming to collect data from more than 400 markets
 - Require reporting catches in fisheries licensed by prefectural governors in addition to Minister-licensed fisheries (offshore and deep-sea fisheries), and reporting usage of fishing grounds in fishing-right-based fisheries (coastal fisheries).
 - Develop a framework to report catches electronically and implement electronic reporting for Minister-licensed fisheries (all fish species), eventually expanding it to fisheries licensed by prefectural governors.
- ② Promoting fisheries management using the TAC scheme based on MSY
 - Expand the subject species of TAC management starting from the ones with large catch volume, eventually expanding to 80% of the total catches.
 - Prioritize TAC management of species whose catch volume is controlled under international agreements.
- ③ Adopting the individual quotas (IQ) system
 - Implement, in principle, the IQ system to Minister-licensed fisheries, which mainly harvest TAC species.
 - Implement the IQ system as a management measure in fisheries management agreements in coastal fisheries where catch shares are currently in effect. (Fisheries of some species and in some areas will transition to the IQ system according to the Revised Fisheries Act.)
- ④ Transitioning to the fisheries management agreement system
 - Complete the transition from the voluntary management plan system to the fisheries management agreement system, in which stock assessments are conducted routinely and the outcomes are made public.

2 The total greenhouse gas emissions caused by activities or products expressed as carbon dioxide equivalent.

3 Costello C, Cao L, Gelcich S, Cisneros-Mata MA, Free CM, Froehlich HE, Golden CD, Ishimura G, Maier J, Macadam-Somer I, Mangin T, Melnychuk MC, Miyahara M, de Moor CL, Naylor R, Nostbakken L, Ojea E, O'Reilly E, Parma AM, Plantinga AJ, Thilsted SH, Lubchenco J. The future of food from the sea. *Nature*. 2020 Dec ; 588 (7836):95–100. doi: 10.1038/s41586-020-2616-y. Epub 2020 Aug 19. PMID: 32814903.

2 Potential of Global Fisheries

Future of the Oceans as a Source of Food

According to the FAO, the world population is expected to reach about 10 billion by 2050. About 500 million tons of animal protein will be required to provide for the population. Many international frameworks, such as the European Commission (EU) which promotes the Farm to Fork Strategy (F2F), and the High Level Panel for a Sustainable Ocean Economy, where heads of states gather for the realization of the SDGs, recognize the issues caused by meat production, such as the loss of biodiversity, emission of greenhouse gas, deforestation, soil contamination, and finite land availability. On the other hand, fishery products, characterized by a low carbon footprint², high feed efficiency, and high production efficiency, can be a solution for future food security and famine. There is a strong interest in the possibility of increasing fishery products, which currently provide only about 20% of the animal protein the world population needs.

Dr. Christopher Costello, Professor at the University of California, Santa Barbara, together with experts of the oceans and fisheries in the world, such as Dr. Jane Lubchenco, a former Administrator of the U.S. National Oceanic and Atmospheric Administration (NOAA), Masanori Miyahara, President of Japan Fisheries Research and Education Agency, and Dr. Gakushi Ishimura, Associate Professor at Iwate University, Japan, published a paper, “The Future of Food from the Sea” in *Nature*, an international science and technology journal, on August 19, 2020³. The study suggests the possibility of future expansion of not only mariculture, which is currently the primary source of seafood production increase in the world, but also of wild fisheries, whose production volume has stayed at the same level for about 30 years, through sustainable fisheries. The study finds that food from the sea could increase from 59 million tons at present to a total of 80 to 103 million tons in 2050, depending on future demand scenarios (159–227 million tons in weight, up 36–74% from present). The paper recommends the following actions to realize it.

Wild Fisheries

- Assuming the demand for seafood increases at the same pace as today, maintaining all fish stocks at MSY levels, which could result in 57.4 million tons of food by 2050 (89.3 million tons in total harvest), a 16% increase compared to the current level.
- In order to maintain all stocks at MSY level, fisheries management via quotas, the implementation of fisheries management in stocks that are poorly managed currently, utilization of advanced technologies, reduction of fishery subsidies leading to overfishing and IUU fishing, and active adaptation to climate-induced change are required.

Mariculture

- Assuming the demand for seafood increases at the same pace as the present, ensuring the development of sustainable mariculture, which could dou-

ble the current seafood production level by 2050.

- To ensure sustainable mariculture, policy reform, utilization of advanced technologies, promotion of innovations, development of alternative feed ingredients with less environmental load, such as microbial ingredients, insects, and algae, and density management of farms are required.

3 Fishery Reform in Japan : Challenges and Vision

1 Transformations for a Sustainable Ocean Economy : A Vision for Protection, Production and Prosperity

The COVID-19 pandemic has wreaked havoc. The pattern of global consumer behavior has drastically changed, and shortages of foreign seasonal fishery laborers in developed economies disrupted international supply chains. The limitations of the short-sighted efficiency-oriented economy and society became apparent. As the EU's F2F Strategy indicates, correcting the perverse and strained effects of the current system and transitioning to a sustainable economy and society will be the new normal, especially in developed economies. The Japanese fisheries industry faces unaddressed issues such as the deterioration of fishery resources, aging fisheries workers, viability of small-scale fisheries, and international competition. With the revision of the Fisheries Act, Japan is putting a strategy into motion to accomplish a Green Recovery and realize the potential that "The Future of Food from the Sea" presents.

Seafood Legacy Co., Ltd. and Nikkei ESG jointly held the Tokyo Sustainable Seafood Symposium 2020 (TSSS2020) online from November 4 to 11, 2020. The symposium is Asia's largest on sustainable seafood. More than 100 speakers from Japan and abroad and over 3,500 participants from more than 50 countries took part. Hideaki Yamaguchi, Head of Fisheries Agency of Japan, gave a speech on Japan's fishery transformation as envisioned by the Revised Fisheries Act. Dr. Christopher Costello presented the paper, "The Future of Food from the Sea," and highlighted their high potential. Veronika Veits, Director of International Ocean Governance and Sustainable Fisheries of European Commission, showcased the innovative F2F Strategy of the EU. It was pointed out during the panel discussion facilitated by Masanori Miyahara that it was essential for Japan's fisheries to undergo substantial reform, with its basis on the Revised Fisheries Act.

The Revised Fisheries Act went into effect on December 1, 2020. Two days later, on



Figure 4-1-1 Masanori Miyahara, President of Japan Fisheries Research and Education Agency, facilitated a panel discussion

(Source : TSSS2020, <http://sustainableseafoodnow.com/2020/>)

⁴ "High Level Panel for a Sustainable Ocean Economy Policy Recommendations: Toward Sustainable Ocean Economy and Promotion of International Cooperation," the webinar hosted by the Ministry of Foreign Affairs of Japan and The Sasakawa Peace Foundation Ocean Policy Research Institute.

December 3, a webinar was hosted by the Ministry of Foreign Affairs of Japan and the Ocean Policy Research Institute of The Sasakawa Peace Foundation⁴ on the policy recommendations released by the High Level Panel for a Sustainable Ocean Economy, which represents 14 ocean nations including Japan. The document, *Transformations for a Sustainable Ocean Economy: A Vision for Protection, Production and Prosperity*, covers the protection and sustainable use of the ocean comprehensively. It lists the outcomes to be accomplished by 2030, such as 1) restoring wild fish stocks so that they can be harvested at sustainable levels, 2) expanding aquaculture sustainably to meet global needs, 3) minimizing waste throughout the fisheries industry, and 4) conserving biodiversity. In the webinar, Prime Minister Yoshihide Suga said, "We are committed to managing all Japanese waters in a sustainable manner so that future generations may enjoy the rich resources of the ocean. Japan will strenuously make an effort to accomplish this goal."

2 To Achieve a Green Recovery Centered on the Revised Fisheries Act

Japan has one of the world's richest three fishing grounds in its Exclusive Economic Zone (EEZ).

The ocean around Japan nurtures a rich and varied ecosystem, and the Japanese fisheries industry could hugely benefit from a Green Recovery that is centered on the Revised Fisheries Act. Given the instability of food supply around the world, fisheries could serve as a solid foundation for the domestic food security strategy. They could provide a secure future for the world's dining tables where food shortage is predicted due to explosive population growth. To achieve a Green Recovery, the Revised Fisheries Act should not become a mere façade. The key factors to implement the Act are:

① Pursuing Process Transparency and Participation of Wide Range of Stakeholders

In addition to stakeholders throughout the supply chain such as seafood processors, distributors, restaurant and business operators, retailers, and consumers, a wide range of players such as scientists, environmental NGOs, and consulting organizations should also be included in discussions, and their opinions and the process of discussions should be made accessible to the public. It is imperative to keep the process transparent for a successful sustainability-oriented fishery reform.

Instead of making decisions through closed negotiations with limited stakeholders such as executive officials of fisheries cooperative associations, it is key to incorporate viewpoints of frontline workers and future generations through engaging fisheries workers who actually go out to the sea, especially younger fisheries workers who will be responsible for the future, in public and transparent discussions.

② Digitalization of the System

In order to reflect catch data necessary for stock assessments in fisheries management on a real-time basis, all the while reducing the burden of fishery managers and distributors to collect and submit data, digitalization of the system is es-

sential. Digitalization will also benefit fishery managers by enabling them to keep up with market developments and helping them to set marketing strategies for each area and each stock. Adjusting catch volume, formulating demand generation plans, and expanding sales channels based on catch data could lead to more profitable fisheries. Moreover, digitalizing traceability systems is expected to help curb illegal fisheries.

③ Building Mutual Trust between Fishery Managers and Scientists

Stock assessments are a purely scientific process. It is important to ensure independence of the stock assessment scientists from the interference of the government and special interest groups. However, data collection necessary to conduct stock assessments requires collaboration between fishery managers and scientists. To dispel fishery managers' distrust of scientists and to build mutual trust, a framework should be established to use scientific findings to improve business management of fishery managers. Through the implementation of IQ management, fishery managers will be able to stop competing for catches of harvesting immature fish, which leads to deterioration of stocks. They will be able to plan catches based on their own management strategy for the pursuit of profitability. Scientific information on stocks and environment will benefit fisheries more than ever.

④ Development of Sustainable Aquaculture

Wild fishery catch volume has been leveling off for the last 30 years, while aquaculture has contributed to an increase in seafood production. In Japan, aquaculture production only accounts for 20% of total seafood production. To increase the share of aquaculture products, the Revised Fisheries Act stipulates measures to facilitate expansion of the scale and new entries. In particular, Japan has a long history of algae farming. Algae farming came to attention in EU's F2F and "The Future of Food from the Sea," and is a promising field that would allow for Japan to contribute to international society. Collaboration among multi-stakeholders and promotion of digitalization are expected here, too.

⑤ International Cooperation

While fishery resources are finite, the sustainable increase of production is possible through proper management. Fishery stocks are transboundary and international cooperation is imperative for their management. East Asia is one of the areas where cooperation among governments still needs work. What is being called for is not competition for fishing grounds and catches, but rather the desire for collaborative management of stocks that would lead to healthy competition. To show the counterpart governments that our intent is genuine, we need to accomplish a sustainability-focused Green Recovery.

(Wakao Hanaoka)

2 Yokohama Blue Resource Project

1 Yokohama City's Efforts against Global Warming

Yokohama City has been undertaking efforts against global warming since the early 2010's with the Yokohama City Global Warming Management Implementation Plan. After the adoption of the Paris Agreement in December 2015 and approval of the National Global Warming Management Plan by the Japanese Cabinet in 2016, the city revised its plan and set a goal to achieve zero carbon by 2050 under its Zero Carbon Yokohama initiative. The Implementation Plan aims to reduce greenhouse gas emissions by 7% by FY2021 and by 30% by FY2030 from the 2013 level.

Yokohama City takes a progressive approach to global warming and showcases its efforts at home and abroad. The city is a member of international networks of cities actively addressing climate change, such as the Large Cities Climate Leadership Group (C40)⁵ and the Local Governments for Sustainability (ICLEI)⁶. It was also selected to be the only member in Asia by the Carbon Neutral Cities Alliance (CNCA)⁷ in 2015.

In December 2011, the city was selected as one of the "Future Cities," an initiative of the Japanese government to realize successful model cases to resolve common 21st century human issues such as the environment and aging. Under the initiative, the city has been working to create a positive cycle of the environ-

ment, the society and the economy and to realize a city "everybody wants to live in" and "everybody thrives in." One of the initiatives is the Yokohama Blue Carbon, an approach to mitigate global warming leveraging on ocean resources.



Figure 4-2-1 Logo of Zero Carbon Yokohama.

2 Yokohama Blue Carbon

Blue carbon is the term for carbon captured and sequestered by the world's ocean ecosystems. It was first used in the report, *Blue Carbon*, published by the United Nations Environment Programme in 2009. The term became widely known when the 2019 United Nations Climate Change Conference (COP25), held in Madrid, Spain, was designated as the "Blue COP," and the importance of the ocean as an integral part of the Earth's climate system was recognized for the first time in the *Decisions adopted by the Conference of the Parties*.

Yokohama City has approximately 140km of coastline. Since the opening of the Yokohama port, it has developed as a port town. Today, the city envisions to become the "Ocean City Yokohama," where the city evolves and thrives by leveraging its connection with the sea.

⁵ C40 is a network of the world's large cities established in 2005. Currently it connects 97 cities in the world to address climate change. Yokohama City and Tokyo participate from Japan.

⁶ ICLEI was established as the International Council for Local Environmental Initiatives in 1990. Currently called Local Governments for Sustainability, it is a global network of more than 1,750 local governments. From Japan, 21 local governments including Yokohama City participate.

⁷ CNCA was established in 2015 by 17 cities aiming to achieve 80% reduction of GHG emissions by 2050. Yokohama City is a founding member.

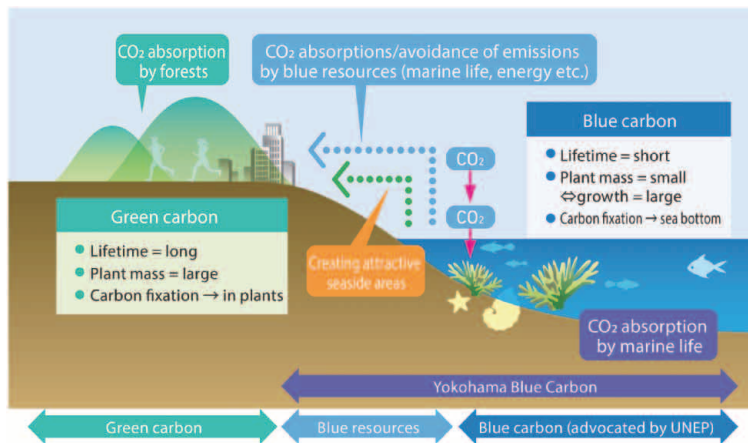


Figure 4-2-2 Yokohama Blue Carbon Project schematic

As a major port town, Yokohama City is now working on “the Yokohama Blue Carbon Project,” a climate action initiative leveraging ocean resources⁸. First, it initiated a project to demonstrate greenhouse gas (GHG) absorption and fixation by seaweed and sea algae and its effect on the marine environment in the Central Bay (currently Umi



Figure 4-2-3 “Green Kids” event held at Yokohama Hakkeijima Sea Paradise

Farm) at Yokohama Hakkeijima Sea Paradise amusement park in 2011. Shellfish and sea algae were cultured in the test farm and their effects on CO₂ emission and absorption were analyzed from the perspective of lifecycle carbon footprints. Based on the findings, the city developed and introduced its own carbon offset credit certification mechanism, the Yokohama Blue Carbon Offset System, in 2014.

The Yokohama Blue Carbon Offset System recognizes two kinds of credits: Blue Carbon credits and Blue Resource credits. Blue Carbon credits are certified for projects to increase CO₂ absorption and fixation by coastal ecosystems. Restoration of eelgrass bed projects and cultivation of kelp and wakame seaweed projects are certified for Blue Carbon credits in the Yokohama system. Blue Resource is a concept unique to Yokohama. Blue Resource credits are certified for projects to reduce CO₂ emissions by using ocean energy, effective use of energy in coastal areas, using seaweed and/or shellfish as food, and utilizing ocean biomass.

In carbon offsets, CO₂ emissions reduction and CO₂ absorption from projects are certified as credits. Companies and organizations which emit CO₂ by doing business or hosting events purchase carbon credits to offset the equivalent CO₂ emissions. The carbon credit certified projects use money from the offset purchase to fund their CO₂ emissions reduction projects. Thus, the scheme promotes reduction of CO₂ emissions as a whole.

8 Ocean Newsletter, No.443

Yokohama Blue Carbon credits are purchased to offset CO₂ emissions from events such as World Triathlon Series Yokohama. The money from the carbon offsets purchase is used to promote ocean-related climate change measures and environmental activities by the city.

The Yokohama Blue Carbon scheme not only helps to promote climate change mitigation measures with the money from credit sales, but also is expected to have various co-benefits, such as environmental benefits of cleaner water and biodiversity conservation, social benefits of improved social comfort and the brand equity of Yokohama, and economic benefits of increased resources and food supplies and an increase in tourists.

Through these initiatives, the city is working to make its ocean policy approachable for the residents.

3 Blue Resources Credits Certified by Yokohama City

- 1) CO₂ emissions reduction credits are certified for local production of wakame seaweed for local consumption. Consuming locally produced seaweed instead of seaweed transported from other regions eliminates CO₂ emissions otherwise emitted in transportation. It is popular among the city residents because eating locally produced wakame contributes to mitigation of climate change.
- 2) CO₂ emissions reduction credits are certified for using heat pumps that utilize seawater as a heat source as part of the air conditioning system of an amusement park. Its energy consumption is less than conventional systems, which results in credits.
- 3) Credits are certified for CO₂ emissions reduction by replacing conventional tugboats using heavy oil with LNG fuel tugboats
- 4) Credits are certified for CO₂ emissions reduction by replacing conventional tugboats which use heavy oil as fuel with hybrid tugboats. Using LNG or electricity reduces CO₂ emissions.

Inclusion of Blue Sources in credit certification made it possible to expand participation in carbon credits generation. Credit trading volume has also increased. It is expected that Blue Resource credit certifications will expand as well as Blue Carbon and it will help to further advance environmental activities in coastal regions.

4 Outcome and Outlook of Yokohama Blue Carbon

When the Yokohama Blue Carbon Offset System started in FY2014, the credit volume was too small to support robust trading. After Blue Resource credit certification was introduced and some outside local governments joined the Yokohama system, the volume of certified credits increased to 319.9t-CO₂ in FY2019. In the inaugural year, only one entity purchased credits. In FY2019, fourteen entities in-

cluding an individual purchased 120.3t-CO₂.

The purchased credits were mainly used to offset CO₂ emissions from events and business activities. Major events, such as the World Triathlon Series Yokohama, purchased credits. Companies of various types, such as construction, printing, and hospitality purchased credits in support of the Yokohama Blue Carbon initiative.

Yokohama Blue Carbon initiative is not widely known yet. The city will continue to host PR events to promote the initiative to increase participation of residents and businesses.

In addition to continuing credit certification of the existing projects, the city will seek new projects to certify Blue Carbon and Blue Resource credits. It is expected that increasing credit volumes to be traded will help to expand the scale of the Yokohama Blue Carbon initiative.

The Ministry of Land, Infrastructure and Transport recently established the “Council on Blue Carbon’s Contribution to Prevention of Global Warming,” and discussions have been held on what role Blue Carbon plays to achieve the national goal of GHG reduction. With the national policy development in mind, Yokohama City, as a forerunner of Blue Carbon initiatives, is looking to further address the issue in cooperation with other local governments.

(Shuji Okazaki)



5 Maritime Security and Safety

1 Maritime Security Environment Surrounding Japan

1 United States-China Standoff leading to a New Cold War Era

There has been debate on whether the tension between the two countries should be called a new cold war. Tensions between the United States and China have been heightened for some time. The conflict in Hong Kong and the Covid-19 pandemic have further aggravated the relationship. The current US-China strategic competition is not expected to be resolved easily. It will be the underlying factor affecting the national security environment surrounding Japan for a considerable period.

In Hong Kong a series of protests in response to the introduction of the Fugitive Offenders Amendment bill by the Hong Kong Special Administrative Region Government, which would allow extradition of suspects arrested in Hong Kong to mainland China, broke out from the middle of 2019. Carrie Lam, Chief Executive of Hong Kong, enforced a repressive crackdown over the movement with the support of Beijing. The protesters demanded resignation of Lam and the implementation of universal suffrage for the election of the chief executive, among others. The protests developed into the movement demanding freedom to protest against pressure from Beijing and for democracy. The November 2019 District Council election was a landslide win of the pro-democracy camp over the pro-Beijing camp. The United States clearly expressed its intention to support the pro-democracy camp and President Donald Trump signed the Hong Kong Human Rights and Democracy Act into law in November 2019.

The Chinese Communist Party expressed wariness over the move of the United States as a threat to its political system. The *People's Daily*, an official newspaper of the Chinese Communist Party, on the enactment of the Hong Kong Human Rights and Democracy Act, criticized that the “anti-Chinese forces in the United States” and the “radical elements in Hong Kong” colluded to disrupt Hong Kong and that the United States was plotting a “color revolution” in Hong Kong.¹ The Chinese Communist Party (CCP) promulgated the Hong Kong National Security Law to disempower the pro-democracy forces in Hong Kong, bypassing local legislation in July 2020. Since then, many prominent leaders and activists of the pro-democracy forces were arrested, thus containing criticisms against the CCP. The ideological conflict between the United States and China came into the open over the Hong Kong issue.

The outbreak of Covid-19 in Wuhan, China in January 2020, which eventually caused the global pandemic, accelerated conflicts between the two countries. Dur-

¹ *People's Daily*, December 3, 2019.

ing the early stages of the outbreak, Wuhan city officials covered up the spread of the infectious disease. The Chinese government first refused the international investigation to study the origin of the virus that caused Covid-19. The United States and other countries blamed China for causing the Covid-19 pandemic. The Trump Administration

claimed that the excessive control and secretive nature of the CCP led to the failure of containment of Covid-19 in China and criticized the authoritarian regime. The Xi Jinping Administration responded strongly against the United States for shifting the blame to China for its own failure to contain the virus. The Xi Jinping Administration also highlighted China's achievement in successful containment of Covid-19 and securing an economic recovery, and trumpeted the superiority of socialism under the CCP. The pandemic has heightened the conflict between the United States and China political regimes and increased mutual distrust.

China also disrupted relations with friends and allies of the United States. In April 2020, when Scott Morrison, Prime Minister of Australia, called for international investigation into the origin of Covid-19 in Wuhan, China pushed back and exerted economic pressure on Australia. It imposed a partial import ban of beef from Australia, put punitive duties on barley imports, and warned its citizens against visiting Australia. China also has entered into a border conflict with India. Chinese and Indian troops engaged in skirmishes in the Galwan river valley along the Sino-Indian border in June 2020, which resulted in the death of 20 Indian soldiers and four Chinese. They engaged in a face-off again near the Pangong Lake further south in August 2020. Both China and India have built up their forces in the area and remain at a military standoff.

While China increases antagonism toward the United States and applies pressure on Australia and India, the United States, Japan, Australia, and India conducted a multilateral military exercise, MALABAR 2020, in the offshore east coast of India and in the Arabian Sea in November 2020. The Quadrilateral Security Foreign Ministerial Dialogue between the United States, Japan, Australia and India was held in Tokyo in October 2020. The partnership of the four countries (Quad) for maintaining and strengthening a "free and open Indo-Pacific" is making progress.



Figure 5-1-1 Joint Exercise MALABAR 2020
(Source : The Ministry of Defense of Japan)

2 Increased Threat of China in East Asian Waters

The presidential election was held in Taiwan in January 2020 and Tsai Ing-wen of the Democratic Progressive Party, who refused to accept the “one country, two systems” formula Beijing demands, won re-election by a landslide, defeating Han Kuo-yu of Kuomintang, who proposed improved ties with Beijing. In her inaugural address in May 2020, President Tsai Ing-wen said that the country would not accept “one country, two systems” and that they “stand fast by this principle,” expressing her resolution to resist the pressure from Beijing. At the same time, she expressed her intent to establish peaceful and stable relations with Beijing on the principle of “peace, parity, democracy, and dialogue.” President Tsai also expressed her policy to continue efforts to participate in international and regional organizations, and to strengthen partnerships with the United States, Japan, Europe and other like-minded countries.

As US-China relations deteriorate, the Trump Administration moved to strengthen ties with Taiwan. The TAIPEI Act² was passed both by the Senate and the House and President Trump signed it into law in March 2020. The act requires the U.S. government to advocate for Taiwan’s membership or observer status in international organizations, to have government high officials visit Taiwan, and to continue sales of arms to Taiwan. China opposed granting Taiwan observer status at the World Health Organization (WHO) World Health Assembly held in May 2020, while the United States strongly advocated for Taiwan’s participation. In August 2020, the United States Health and Human Services Secretary Alex Azar visited Taiwan as the highest U.S. government official since the severance of diplomatic relations in 1979. In September 2020, the United States Under Secretary of State for Economic Growth, Energy, and the Environment Keith Krach visited Taiwan to meet President Tsai Ing-wen and attended the farewell service of Lee Teng-hui, former president of Taiwan, who passed away in July. The Trump Administration announced arms sales to Taiwan six times in 2020, including torpedoes, air-to-surface missiles, and surface-to-ship missiles. The United States also sent a Navy ship through Taiwan Strait nearly every month as a warning to China.

China, on the other hand, has increased its military presence to pressure the Tsai Ing-wen Administration, which refuses the demands of the CCP, and to warn the United States, which is moving closer to Taiwan. China held a symposium in May 2020 to mark the 15th anniversary of the enactment of the Anti-Secession Law, which provides legal grounds for the exercise of force against Taiwan. At the symposium, Li Zhanshu, Chairman of the Standing Committee of the National People’s Congress of China, praised the law’s deterrent effects on Taiwan Independence forces and voiced firm opposition to “foreign interference” in Taiwan-related issues and hinted at the possibility of the use of force against them. The Chinese military flew an increased number of military aircraft around Taiwan. Chinese fighter jets repeatedly entered into the air zone of Taiwan across the median

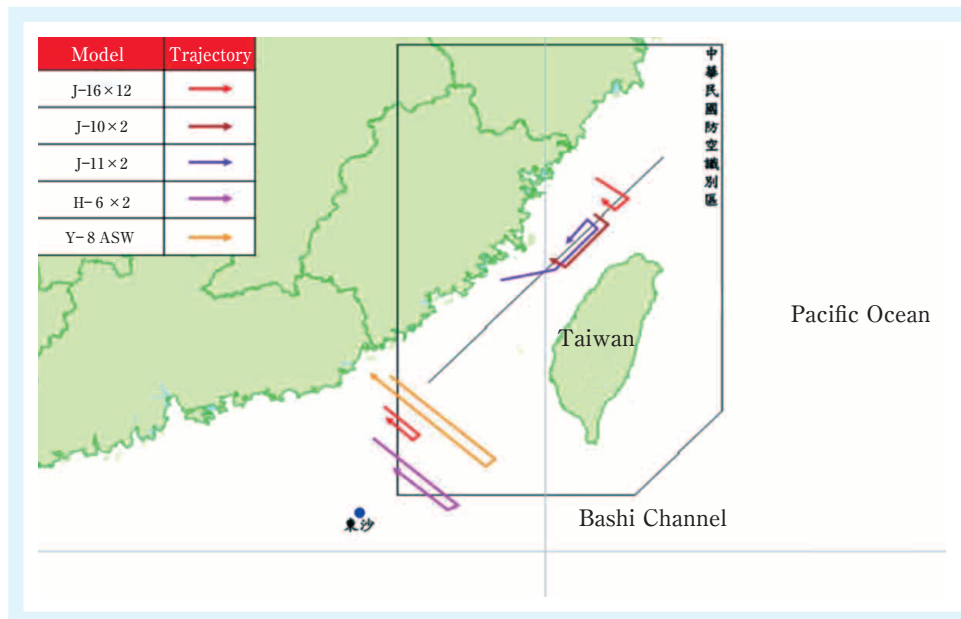


Figure 5-1-2 Flight patterns of Chinese military aircraft around Taiwan (September 19, 2020)

(Source: "Activities of the Chinese Communist Party's People's Liberation Army Crossing the Middle Line of the Strait and Entering the Airspace of Southwest China," Republic of China Air Force, September 19, 2020, modified by the author)

line down the Taiwan Strait, which is historically considered as their maritime border. Chinese bombers and patrol aircraft also flew into Taiwan's southwestern air defense identification zone.³ It is believed that China is expanding its offensive capability against surface warships and submarines of Taiwan and the United States in international waters between the Bashi Channel and Pratas Island. In December 2020, the carrier strike group led by *Shandong*, China's first domestically built aircraft carrier, sailed south from the East China Sea through the Taiwan Strait to Hainan Island.

China has also increased the intensity of its efforts to secure and expand maritime interests in the South China Sea. The Chinese government created Sansha City as an administrative unit to cover the entire area of the South China Sea in 2012. In April 2020, China established two new districts in Sansha City: Xisha District to manage the Paracel Islands and Nansha District to manage the Spratly Islands. It is believed that China is extending its governance over both islands by establishing the new districts. The China Coast Guard (CCG), the maritime law enforcement force of China, has also intensified moves to demonstrate China's maritime claims in the South China Sea. In April 2020, a CCG vessel collided with a Vietnam fishing vessel, which subsequently sank, in the vicinity of the Paracel Islands. The Chinese government claimed that the Vietnamese fishing boat illegally entered the area to fish and made dangerous maneuvers to flee from the Chinese patrol ship, ending up ramming into it. Also, in April CCG patrol vessels obstructed offshore a drilling operation a Malaysian company was conducting in the vicinity of the Spratly Islands.

The CCG is strengthening its coordination with Chinese Navy. They conducted a joint exercise at Woody Island in the Paracel Islands in July 2020. In addition

³ Ministry of National Defense R.O.C., "The Air Force Command Headquarters issued a press release regarding the media coverage '2 IDF fighter jets surrounded by the Chinese jets yesterday,'" September 20, 2020.

⁴ "China Launches Naval Exercise in South China Sea," Radio Free Asia, July 1, 2020. <https://www.rfa.org/english/news/china/exercise-southchinasea-07012020194330.html>

to a handful of CCG patrol vessels, navy ships including a Type 071 amphibious transport ship participated. It is believed that CCG troops, supported by the navy, showcased its ability to land on the island and subdue civilian unrest.⁴ The CCG was incorporated into the People's Armed Police in 2018 and the joint exercise illustrates strengthening of its ties with the navy. The People's Armed Police Law, revised in June 2020, stipulates that "to protect rights and enforce laws at sea" is a new duty of the People's Armed Police. In peace time the People's Armed Police Force participates jointly with the People's Liberation Army (PLA) in non-combat military operations such as emergency rescue, and conducts joint training exercises; in wartime the People's Armed Police assumes defense operation missions under the command of the Central Military Commission. China's new Coast Guard Law, enacted in January 2021, authorizes the CCG to remove structures installed on islands under the jurisdiction of China by foreign organizations and individuals and to use weapons against terrorism and major violent incidents. The recent CCG's military exercises and China's legislative activities suggest that the country is expanding the CCG's scope of operation for securing its interests from the maritime domain to land areas of islands over which China claims territorial rights.

The CCG also has been putting mounting pressure in the East China Sea over the Senkaku Islands which are Japan's sovereign territory. Since September 2012, China has been strengthening its presence in the area. Chinese government vessels have repeatedly intruded into Japan's territorial waters around the Senkaku Islands and sailed through Japan's contiguous zone. The number of Chinese government vessels intruding into Japan's territorial waters have been around 100 a year. Recently it is often the case that a group of four Chinese government vessels intrudes about three times a month. The number of Chinese government vessels entering Japan's contiguous zone has been increasing for several years. Since 2019, there have been cases of Chinese government vessels remaining inside Japan's contiguous zone for an extended period. In 2020, the number of days Chinese government vessels operated inside Japan's contiguous zone reached a record high of 333. The almost constant presence of Chinese government vessels just a stone's throw away from the territorial waters of Japan became a reality.

Furthermore, Chinese government vessels have been challenging Japanese sovereignty by making moves suggesting it intended to exercise its jurisdiction within Japanese territorial waters. In May 2020, Chinese government vessels pursued a Japanese fishing boat operating in Japanese territorial waters around the Senkaku Islands. Japanese Coast Guard patrol vessels intercepted to protect the fishing boat. Again, in July, October and December 2020, Chinese government vessels attempted to approach Japanese fishing boats in Japan's territorial waters. A spokesperson of the Ministry of Foreign Affairs of China said, "China Coast Guard followed and monitored this ship in accordance with law and demanded it immediately leave China's waters," and claimed the Chinese government vessels acted from a law enforcement stance. When Chinese State Councilor and Foreign Minister, Wang Yi visited Japan in November 2020, he said, "The fact is that some

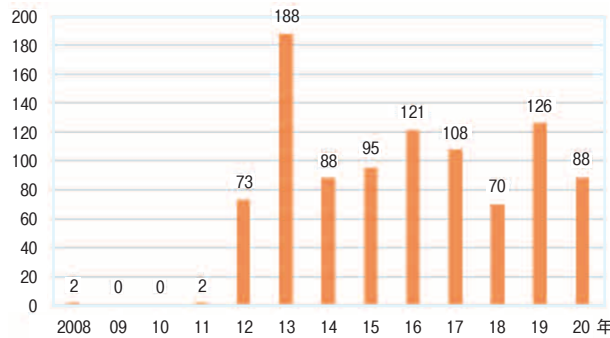


Figure 5-1-3 The number of Chinese government vessels entered Japan's territorial waters around the Senkaku Islands
(Source : Created by the author using data released by Japan Coast Guard)

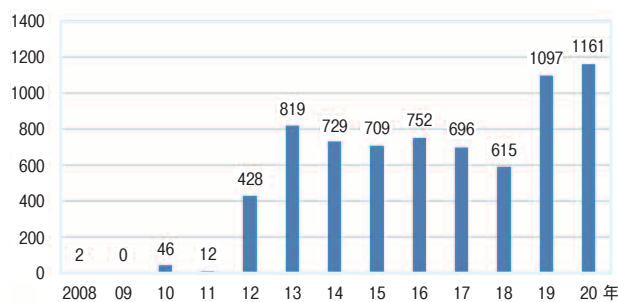
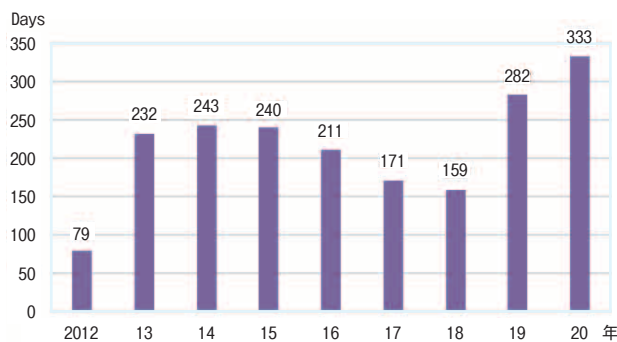


Figure 5-1-4 The number of Chinese government vessels entered Japan's contiguous zone off the Senkaku Islands.
(Source : Created by the author using data released by Japan Coast Guard)



(Note : Days in 2012 are only after September 14.)

Figure 5-1-5 Days of intrusion of Chinese government vessels into Japan's contiguous zone off the Senkaku Islands.
(Source : Created by the author using data released by Japan Coast Guard)

Japanese fishing boats of unknown origin have repeatedly entered the sensitive waters off the Diaoyu Islands, and China has to make necessary responses.” He said, “On this issue, China’s position is clear,” adding that “the Chinese side will continue to firmly safeguard its sovereignty.” Those remarks reveal China’s intent to challenge Japan’s sovereignty, by building up its presence around the Senkaku Islands with government vessels as well as by showing the world they enforced Chinese law using government vessels.

3 Chinese Military Strengthen Confrontational Postures against the U.S. Military

As China intensified confrontation with the US, it also made more aggressive moves against the United States on a military front. From January to February 2020, a fleet of four navy vessels including a destroyer and a frigate under the PLA Southern Theater Command conducted a far sea exercise deep into the Pacific Ocean. The fleet sailed from the South China Sea, through the Bashi Channel into the Pacific Ocean. The Chinese fleet approached an area 300km west of Hawaii, where the United States Indo-Pacific Command is headquartered, and then sailed through waters near Guam, then through the Sulu Sea of the Philippines, and back to the South China Sea. When they were in waters near Guam, the Chinese destroyer intercepted a U.S. patrol aircraft. The U.S. Pacific Fleet reported that a U.S. P-8A maritime patrol aircraft was lasered by a Chinese navy destroyer in airspace above waters approximately 380 miles west of Guam on February 17, 2020. The U.S. Navy issued a statement criticizing the Chinese navy destroyer's actions as "unsafe and unprofessional."⁵ A spokesperson of the Ministry of National Defense of China claimed that the U.S. P-8A patrol aircraft approached the Chinese fleet conducting a routine exercise on the high seas and conducted low altitude reconnaissance for a long period, posing a serious threat to the safety of ships and personnel. The spokesperson argued against the U.S. criticism by saying the actions of the U.S. aircraft were "unfriendly in intention and unprofessional in operation."⁶ The PLA asserted its far seas operation capabilities by deploying a navy fleet off the coast of Hawaii and indicated its strong intention to constrain movements of U.S. forces in the Western Pacific by intercepting the U.S. reconnaissance aircraft scouting the Chinese navy vessel.

Furthermore, the PLA made a move to show its intent and capability to block U.S. military operations in the seas near China. In August 2020, China launched anti-ship ballistic missiles (ASBMs) into the South China Sea. An ASBM activates the warhead at the last stage to search for the current location of a moving large target such as an aircraft carrier, allowing a precision attack from a long distance. China deploys ASBMs: DF-21D (a range of 1,500km) and DF-26 (a range of 4,000 km), colloquially called "carrier killers," and the United States is highly concerned about them. The DF-26 was fired from Qinghai province, while the DF-21D was launched from Zhejiang to the area north of the Paracel Islands in the South China Sea.⁷ Admiral Philip S. Davidson, Commander of the U.S. Indo-Pacific Command, affirmed that the missile hit a moving target vessel.⁸ It is believed that the PLA has been consistently improving the capability of ASBMs. They are becoming threats that could constrain the free movements of US Forces in the South China Sea, the East China Sea, and even in the Western Pacific.

(Masafumi Iida)

⁵ U.S. Pacific Fleet Public Affairs, "People's Liberation Army Navy lased a U. S. Navy P-8A in unsafe, unprofessional manner," February 27, 2020.

⁶ "国防部发言人就美炒作'激光照射'答记者问," 新华网, March 6, 2020.

⁷ *Yomiuri Shinbun*, April 28, 2020 and "Chinese Military Fires 'Aircraft-carrier Killer' Missile into South China Sea in 'Warning to the United States,'" *South China Morning Post*, August 26, 2020.

⁸ Josh Rogin, "Opinion: China's military expansion will test the Biden administration," *Washington Post*, December 4, 2020.

2 Oil Spill from a Japanese-Owned Ship off the Coast of Mauritius

On July 25, 2020, the bulk carrier MV *Wakashio*, owned by Okiyo Maritime Corp., a subsidiary of Nagashiki Shipping Co., Ltd., and chartered by Mitsui O.S.K. Lines (MOL), ran aground off the coast of Mauritius. The ship leaked bunker oil which polluted the coast of Mauritius. This section summarizes the development of the grounding incident, responses by Mauritius and other countries, and responses of the shipowner and parties involved.

1 The *Wakashio* and the Grounding Incident

The *Wakashio* left Lianyungang, China on July 3, 2020, bound for Tubarão, Brazil via the Strait of Malacca and around the Cape of Good Hope.

The vessel sailed through the strait of Malacca, and was sailing in the Indian Ocean. On July 23, its passage plan was altered to reduce the distance from the coast of Mauritius from 22 nautical miles (nm) to 5 nm, and on the day of the grounding, July 25, there was a further attempt to reduce the distance from the coast from 5 nm to 2 nm to get within the communication range of mobile phones. It did not use a proper nautical chart with sufficient scale to confirm the accurate distance from the coast and water depth. In addition, crew members failed to maintain appropriate watch-keeping visually and by radar, even though the vessel was to sail so close to the coast. As a result, the ship ran aground in shallow waters 10 meters deep, 0.9 nm off the coast of Mauritius⁹. According to the IHI Jet Service Co., Ltd., a satellite AIS data provider, other vessels with LOA (length overall) of 200 meters and over sailing off Mauritius at the same period kept a distance of about 10 nm from the coast.

On July 26, the day after the grounding, the Mauritius National Oil Spill Contingency Plan was activated. Oil booms were deployed, and the water quality was tested. The vessel's attempt to refloat was hindered by inclement weather. At first, no oil spill was detected on the ocean surface due to the grounding. However, continuous high waves damaged the vessel's hull and the starboard side bunker tank was breached, causing fuel oil to begin leaking¹⁰.

Oil remaining onboard, including lubricant oil and residual oil, was recovered and transferred, and spilled oil was collected. However, on August 15 the vessel split in two¹¹. The forward half of the vessel was towed to a designated location and sunk¹². A team of salvage experts was hired to safely remove the stern part



Figure 5-2-1 The bulk carrier, the *Wakashio*, grounded and spilling fuel oil.
(Source : IMO)

⁹ <https://www.mol.co.jp/en/pr/2020/20090.html>

¹⁰ <https://www.mol.co.jp/en/pr/2020/20042.html>

¹¹ <https://www.mol.co.jp/en/pr/2020/20045.html>

¹² <https://www.mol.co.jp/en/pr/2020/20049.html>

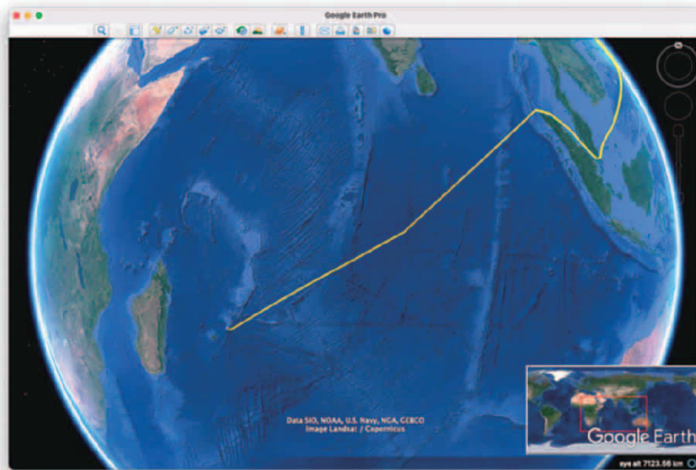


Figure 5-2-2 Google earth image with superimposed trajectory
(Source : image by Google Earth, track by exactEarth Satellite AIS)

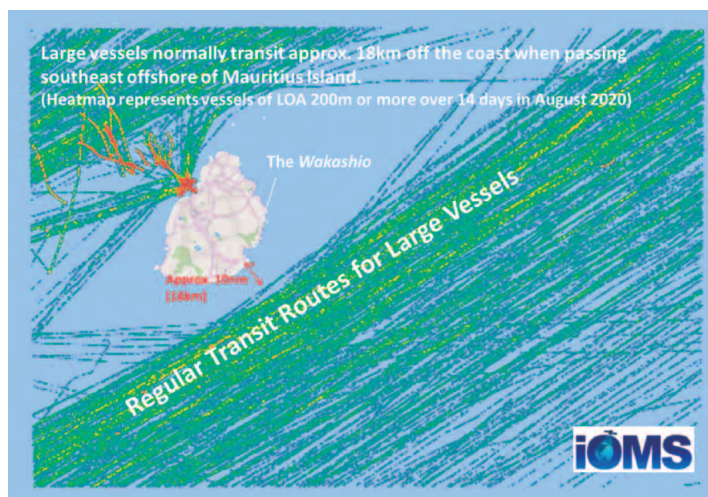


Figure 5-2-3 Image analysis by IHI Jet Service Co., Ltd.
Normal shipping routes are 10km or more away from the shore.
(Source : IHI Jet Service Co., Ltd.)

¹³ <https://www.mol.co.jp/en/pr/2020/20050.html>

of the hull¹³.

It is probable that the investigation is still under way, since no official incident investigation report on the causes has been released as of December 2020. However, Nagashiki Shipping Co., Ltd. and MOL posted probable causes of the incident on their homepages.

2 Responses of the Government of Mauritius

The government of Mauritius activated the National Oil Spill Contingency Plan on July 26, the next day of the grounding incident. They declared a state of environmental emergency on August 6, when the oil began to spill, and requested international assistance. On August 7, the government started to share information on the *Wakashio* incident on Facebook¹⁴ and asked for volunteers to assist in disasters.

¹⁴ <https://www.facebook.com/MobilisationNationaleWakashio/>

The Captain and Chief Officer of the *Wakashio* were arrested by local authorities on suspicions of “endangering safe navigation” on August 18¹⁵. The Mauritian government started the process to request compensation for the oil spill damages on August 20.

3 International Responses

France, whose overseas territory of Réunion lies close to Mauritius, sent the Minister for Overseas Territories to Mauritius on August 16 and deployed oil spill response experts¹⁶. India sent an air force aircraft with oil spill cleanup equipment and a technical response team¹⁷. Panama, the flag state of the *Wakashio*, sent a team of experts to investigate the incident¹⁸.

The International Disaster Charter, established in 2000 as a framework to internationally share data from earth observation satellites at the time of disasters, was activated by the United Nations Institute for Training and Research (UNITAR) to identify the scope of the oil spill by satellite images. Delineation maps¹⁹ were created based on the satellite images²⁰ provided by member countries.

On August 10, Japan sent the first international disaster relief team (JDR team), including members from Japan Coast Guard National Strike Team²¹. The team arrived at Mauritius on August 11 and supported oil spill cleanup operations²². To assess environmental damage after the spill cleanup, the second team, including experts from the Ministry of the Environment, was sent on August 19²³, and the third team was sent on September 2²⁴. Japan also sent the investigative team of the Transportation Safety Board to Mauritius²⁵, with the agreement of Mauritius (the coastal state) and Panama (the flag state), since they have the primary authority to investigate the incident. The Japan International Cooperation Agency (JICA) dispatched a survey mission to Mauritius from October 24 for mid-to-long-term

15 <https://www.mol.co.jp/en/pr/2020/20046.html>

16 <https://govmu.org/EN/Pages/NewsDetails.aspx?n=MV-Wakashio-French-Minister-Lecornu-meets-the-Prime-Minister.aspx>

17 <https://govmu.org/EN/Pages/NewsDetails.aspx?n=India-assists-Mauritius-in-dealing-with-marine-environmental-emergency.aspx>

18 <https://amp.gob.pa/nota-s-de-prensa/delegacion-panamena-de-expertos-en-accidentes-maritimos-asiste-en-investigaciones-sobre-el-accidente-de-la-embarcacion-wakashio-en-isla-mauricio/>

19 <https://disasterscharter.org/web/guest/activations/-/article/oil-spill-in-mauritius-activation-666>

20 Sentinel-2, terraSAR-X, ALOS-2, GeoEye-1, WorldView-2/3, etc.

21 <https://www.kaiho.mlit.go.jp/info/kouhou/r2/k200809/k200809.pdf>

22 <https://www.kaiho.mlit.go.jp/info/kouhou/r2/k200821/k200821.pdf>

23 <http://www.env.go.jp/press/108340.html>

24 <http://www.env.go.jp/press/108393.html>

25 <https://www.mlit.go.jp/report/interview/daijin200918.html>

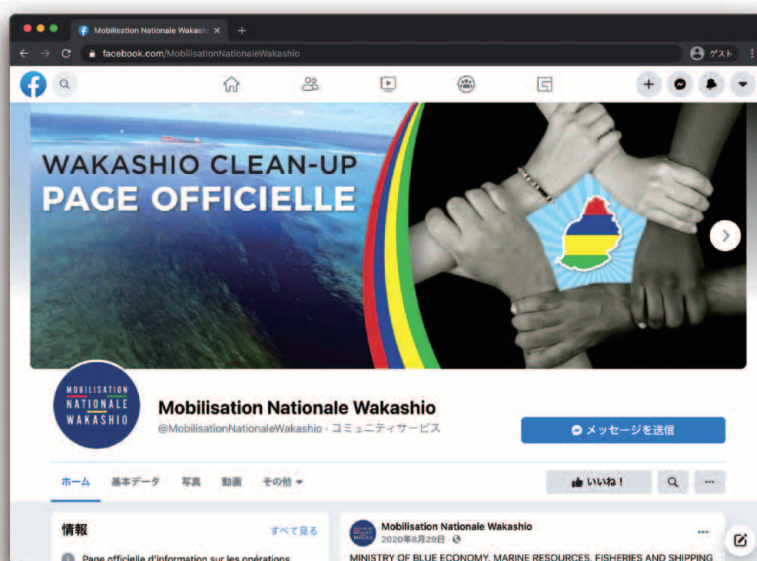


Figure 5-2-4 Website for Mobilisation Nationale Wakashio

²⁶ https://www.mofa.go.jp/mofaj/press/release/press4_008902.html

support²⁶. Moreover, embassies of various countries, including Japan, and foreign companies in Mauritius volunteered for disaster relief.

4 Responses from the Ship Owner and the Charterer

Okiyo Maritime Corp. owns the *Wakashio* and is liable for the damage caused by the grounding. Neither the government nor MOL, the charterer of the vessel, is legally responsible for compensation.

Since the vessel was a “non-tanker”, or not carrying cargo oil, international codes on liability and compensation for oil pollution from tankers, such as the International Convention on Civil Liability for Oil Pollution Damage (CLC), the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND), and the International Oil Pollution Compensation Funds (IOPCF), do not apply to this incident. Instead, the incident is covered by the International Convention on Civil Liability for Bunker Oil Pollution Damage (Bunker Convention). The Bunker Convention requires the owner of a vessel to maintain compulsory insurance coverage and allows a claim for compensation for oil pollution damage to be brought against an insurer. The Convention on Limitation of Liability for Maritime Claims (LLMC) sets a ceiling on compensation liability, and the ship owner and the insurer are not held responsible for the compensation exceeding the limit. Based on the gross tonnage of the vessel, the limits under the LLMC1976 which Mauritius ratified would be set at about USD 18 million, and the limits under the LLMC1995 which Japan ratified would be set at about USD 65 million. Further wait to see the court decision on the claim for damages is necessary²⁷. Panama, the flag state of the *Wakashio*, has not ratified the LLMC.

After the grounding incident, when the oil began leaking, MOL and Nagashiki Shipping Co., Ltd., the shipowner, issued press releases about the grounding and oil spill incident on August 7 and 8. Nagashiki Shipping Co., Ltd. then issued a series of press releases to report the progress, announcing that they were taking necessary measures as the shipowner²⁸.

MOL issued press releases²⁹ in concert with Nagashiki Shipping Co., Ltd., reporting the progress as well as information on dispatch of personnel and provision of supplies.

MOL announced that it would undertake the task of environmental recovery and support local communities. MOL established the Mauritius Environmental Recovery and Social Contribution Team within its corporate planning department on September 1, which specialized in public relations with Mauritian authorities and local communities regarding environmental recovery and social contribution.

On September 11, MOL announced its plan to contribute a fund of about JPY 1 billion to implement projects to protect and restore the natural environment, make donations to local NGOs, continue to dispatch MOL employees to the site, donate a refrigerated container (reefer) to support the local fisheries, and plan a cruise trip

²⁷ https://www.spf.org/global-data/opri/perspectives/persp_011_2020_fujii-higuch.pdf

²⁸ A series of 10 press releases were issued on August 10, 11, 13, 16, 18, 19, 21, 25, November 5, and December 28, 2020.

²⁹ A series of 7 press releases were issued on August 7, 11, 13, 16, 19, 21, and 25, 2020.

to Mauritius by a Mitsui O.S.K. Passenger Line Ltd.'s cruise vessel to contribute to the Mauritian tourism industry. MOL also established the Mauritius Representative Office in October³⁰. Since then, it has been periodically renewing the web page, "MOL's Action towards the *Wakashio* Incident (Environmental Recovery and Social Contribution)," to report its activities in Mauritius³¹.

As discussed before, MOL is not legally responsible for compensation for the damage. However, from the ESG (environmental, social, and governance) viewpoint, MOL's commitment could be a model case for future non-tanker incidents³².

5 Towards Environmental Recovery

As Mauritius is a biodiversity hotspot with coral reefs and mangroves, there is concern over the damage inflicted on these coastal ecosystems. Experts point out the necessity of mid-to-long-term environmental monitoring for the environmental recovery of reefs and ecosystems³³.

The Japanese government sent environmental experts to the spill site as members of the second and the third disaster relief team. The team conducted environmental assessments of mangroves, proposed measures for oil cleanup, assessed the condition of coral reefs, proposed methodologies for implementing the surveys of mangroves, coral reefs, wild fauna and flora, water quality, and bottom sediments, and assisted with their implementation³⁴.

For environmental monitoring to be effective, it must be conducted with methods appropriate to the actual conditions. It could also be necessary to provide monitoring equipment and training for personnel. It is expected that progress of the environmental recovery would be properly monitored by the Mauritian government, universities, and NGOs, with the cooperation of other countries including Japan as needed.

6 Safe and Reliable Shipping

While no official incident reports on the grounding of the *Wakashio* has been released as of December 2020, implementation of the following measures are recommended in order to prevent future incidents.

- 1) Facilitation of crew changes during the COVID-19 pandemic
- 2) High-speed and affordable internet access for the crew
- 3) Access to detailed nautical charts or electronic marine charts
- 4) Appropriate watchkeeping
- 5) Improvement of vessel movement awareness and alert systems
- 6) System for rapid initial responses for pollution
- 7) Establishment of restricted and controlled areas for vessel navigation

According to the *White Paper on Traffic Safety in Japan 2020*, published by the Cabinet Office, 73% of accidents at sea were caused by human errors³⁵. It other

30 <https://www.mol.co.jp/en/pr/2020/20053.html>

31 <https://www.mol.co.jp/en/sustainability/incident/index.html>

32 <https://www.nikkei.com/article/DGXMZO63762930R10C20A9EA1000>

33 https://www.spf.org/global-data/opri/perspectives/persp_013_2020_toyoshima.pdf

34 <http://www.env.go.jp/press/108480.html>

35 https://www8.cao.go.jp/koutu/taisaku/r02kou_haku/english/pdf/wp2020.pdf

words, human factors are still essential to ship operations.

Today, countries including Japan are competing for practical application of maritime autonomous surface ships (MASS). In Japan, The Nippon Foundation supports and funds autonomous ship demonstration trials through the Technological Development Grant Program. It is expected that the future of shipping will be safer and more reliable through elimination of human factors, a major cause of accidents at sea, or through shifting from operations that are highly human-dependent to those with appropriate human assistance.

(Takeshi Mizunari)

3 Ten Year Anniversary of the Great East Japan Earthquake

1 The Catastrophe Caused by the Mega-Tsunami and a Study on It

A decade has passed since the Great East Japan Earthquake of March 11, 2011. More than 22,000 are dead or missing³⁶. It was the third largest disaster in Japan since the beginning of the Meiji period (1868), after the Great Kanto earthquake (1923) and the Meiji Sanriku Tsunami (1896). In addition, the Fukushima Daiichi Nuclear Power Plant of the Tokyo Electric Power Company (TEPCO) caused a series of accidents that led to core meltdowns. In some areas in Fukushima prefecture, residents of nearby communities were ordered to evacuate, and restricted areas were designated. Although decontamination operations have progressed and the restrictions have been eased, there are still off-limit areas and the recovery and reconstruction are still under the way. In this section, I discuss direct damages by the mega-tsunami (hereafter referred to as the 2011 Tohoku Tsunami), a major threat from the oceans which jeopardized society, disaster prevention measures based on lessons learned, and various measures implemented after the disaster.

The 2011 Tohoku Tsunami struck such a widespread area along Japan's eastern Pacific coast that a tsunami warning was at one point issued for all coastal areas in Japan. The tsunami was entrapped in the shallow area, that is, part of the tsunami's energy reflected back to the open ocean traveled back to other shores, so the warning remained in effect for more than 24 hours.

After the earthquake and tsunami off southwestern Hokkaido of 1993, tsunami forecasts and disaster warnings included information on the expected height of each tsunami and its expected arrival time. At the time of the 2011 Tohoku Tsunami, the expected height was revised upward multiple times within an hour of the earthquake. The size of the earthquake was so massive that it took a fair amount of time to arrive at a precise estimate. The initial low estimate of the expected height of the tsunami in the warning could have contributed to the de-

³⁶ The number includes people who died of shock and stress related problems after the earthquake

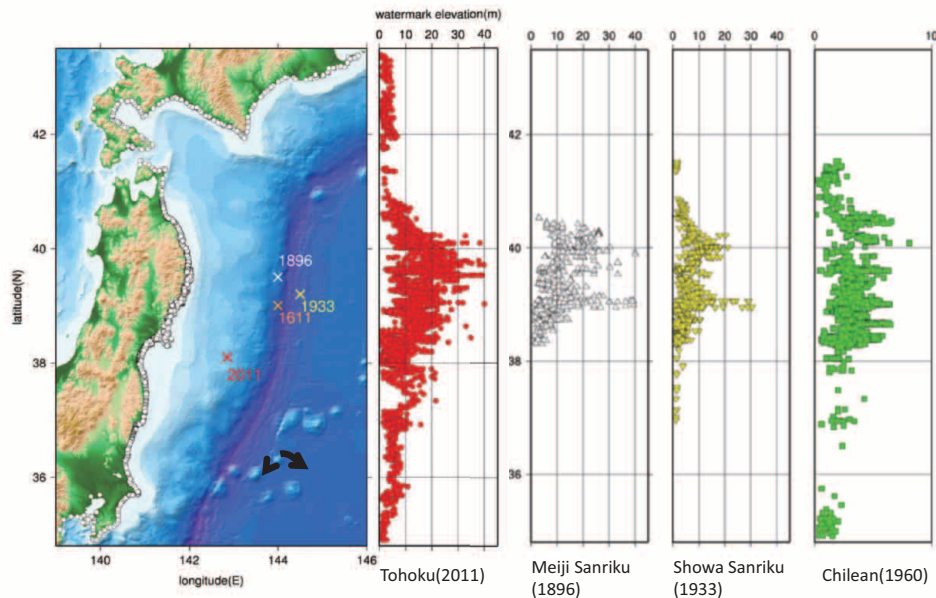


Figure 5-3-1 Maximum inundation heights of 2011 Tohoku Tsunami

layed evacuations. Discussions were held on proper ways to warn against a major tsunami in forecasts and warnings in the future. The phrasing of tsunami warnings caused by major earthquakes has been changed to notify only the expected arrival of a major tsunami without identifying expected height so that people will evacuate as soon as possible.

It is important to accurately measure tsunami height at various impact points for prompt recovery and rebuilding. However, a very limited number of water-level indicators and surveillance cameras had been installed to monitor the tsunami. The behavior of the tsunami and the extent of damage could only be figured out from field surveys of watermarks and left behind debris. Watermarks in the field quickly fade with the passage of time and immediate surveys are necessary. As the 2011 Tohoku Tsunami's inundation zone was extremely widespread, it was difficult to get a whole picture of the damage based on voluntary surveys by individuals. It was necessary to establish a framework for collective study based on data accumulation in a uniform format with common measurement methods. Multiple academic societies got together on the day after the tsunami and set a venue where information could be shared, making effective study and real-time information sharing possible. While logistics were severely disrupted in the aftermath of the earthquake, joint research groups conducted surveys, paying attention to information on aftershocks and the nuclear power plant accident. Top priority was placed on not interfering with relief operations. Autonomous surveys were conducted by the field survey teams and the logistic support team, which handled survey permit application, data management, and website administration, sharing the objectives of understanding behaviors of the tsunami and the extent of damages. The survey data was promptly released on the internet as preliminary figures and played an important role as basic information for relief, restoration, and reconstruction activities³⁷.

The joint survey group completed its mission in February 2012 when it finished

³⁷ <https://coastal.jp/ttjt/>

the survey in the evacuation zone set around the Fukushima Daiichi Nuclear Power Plant. Figure 5-3-1 shows the high watermarks of major tsunamis. It illustrates that the run-up height of the 2011 Tohoku Tsunami was about 40 m and that it was larger in scale and affected wider areas than other major tsunami incidents of which scientific records were kept: the Meiji Sanriku Tsunami (1896), the Showa Sanriku Tsunami (1933), and the Chile Earthquake Tsunami (1960). The only recorded tsunami incident affecting such a widespread area south to Sendai Bay, including Fukushima prefecture, was the 869 Jogan Tsunami, whose characteristics are still being researched through analysis of the tsunami deposit. It is likely that the 2011 Tohoku Tsunami was a massive tsunami of extremely infrequent occurrence.

2 Tsunami Countermeasures based on 2 Tier Tsunami Scale

Most of the coastal areas struck by the 2011 Tohoku Tsunami had implemented tsunami countermeasures based on the lessons learned in the past, such as offshore and onshore tsunami barriers. However, except in certain areas in northern Iwate prefecture such as Fudai village, the tsunami waves went over the coastal protection infrastructures and flooded the land. Many breakwaters and seawalls were reported destroyed during tsunami inundation.



Figure 5-3-2 Damage to the coastal levee and the residential area (Touni, Kamaishi City, Iwate Prefecture)

Surveys and studies were conducted in each region, and destruction mechanisms of coastal levees and seawalls and their relationship with damage to the protected areas are now understood. For example, at the Nakoso coast in Iwaki City, Fukushima prefecture, many cases were reported that when tsunamis overflowed 1 to 2 meters over dikes breaching occurred. It was also reported that breaching of levees caused significantly worse damage in the protected areas. Based on these findings, preventive measures were discussed in the Central Disaster Management Council and academic societies. For mega tsunamis against which levees are not effective, as in the case of 2011 Tohoku Tsunami, it was recommended to aggressively implement comprehensive measures, including relocation of residential areas to higher ground and rapid evacuation.

To develop comprehensive Tsunami countermeasures, two tsunami levels were set as a parameter for designing coastal protection. Coastal protection structures such as breakwaters and seawalls are designed to withstand “Level 1,” a potential tsunami level with a recurrence interval of from several decades to 150 years.

“Level 2” is the largest-possible tsunami level of a 1000 year recurrence interval, used for disaster management policy measures such as urban planning and evacuation planning policy. As discussed earlier, the 2011 Tohoku Tsunami was a “Level 2” tsunami, which is called an extreme event.

Run-up heights of tsunamis vary depending on the size of earthquake, fault characteristics, and seabed topography. Tsunami protection should include comprehensive disaster countermeasures incorporating both coastal structural protections such as seawalls and coastal land use restriction, and rapid evacuation planning with the assumption of overtopping. Before the 2011 East Japan Earthquake, the importance of comprehensive tsunami countermeasures was recognized and “hard” measures such as construction of seawalls and “soft” measures such as land use control and rapid evacuation planning were in place. However, there were no tsunami level benchmarks for the soft measures and each local government used different estimates about the potential size of a tsunami. The two-tier tsunami scales set after the 2011 Tohoku Tsunami standardized the expected scale of tsunami against which disaster management plans are developed.

Examples of hard tsunami countermeasures include restoration of seawalls, building high embankments, and construction of evacuation facilities. During the 2011 Tohoku Tsunami, many cases were reported where the tsunami overtopped coastal levees and destroyed the land side of levee sections. It was necessary to evaluate how levees work in terms of tsunami disaster mitigation. As discussed before in the case of the Nakoso coast, Fukushima prefecture, when the overflow tsunami depths are less than 2 meters and the levee is mostly intact, the damage to the protected area could be reduced. Building coastal levees with higher structural resiliency could prolong the time to full breaching. It is expected to have a disaster reduction effect on tsunami overflow. Structural measures to add resiliency are being actively studied. Strengthening the land-side structures of levees is considered effective and is being implemented.

Coastal structures destroyed by the tsunami were to be restored to withstand Level 1 tsunami heights that were set based on historical tsunami records and numerical calculations. In practice, the height of the structures to be con-



Figure 5-3-3 Top : Typical break of the coastal levee (Soma City, Fukushima Prefecture)
Bottom : Restored coastal levee(Watari Town, Miyagi Prefecture)



Figure 5-3-4 Inundation damage by tsunami

Top : × indicates a house that was washed away ; the white block indicates a coastal levee that was destroyed.

Bottom : Various tsunami countermeasures afterwards (Iwama district, Nakoso, Iwaki City, Fukushima Prefecture)

structed was decided according to agreements of the local communities. While coastal levees were built to the height of Level 1 tsunami in many coastal regions, in some regions such as Akahama section in Otsuchi town, Iwate prefecture, the height of coastal levees was set lower than Level 1 tsunami height, while land-use restrictions on coastal low-lying ground were incorporated in its tsunami disaster prevention measures.

The purpose of the Coast Act (enacted in 1956 and last revised in 1999), which set the statutory base of coastal disaster management, is to promote protection measures near the coastline and does not accommodate implementation of measures in coastal onshore areas against mega tsunami overtopping coastal structures. However, to implement tsunami countermeasures based on the 2-tier tsunami scale, a new legal framework was needed. The Tsunami Disaster Prevention

Community Building Act was enacted in December 2011 to facilitate development of mega-tsunami countermeasures. The Act stipulates establishment of tsunami inundation estimates and tsunami disaster evacuation zones. Through those efforts, comprehensive tsunami disaster mitigation measures are being implemented.

3 Rebuilding and Pre-emptive Rebuilding

Rebuilding efforts are in progress based on the new tsunami countermeasures in the areas afflicted by the Great East Japan Earthquake. Restoration of coastal levees has been mostly completed. As a measure against larger tsunamis, high embankments doubled as green strips or roads are built along the levees and residential areas are relocated further inland or to higher ground. Along the aforementioned Nakoso coast, high embankments are being built and part of the village is being relocated.

Various measures implemented in the process of rebuilding after the 2011 Tohoku Tsunami are not only for the affected areas in eastern Japan. They provide a springboard for discussion about tsunami disaster prevention for all the coastal areas of Japan. Measures are being pre-emptively taken to facilitate the rebuilding efforts for future disasters. This is sometimes referred to “pre-emptive rebuilding.” As measures in preparation for a Nankai Trough earthquake, which is predicted to occur in the near future, the Cabinet Office released expected run-up heights and inundation areas of Level 2 mega tsunamis and disaster prevention measures are being studied. On the coast of the Sea of Japan, sea bottom geotectonic structures are being studied and faults which might cause a mega-tsunami are being identified and tsunami countermeasures studied based on the findings.

An example of specific pre-emptive rebuilding efforts is the high embankments being built along the land side of coastal levees in Shizuoka prefecture. In Hamamatsu city, a 13-meter-high embankment of cement mixed gravel is being built. To facilitate rapid evacuation, evacuation drills are conducted, and emergency evacuation towers and



Figure 5-3-5 Top: High embankments built along the land side of coastal levees (Hamamatsu City)
Bottom: “Life saver hill” (Fukuroi City)
(provided by Shizuoka Prefecture)

man-made higher grounds called “life saver hills” are being built with greater urgency. In various locations, work for strengthening the earthquake resistance of coastal levees is progressing. In Kochi prefecture, steel pipe piles longer than 10 meters are placed in a row into the coastal levees to improve aseismic performance.

To avoid devastation like that caused by the 2011 Tohoku Tsunami, we must not forget the lessons learned. Even if a mega tsunami is only expected to occur once every several hundred years, we must commit to instituting truly comprehensive tsunami countermeasures. Utilizing the guidance provided by the tsunami scale and its two levels is an important step forward.

(Shinji Sato)