Chapter 4 Basic perspectives on conservation and sustainable use of marine biodiversity

The National Strategy on Biological Diversity 2010 states the following five basic perspectives as the essential common bases to implement measures intended to conserve and sustainably use biodiversity: (1) achieving scientific recognition and having a preventive or adaptive attitude, (2) having a community-oriented attitude and broad view, (3) having coordination and collaboration, (4) using socioeconomic systems, and (5) having an integrated and long-term viewpoint. All of these perspectives are also crucial in implementing measures related to marine biodiversity. However, in addition to these, another five basic perspectives should be recognized especially when considering marine biodiversity, and these are given below.

1. Recognition of the importance of marine biodiversity

Because the ocean is extensive and difficult to access, it is difficult to recognize the biodiversity there in our daily lives. However, the ocean's ecosystem is highly diverse. For example, the existence of an ecosystem independent of solar energy (chemosynthetic ecosystem) was discovered in the deep sea, where no light reaches, with the development of deep sea research.

In addition, it is important to recognize that marine biodiversity does not only supply resources that can be used directly, such as seafood and genetic resources for medicine. Through services such as climate moderation and water purification, marine biodiversity supports systems which support the lives of human beings. For example, seaweed beds, tidal flats and coral reefs provide a living space for numerous marine organisms; seaweed beds and tidal flats purify water flowing in from land; and coral reefs stop the rough sea waves from reaching islands and protect the humans and organisms living there.

The objectives of the Convention on Biological Diversity are to conserve biological diversity, sustainably use its components, and fairly and equitably share the benefits arising out of the utilization of genetic resources. Each of these objectives could also be reworded as objectives for changing the current state of nature, our economies, and societies to sustainable ones.

Upon utilising ecosystems, the public must consider the long-term and continuous benefits society could receive from them and realize the need to sustainably manage a sound ecosystem. Continuous progress in conservation and sustainable use of natural resources is unachievable without appropriately evaluating the importance of marine biodiversity in economic activities and social life, and we must realize that environmental conservation is a valuable activity.

2. Integrated management of the sea

The Basic Plan on Ocean Policy states that "Comprehensive governance of the sea" is one of the basic aims of ocean-related policies. The Plan clearly states that it is important to have an integrated perspective when managing the ocean, and the following must be achieved: appropriate use of rights and jurisdiction; fulfilment of obligations; and international cooperation in line with international rules including the United Nations Convention on the Law of the Sea.

The National Strategy on Biological Diversity also follows the concept of the Ecosystem Approach, which aims for integrated management of the entire ecosystem and thus clearly states the importance of implementing preventive and adaptive management and use based on scientific knowledge. The strategy also states the importance of sharing information among all the relevant actors and states that society should decide on the manner of managing and using ecosystems.

In such ways, having an integrated perspective is crucial for conserving and sustainably using marine biodiversity.

(1) Importance of its integration with land in coastal areas

The land and the sea are connected

through water systems including rivers and groundwater. Downstream transportation of sediments creates tidal flats and beaches in coastal areas, and the nutrients provided from land nurture organisms such as fish in rivers and seas, creating rich ecosystems. Marine nutrients are also transported to upstream forests by anadromous salmon. In such ways, the land and the sea are closely connected. Many organisms living in coastal areas such as land crabs, coconut crabs, gobies, Ayu sweet fish, and Japanese sea perch are migratory and change their habitats at different stages of their lives. Thus, it is important to perceive these come-and-go routes and habitats as a network. Some organisms like common freshwater clams inhabit estuaries where freshwater and seawater mix. Thus, coastal areas require comprehensive management that, with a broad perspective, perceives the watershed as a whole considering the connection between the land and the sea. In addition, the habitat and nursing grounds of inner bay organisms are connected by ocean currents in coastal inner bays. Thus, in promoting coastal area management and the protection or restoration of suitable habitats and nursing grounds, such networks must also be considered.

To implement protective measures that consider ecosystem networks for marine biodiversity, the life history and migratory pattern of the target marine organisms must be considered and systematic measures that embrace such features must be established.

In addition, it is important to encourage various actors relevant to the water bodies which comprise ecosystem network to share information, to widely participate and cooperate, and to establish systematic conservation measures that consider the region's features.

(2) Importance of extensive perspectives on open ocean

Considering the continuity of the ocean, the existence of ocean currents, atmospheric input of pollutants, and extensive migration of marine organisms, problems related to marine biodiversity cannot be solved within a single country. Each country has an obligation to maintain a sound environment in the marine areas within its jurisdiction; however, cooperation with neighboring countries is essential when such environment is the open ocean. To implement conservation measures in highly enclosed waters such as the Sea of Japan, cooperation with the relevant countries is necessary, and measures for conserving marine biodiversity must be implemented under international cooperation. In addition, it is necessary to recognize that marine areas have a strong relationship with continental land, just as the Amur River and Yangtze River (two large continental rivers) supply the Sea of Okhotsk and the western part of the East China Sea, respectively, with nutrients and foster rich ecosystems.

Japan stretches a long way from north to south on the western rim of the vast northern Pacific Ocean, and it is connected to many countries via the Pacific Ocean. Therefore, international cooperation is essential for Japan. For example, organisms such as migratory birds, sea turtles, diadromous fish and marine mammals including whales, migrate long distances over national boundaries and use the Japanese coastline. To conserve and protect such organisms, it is important to have a broader international point of view in collaborating and cooperating with the relevant countries to implement measures to conserve their habitats. Such cooperation is also required to prevent pollution including marine debris.

Of the countries in the Organization for Economic Cooperation and Development (OECD), Japan consumes the largest amount of fisheries products of all the developed countries. Thus, Japan plays an internationally important role in promoting the sustainable use of fishery resources and conservation of marine biodiversity.

In addition, negative impacts from global warming and global dispersion of chemical substances are also causing concerns. To face such problems, measures must be taken with international cooperation. Collaborative research on the global distribution of hazardous substances, effect of climate change upon marine ecosystems, and effective measures to mitigate such impact must also be promoted.

Internationally, under the United Nations Environmental Programme (UNEP), the establishment of "Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services" (IPBES) had been conferred, and in June 2010, the attending parties came to a basic agreement on its establishment.

To establish IPBES as an efficient and effective framework that provides a scientific basis for policymaking, we must be actively involved in and positively contribute to discussions on the framework of IPBES. And through this kind of framework, utilization of scientific bases in making policies relating to marine biodiversity and ecosystem services must be promoted as well.

3. Measures appropriate to the characteristics of marine areas around Japan

The characteristics of the ecosystem and major factors that affect them differ between coastal areas and open oceans. The marine environment also varies significantly with latitude, ocean current and bottom topography. Thus it is important to promote measures for conservation and sustainable use of marine resources that take into account the characteristics of the particular marine area. When implementing such measures, it is essential to realize the need to understand and maintain the structure and function of the ecosystem in the target marine area.

Upon conserving marine biodiversity, it is important to systematically and comprehensively identify the factors that affect it and threaten the biodiversity of the marine area. It is also crucial to promote effective conservation measures and consideration in utilization.

In terrestrial areas, ecosystems can be generally depicted by the distribution of vegetation (an indicator of regional biological characteristics) as basic information. However, in the sea such ecosystems with a stable base

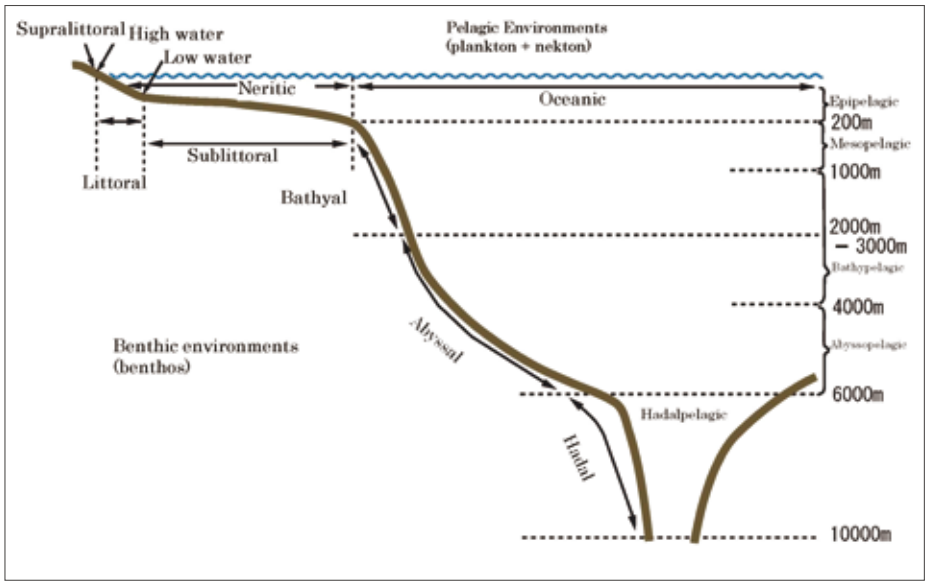


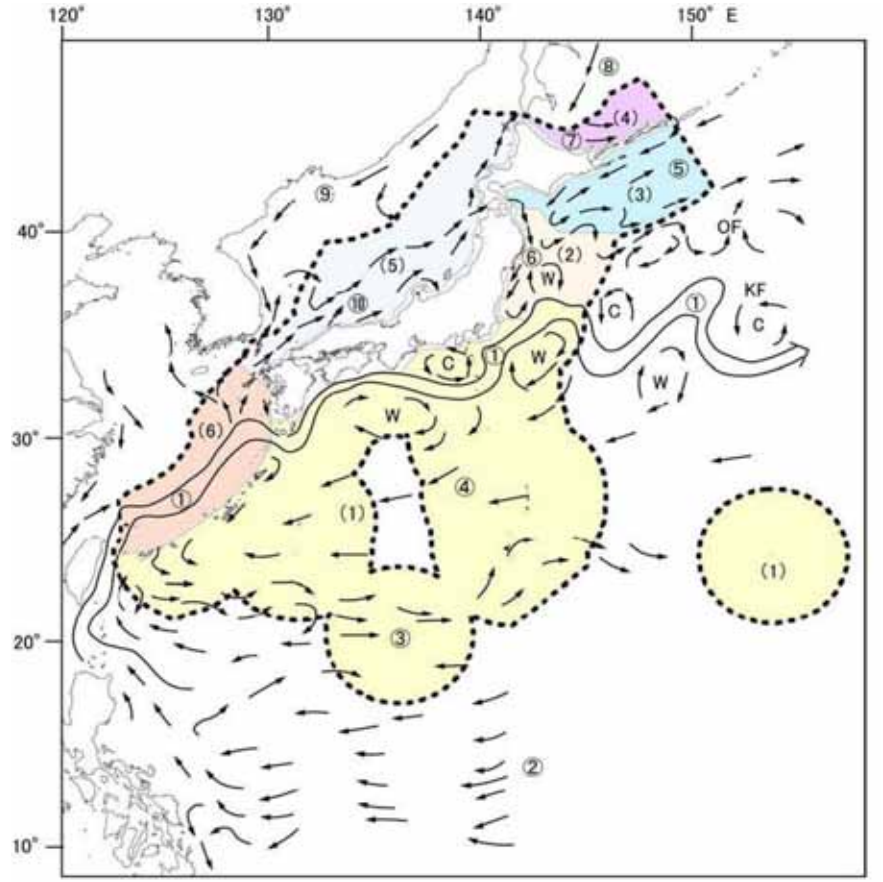
Figure 1: Ecological divisions of the ocean

Modified from "Biological Oceanography - an Introduction" (2nd ed., 2009) translated by Takeshi Naganuma and edited by Fumitake Seki.

are limited to coastal areas such as seaweed beds. The distribution of fauna in the ocean is regulated by physiochemical factors such as topography, matrix and ocean currents. Thus, to understand marine ecosystems, the types of physiochemical environment factors must be classified.

Coastal waters could be divided into "enclosed areas", which from a topographical point of view are highly enclosed seas such as inland seas and inland bays like the Seto Inland Sea; and "open areas" connected to the ocean. Coastal areas could also be classified according to their vegetation such as seaweeds and sea grasses, similar to the way land is classified. In such cases, the water temperature largely determines the vegetation that can grow there. Open ocean areas could be divided into layers according to the depth of the water mass (water columns) and sediment layers (Figure 1).

Marine Ecoregions of the World (MEOW)[18] is a system that classifies the marine areas of the world shallower than 200m into 232 ecoregions. There are other national and international classification systems, but the sea surrounding Japan could be classified into 6 major marine zones according to topographical characteristics and oceanographic conditions including the distribution of ocean currents: (1) the Kuroshio Current and subtropical zone; (2) Eastern Honshu mixed water region; (3) Oyashio Current and subarctic zone; (4) Sea of Okhotsk; (5) Sea of Japan; and (6) East China Sea.[19]



(1) Kuroshio Current and subtropical zone
(2) Eastern Honshu mixed water region
(3) Oyashio Current and subarctic zone
(4) Sea of Okhotsk
(5) Sea of Japan
(6) East China Sea
① Kuroshio Current
② North Equatorial Current
③ Subtropical Countercurrent
④ Kuroshio Countercurrent
⑤ Oyashio Current
⑥ Tsugaru Warm Current
⑦ Soya Warm Current
⑧ East Sakhalin Current
⑨ Liman Current
⑩ Tsushima Warm Current
KF : Kuroshio Front,
OF : Oyashio Front,
W : Warm water,
C : Cold water

Figure 2: Marine zones of Exclusive Economic Zone of Japan according to characteristics of oceanographic conditions

Modified from "Research report on establishment of marine management network of our nation's 200 nautical miles of marine areas" Incorporated Association of Research Institute for Ocean Economics.

18 Mark, D.S. et al. (2007) Marine Ecoregions of the World: a bioregionalization of coastal and shelf areas., Bioscience. 57(7): 573-583

19 Incorporated Association of Research Institute for Ocean Economics (2002) Research report on establishment of marine management network in our nation's 200 nautical miles of marine area.

Table 1: Marine Zones and theirCharacteristics

Marine Zones	Characteristics of geography and topography	Characteristics of climate, ocean currents etc.	Characteristics of ecosystem, biological resource etc.
(1) Kuroshio Current and Subtropical Zone	●It is a vast area on the pacific side of the country, from Nansei Island to the offshore area of the Boso Peninsula in the eastern shore of Honshu, including the Ogasawara Islands. ●The Philippine Sea Plate, the Pacific Plate and the Eurasian Plate collide in the area. Steep and deep sea trenches such as the Nansei Island Trench, Izu-Ogasawara Trench, Nankai Trough and Ogasawara Trough can be seen here	●Okinotori Island is the only Japanese land in a tropical zone. The Nansei Islands lie in a subtropical zone and the coasts of Honshu lie in a temperate zone. ●One of the largest Kuroshio currents of the world flows north along the Nansei Islands and the Eastern Coast of Honshu. The mesopelagic zone of the Kuroshio disperses at the relatively shallow Izu-Mariana Trench. The Kuroshio Countercurrent flows southwest offshore of Shikoku. ●Offshore at Boso, the Kuroshio Current heads east and becomes the Kuroshio Extension, which flows to the west coast of North America.	●This marine area is connected to the “Coral Triangle,” the most biologically diverse sea in the world, by the Kuroshio Current. Thus this area could be considered to be one of the world’s most biologically diverse marine areas. ●Low latitude marine areas are in subtropical marine environment, and diverse ecosystems such as mangroves, coral reefs, seaweeds, and sea grasses could be seen on the coast. ●The coasts of Honshu are temperate, allowing some species that are distributed mainly in subtropical zones to coexist with species unique to temperate zones. The majority of sea grasses seen in this marine area are eelgrasses, and mangroves are rare. Brown algae such as Arame, Kajime, and sargassum are found in abundance on rocky shores. ●The Kuroshio Current is a highly saline, warm and oligotrophic surface current. Its primary production in the open ocean is supported by small phytoplanktons. ●Due to the Kuroshio Current, warm water biotas are seen. And a complex grazing food web consisting of microbial food chains, small zooplanktons, mesopelagic fish and squids, small epipelagic fish, large migratory fish, seabirds and whales is created. ●Spawning sites for fish lie in the inner Kuroshio regions from Satsunan to Boso (for sardine and mackerel) and offshore south of extension areas (for Pacific saury and neon flying squid). ●Subtropical areas are the spawning areas for large fish such as tuna, and are the migratory route of highly migratory fish. ●Loggerhead turtle (North Pacific stock) and green turtle lay their eggs mainly on the sand dune coasts of southern Japan. Ogasawara is the largest spawning site for green turtle. ●Drifting seaweeds consisting of sargassum are used as spawning sites and juvenile and larval fish are transported offshore. ●Approximately 30% of all whale species in the world inhabit areas around the Ogasawara Islands. In addition, albatross breed on some of the islands. ●Hydrothermal ecosystems are observed in the Izu-Ogasawara, Mariana and Nansei Island region. ●Cold seep ecosystems are observed in some areas like the Sagami Bay
	●The Seto Inland Sea, surrounded by Honshu, Kyushu and Shikoku, is the largest enclosed water in Japan. The sea has many islands and the water is shallow.	●In the Seto Inland Sea, spacious sea with a calm flow called “nada” and narrow sea with fast tidal current called “seto” exists alternately.	●The Seto Inland Sea has many complex coastlines. Thus, there are various marine environments and diverse organisms, especially those of inner bays, inhabit and grow abundantly there. ●Being an inland sea, the effect of warm currents is limited. Therefore compared with the Pacific coasts, subtropical species are scarce and most are temperate species. ●Primary production of the Seto Inland Sea is relatively high and fish that feed on plankton such as Japanese sardine, Japanese anchovy, whitebait and sand lance are abundant. ●The coasts of the Seto Inland Sea are dotted with shallow areas such as tidelands and eelgrass beds that are habitats for benthic organisms and breeding grounds for horseshoe crabs. In addition, sandbanks exist in various places and serve as a habitat for species such as lancelet and sand lance, attracting the migration of black finless porpoise and loons which feed mainly on sand lance.

Marine Zones	Characteristics of geography and topography	Characteristics of climate, ocean currents etc.	Characteristics of ecosystem, biological resource etc.
(2) Eastern Honshu mixed water region	●It is an area where the North American plate and Pacific plate collide offshore of Sanriku. The Japan Trench stretches north to south. ●The coast of Sanriku has a developed rias coast.	From summer to autumn, Kuroshio-Oyashio transition region (mixed water region) spreads in the northern area offshore of the Kuroshio Extension and a complex front structure with warm and cold water eddies develop. The Kuroshio Current, Oyashio Current and also the Tsugaru Current flow into the Sanriku coasts establishing a mixed water region and a very complex marine environment.	●Temperate and subarctic species coexist, creating a unique biota. Subtropical species that are seen along the Kuroshio Current are scarce. ●Eelgrass beds and seaweed beds develop well in inner bays. ●Many areas with a spacious sublittoral zone exist, and echinoderms and the like dominate. ●The Kuroshio-Oyashio transition region offshore serves as foraging and growing area for epipelagic fish and squids such as Pacific saury, mackerels and sardines, and large migrating fish such as tunas and skipjacks. ●Both cold and warm current fish biotas are observed, and cold current fish and Japanese sardines prevail in the cold regime, while warm current fish prevail in the warm regime. ●From spring to early summer, the coasts of Sanriku are abundant with krill and become important foraging area for baleen whales that feed upon the krill and for shearwaters that have crossed the equator heading north. ●In the marine trenches, cold seep ecosystems are observed.
(3) Oyashio Current and subarctic zone	●It is the marine area north of the eastern coast of Hokkaido and surrounded by the Kurile Islands. ●It is the area where the North American plate and the Pacific plate collide. The Kuril and Kamchatka trenches stretch north to south.	●It is the area that contains the Oyashio Current, with a flow rate almost equivalent to the Kuroshio Current. ●The Oyashio Current originates from the Sea of Okhotsk, the surface water of the western subarctic circulation, and flows southward in a tongue-like shape. ●The Oyashio Current is divided into three portions. The first, the Oyashio Current Branch, flows south from Erimo. The coastal Oyashio current branches off from the first and flows along the Hokkaido and Tohoku Coasts. The second Oyashio current branch flows offshore.	●The Oyashio Current is a cold, low-salinity surface current, rich in nutrient. The primary production of the open ocean is supported by the spring bloom of large phytoplanktons (diatoms). ●In the coast, cold water biota develops. Generally, the ecosystem has a large biological mass but the number of species is small compared to subtropical marine areas. ●Large zooplanktons such as krill and copepods, and mesopelagic fish and squids are abundant. It is foraging area for organisms such as valuable fish species (salmons, cods and flatfish), seabirds, pinnipeds and whales that feed upon them. ●From summer to autumn, mackerels, sardines and squids migrate north and the Oyashio Current transition region becomes an important feeding and growing area for them. ●In autumn, salmon (chum salmon) that grew in northern seas migrate to the coastal area and rivers to breed. ●Large brown algae (such as kelps) flourish on coastal rocky shore areas and the areas function as important spawning sites for Pacific herring and other organisms. Also, valuable benthic organisms such as abalones and sea urchins inhabit there abundantly. ●Eelgrass beds spread over the sandy beach regions. ●The eastern coast of Hokkaido serves as a habitat for harbor seals (the only land-breeding seal in Japan) and a breeding place for rare seabirds such as tufted puffins.
(4) Sea of Okhotsk	●Highly enclosed sea surrounded by the Kamchatka Peninsula, Kuril Islands, Sakhalin and Hokkaido.	●It is the world's lowest latitude marine area with seasonal sea ice formation. It is Japan's only frozen marine area. The Sakhalin cold current flows southward along the eastern coast of Sakhalin. ●The Soya warm current, derived from the Tsushima warm current, flows from the Soya Channel along the Sea of Okhotsk side of Hokkaido, reaching the Shiretoko Peninsula. ●With the formation of seasonal sea ice at the Northern Sea of Okhotsk, cold, high-salinity, and nutrition rich seawater sinks, and the Sea of Okhotsk intermediate cold water is created.	●The Sea of Okhotsk intermediate cold water spreads from the Sea of Okhotsk to northwest of the northern Pacific Ocean as nutrient-rich water mass. This supports rich biological production such as a bloom of phytoplankton in spring. ●Diatoms (ice algae) attach to the bottom of the seasonal sea ice where they flourish and then sink, feeding benthic communities (especially filter feeders). ●Drift ice strands to the coasts, and special biota originating from drift ice can be seen. ●Environmental characteristics such as water temperature are similar to those of the Oyashio Current area, and similar biota is observed: abundant biomass but limited species. ●Similar to the Oyashio Current area, large zooplanktons such as krill and copepod are abundant and it becomes foraging area for valuable fish species (cods, flatfish and crabs), sea birds, pinnipeds and whales that feed upon them. ●From spring to early summer, southern Sea of Okhotsk is the area where salmon fry and larva from the rivers of Tohoku and Hokkaido grow. In autumn, salmon and pink salmon that matured in the northern Pacific Ocean migrate to the coast and rivers to breed. ●From winter to spring, cold water marine organisms (bottom fish including codfish, sea eagles and seals breeding on ice) similar to those found in arctic ice edge ecosystems prevail, but from summer to autumn, warm current migratory epipelagic fish also arrive.

Marine Zones	Characteristics of geography and topography	Characteristics of climate, ocean currents etc.	Characteristics of ecosystem, biological resource etc.
(5) Sea of Japan	●Highly enclosed sea surrounded by the Tsushima Channel, Soya Channel and Mamiya Channel with a deep-sea-basin-like feature. ●A shoal called the Yamatotai exists in the centre of the Sea of Japan. ●It has a vast, shallow and rather flat topography (due to the continental shelf).	●The Tsushima Current, a mixture of the Kuroshio Current and Chinese coastal water flows northward. This current includes a current that flows along the eastern coast of the Korean Peninsula, and another current that flows along the Sea of Japan side of the coast of Honshu. It creates complex warm and cold water eddies and fronts with the Liman Current that flows southward along the continental coast. ●The 300m deep surface water layer is composed of the Tsushima warm current, and the bottom layer is composed of the Sea of Japan proper water below 1 degree Celsius. This proper water originates from the cold, high-salinity water that sinks with the winter seasonal wind at the Russian coast.	●With the winter seasonal wind, vertical mixing occurs in the Sea of Japan, transporting nutrients in the middle-to-bottom part to the surface layer. With the increase in sunlight and water temperature, phytoplankton proliferates from spring. ●The Tsushima warm current is a surface current with warm, high-salinity, low nutrient water, but at the complex front area with the Liman Current, highly productive primary production similar to that of the Oyashio-Kuroshio transition region occurs. ●Warm current fish that lay eggs mainly in the South China Sea (ex., bluefin tuna, yellowtail, horse mackerel) and Japanese common squid migrate northward along the Tsushima warm current and migrates back southward before winter to their egg laying area at the Sanin-South China Sea. ●On the continental shelf and slope areas, there are many warm current species in the south, and cold current species in the north. A large number of snow crabs inhabit the baythal zone. ●Not long has passed since the formation of the Sea of Japan. Thus in general, the area has lower biodiversity compared with other areas but the production is high. ●Due to the lack of tidal changes, tideland ecosystems do not develop. ●Benthic biota on the coastal area is a part of the biota of the Kuroshio Current area. However, due to the effect of the Tsushima warm current, warm current species are distributed in higher latitudes than on the Pacific side of Japan. ●Mesopelagic areas are affected by the Sea of Japan proper water and only a limited number of species are distributed. Fish such as Maurolicus japonicus and Porous-head eelpout dominate and other organisms such as firefly squid are distributed.
(6) East China Sea	●Located west of the Nansei Islands, 70% of the area consists of a continental shelf shallower than 200m. However, in the southeast portion of the East China Sea, the continental slope along the Ryukyu Islands is steep and depths reach beyond 1000m. ●The continental shelf is covered with thick layers of sand and silt sediments affected by land water from areas such as the Yangtze River.	●The top layer of the Kuroshio Current flows through a narrow channel of eastern Taiwan, into the East China Sea, and once again out to the Pacific through the Tokara Channel. ●On the upper layer of the inner side of the coastal slope, the Kuroshio Current and China cold water (originating from China's continental coast) mix and form surface-mixing water that flows counter clockwise along the coast of Kyushu becoming an eddy. A portion of this water flows into the Sea of Japan as the Tsushima Warm Current.	●In the continental shelf and slope of the Chinese continent, vertical mixing from the winter seasonal winds and the increase in sunlight and water temperature in spring cause phytoplankton to proliferate, as in the Sea of Japan. ●It is the spawning and nursing ground for many epipelagic fish (ex., yellowtails, horse mackerels and mackerels) and winter stocks of Japanese common squid that migrate north along the Tsushima warm current of Sea of Japan and Kuroshio Current of North Pacific Ocean. ●Due to abundant supply from the continent, there is a substantial biomass in the ocean and continental shelves. ●The coastal area is environmentally the same as those of the Kuroshio Current subtropical area, and there is no difference in biota as well. Thus, it is one of the world's most biologically diverse bodies of water. ●Many hydrothermal ecosystems are distributed around the Nansei Islands.

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4. Effective measures to utilize local knowledge and technology

Surrounded entirely by the sea, Japan has actively used the ocean throughout its history. It has been used as a place for transporting products and humans, necessary for the formation and development of industry in each area, and as a place for harvesting marine resources which are an important component of the diet of the country.

From such a historical background, especially in the coastal areas, various actors utilize and manage the sea. Thus it is important to promote effective conservation and sustainable use of marine biodiversity by incorporating such various measures taken by social bodies utilising or managing the sea. The simultaneous conservation and utilization of marine biodiversity in a sustainable manner is the responsibility of any user of the sea.

The history of fishery in coastal regions goes back an exceptionally long way in Japan. By the Edo period, fishing gear and methods had been developed, and an order related to rights on exclusive use of fishing grounds, which could be suggested to be a primitive form of the current fishery right and piscary, was created. Coastal fishing villages were allowed the right to monopolize the use of site water surface. A system where the management of coastal area was left to the responsibility of the local fishers and the village was established. This background has led to the strict local management of fishery resources in Japan today. For example, conserving the environment of fishing grounds, setting fish shelters, establishing no-take areas and limiting operation waters are the major types of autonomous fishery management done by entities such as fisheries cooperative associations[20].

Shiretoko was registered as a World Natural Heritage site because of its unique marine ecosystem affected by the formation of sea ice and the distinguished interaction between terrestrial and marine ecosystems. In 2007, Shiretoko developed The Multiple Use Integrated Marine Management Plan, and under the idea of adaptive management, is aiming to conserve the biodiversity of the marine area while sustaining fishing resources by the legal restrictions as well as the local fishers' autonomous regulations.

Such autonomous measures taken by the local people may become a more effective measure in conserving and managing biodiversity than regulations based on laws, because flexible and detailed management by the related entities can be expected. Coastal areas are places where human life and nature are closely related. Seas that show high productivity and maintain rich biodiversity by the assistance of human activity that harmonizes with natural ecosystems have recently come to be gradually recognized as "Sato-umi (village seas)". Thus, it is important to progress with their appropriate conservation and use by utilising locally cultivated knowledge, technology and systems on the relationships between people and the sea.

Extensive and diverse actors are involved with the ocean. To maintain the biodiversity of such, we need to have further cooperation among the relevant actors and to establish systems for coordination. Among the measures taken by the Shiretoko World Natural Heritage Site described before, it is important to note that a cooperation system was created in the related scientific committees and regional liaison meetings that involve various actors such as local citizens, industries, intellectuals and governments.

Such cooperation system is also important to continue with long-term monitoring and conservation, regeneration and adaptive management of coastal areas based on the results of the monitoring.

5. Summary of the concept of Marine Protected Areas

(1) Defining Marine Protected Areas

Movements to promote conservation by

20 According to the 2008 Fishery census, 1,738 organizations are conducting voluntary fishery management in Japan.

Table 2: IUCN Protected Area Management Categories

Category of protected areas		Main objectives of managing areas
Ia	Strict nature reserve	Strict protection (mainly for scientific research)
Ib	Wilderness area	Strict protection (mainly for preservation of wilderness)
II	National park	Ecosystem conservation and protection
III	Natural monument or feature	Conservation of natural features
IV	Habitat and species management area	Conservation through active management
V	Protected landscape and seascape	Landscape and seascape conservation and recreation
VI	Protected Area with sustainable use of natural resources	Sustainable use of natural resources

* "Protected Area" in this table refers to both land and marine areas.
Reference: Dudley ed. (2008) Guidelines for Applying Protected Area Management Categories

establishing protected areas in marine areas (Marine Protected Area: MPA) have become globally active. This is against the backdrop of increased global interest about ecosystems and the conservation of biodiversity, and the accumulation of relevant scientific knowledge. In response to such movements, the Seventh Ordinary Meeting of the Conference of the Parties to the Convention on Biological Diversity defined a Marine and Coastal Protected Area as the following after a long discussion:

"A marine and coastal protected area means any defined area within or adjacent to a marine environment, together with its overlying waters and associated flora, fauna and historical and cultural features, which has been reserved by legislation or other effective means, including customs, with the effect that its marine and/or coastal biodiversity enjoys a higher level of protection than its surroundings."

The International Union for Conservation of Nature and Natural Resources (IUCN), which had been working on this problem for a long time, revised the definition of marine protected areas established in the late 1980s. In 2008, the IUCN issued a definition of protected areas (applied to both terrestrial and marine areas) as follows and also produced some detailed guidelines.

"A protected area is a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values."

There is no uniformly effective "marine protected area" for all marine areas. The importance lies in establishing protected areas in appropriate locations considering the target marine areas and the way they are used. Thus, in addition to the above definition, the IUCN has created "Protected Area Management Categories" (Table 2) and requests that protected areas be set up in a balanced way after clarifying the objective of managing them.

In addition, there is an emerging idea of creating networks of marine protected areas, so that the individual protected areas would effectively conserve biodiversity or ecosystems as a whole.

Therefore, internationally recommended marine protected areas today could be seen as an effectively set and clearly defined protected area in specified marine areas with the main objective of conserving marine biodiversity or ecosystems. Measures for such protection are decided flexibly according to their objectives, and include non-legislative measures such as local customs. Also the sustainable use of ecosystem services cannot be separated from the conservation of biodiversity, and is achieved by conserving biodiversity. Thus, aiming for the sustainable use of any of the ecosystem services could also be regarded as marine protected areas.

Considering the above, in this conservation strategy, the marine protected areas that Japan must promote from now on are defined as the following; however, this definition will be revised as necessary in accordance with the progress of the measures:

> Marine areas designated and managed by law or other effective means, in consideration of use modalities, aimed at the conservation of marine biodiversity supporting the sound structure and function of marine ecosystems and ensuring the sustainable use of marine ecosystem services.

(2) Current status of Marine Protected Areas in Japan and their challenges

Japan has been designating marine areas that would fall under Marine Protected Areas through the ages in various ways. These areas include: (1) Natural Parks and Natural Seashore Conservation Areas that aim to protect the natural landscape and the like; (2) Nature Conservation Areas, Wildlife Protection Areas, Natural Habitat Conservation Areas and designated areas for natural monuments that aim to conserve the natural environment or the habitat or nursery ground of organisms; and (3) Protected Water Surface that aim to conserve and cultivate aquatic fauna and flora, coastal marine resource development areas, and many other various specified areas designated by different entities such as prefectural governments and fishing groups. Thus, a great many Marine Protected Areas already exist.

The coastal Ramsar site based on the Ramsar Convention and marine areas of Shiretoko

inscribed as natural properties of the World Heritage List based on the Convention for the Protection of the World Cultural and Natural Heritage could also be seen as protected areas that are designated in marine areas. Continuous protection of the site by any of the domestic systems listed above is required once they are added to these international lists.

In these already existing protection areas, the target of each conservation measure corresponding to each objective is made clear. However, because of this, there are cases where the target of conservation is limited to the unique landscape, academic value or specific species. This is in contrast to the trend of marine protected areas recommended in earlier mentioned international contexts, and the perspective of this Conservation Strategy, which aims for the conservation of biodiversity that supports a sound structure and function of ecosystems, and the sustainable use of ecosystem services.

The Basic Plan on Ocean Policy (decided by the Cabinet in March 2008) clearly states that in accordance with the Convention on Biological Diversity and other international agreements, as one means to ensure biodiversity and realize sustainable use of fishery resources, the government should clarify how to establish Marine Protected Areas in Japan. This should be done with coordination among the related ministries. In this way, Japan should appropriately promote the establishment of such marine conservation. The definition of Marine Protected Areas in this conservation strategy includes various factors, but the important point is that it clearly states the conservation of biodiversity and sustainable use of ecosystem services as the objective. From now on, upon promoting designation of Marine Protected Areas in necessary marine areas, the establishment of effective Marine Protected Areas by appropriately expanding and improving the existing systems, and the effective combination and coordination of such systems should be considered from the perspective of biodiversity and ecosystem services as shown in the objective in the definition. It is also important to improve the management of currently protected areas by reviewing the current situation and revising the management plan, strengthening the regulations as required, taking measures to restore degraded nature, and taking measures such as the previously mentioned Sato-umi. At the same time, it is necessary to continue discussing appropriate measures and systems, considering the enhancement of ocean-related knowledge and changes in the social situation.

It is noteworthy that the change of marine ecosystems such as migration of organisms is large compared to the land. Thus, in addition to establishing a spatial protection area, a flexible management such as change of regulations and management according to the season or a period is important considering the temporal factors.