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Marine Ecosystem on Dokdo and Ullŭngdo Islands

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ABSTRACT: Dokdo is a volcanic island, and its formative geological age took place at the end of the Pliocene Epoch. Dokdo is located at 131 ° 52′ 33″ East longitude, and 37 ° 14′ 18″ North latitude, and is consituted of 87 islands. The total area of Dokdo is 0.186 km^2 and the length of its coastline is 4 km.Dokdo is a treasury of fish resources where many varieties of fish including squid and Alaska pollack live in abundance of greatest importance. Dokdo is a forward fishery base. Ullŭng island is located at 37 ° 27′ ~ 37 ° 33′ North latitude and 130 ° 47' ~130 ° 56' East longitude. The area of Ullŭng is 72.92 km^2 and the length of its seashore is 44.21 km. The total marine product of Ullŭngdo(1995) is 9,066 tons (M/T). The largest is squid, 8,900 tons. For the sea area of the depths near the Ullŭngdo coast, that of 50m or less is 2,477 ha, and that of 50 - 100m is 1,471ha. This fact tells us that there is no extensive area of a very shallow sea, and that it is directly connected to the deep sea. Ullŭngdo is a treasury of marine bioresources with rich and varied fishes including squid and Alaska Pollack and many others. Presently there is a sovereignty dispute over Dokdo between Korea and Japan. Since A.D.512, Dokdo has been a part of territory of Korea. Dokdo is a part of Kyungsang-Bukdo, Ullŭng-gun, Ullŭng-ŭp, Do-dong in the Korean administrative district division system. Japan strenuously claims sovereignty for significant economic reasons, including fishery rights, and has adhered to a contradictory position that "Dokdo is Japanese land" since Japan incorporated Dokdo into Japanese territory in 1905.

Key words: Dokdo, Fish resources, Marine ecosystem, Ullŭngdo

HISTORY OF DOKDO ISLAND

To begin with, we should make mention of the history of Dokdo and Ullŭngdo. Dokdo Island has been recognized as Korean territory since the era of Samkug (the Three Kingdoms), but it was so far away from land, and situated in such adverse conditions that it could not be put under control. But our ancestors who were filled with patriotism and bravery have continued to guard it.

Lee Saboo, a brave general and a great-great-grandchild of King Lemool, who was active in the reigns of Kings Ji-Júng, Pup-Hŭng and Jin-Húng was a very important figure. He conquered the Woosankug(Ullŭngdo) in 512 A.D. (King Ji-Júng, the 13th year, early 6th C).

Dokdo has been part of our territory since then and was called Woo-Lŭng-Do since King Hyun-Jong of Korea. He could not conquer Dokdo militarily because Dokdo was too far away from the main land and the natives were very wild.

He sailed with ships full of wooden lions. He then threatened that if the natives didn't yield, he would let loose the wild beasts, and then kill the natives. Eventually, he forced them to surrender.

In the reign of King Sookjong of Chosun, An Yongbock was an outstanding person who actively oversaw Ullŭngdo and Dokdo which the government had put aside. When he sailed with his crew of 14 people, and an inspector in 1696, he discovered Japanese fishing smacks near Ullŭngdo. He then pursued them, reproving them for having invaded our territory.

He called himself " The guardian of Ullŭng and Usan" and visited the Sinemahyun of Japan, which issued an apology from the leader of Sinemahyun for the Japanese fishermen having invaded our territory.

But he was put under custody because he had violated the policy of causing an uninhabited island to raise international problems. (The Chosun Dynasty followed this policy to prevent criminals and fugitives from joining any rebel army which may have escaped to an island). Through his kind offices, the Aeto-Macboo allowed the chief of the Daemado to send a document which announced the prohibition of the entry and exit of Japanese fishermen to and from Dongleboo in the Chosun Dynasty, and reported to the government of Chosun that Ull ngdo and Dokdo were islands native to Korea.

Recently Hong, Soonchil, the head of heroic guards of Dokdo,

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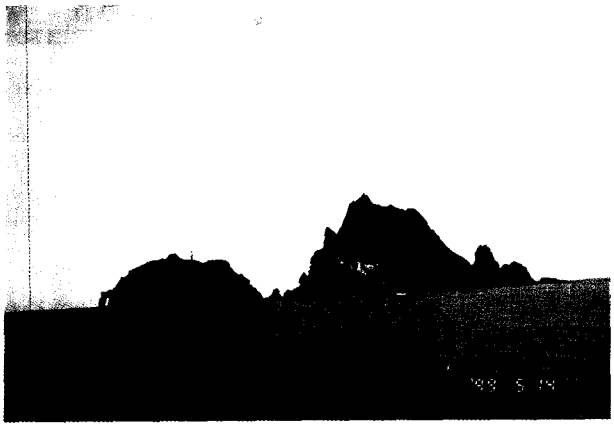

Plate 1. A view of Dokdo, the main island which consists of an East Island and West Island.

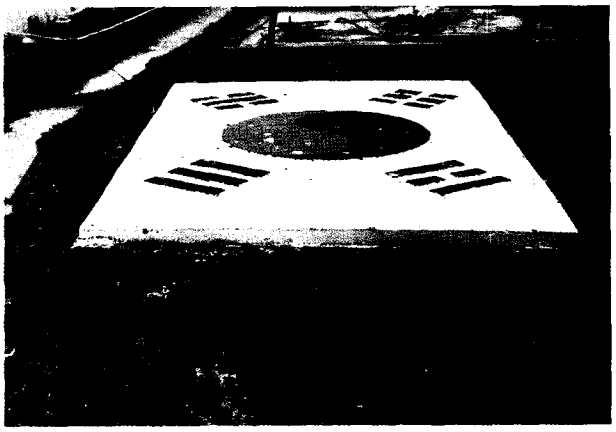

Plate 3. The Korean national flag was laid in concrete on the East Island of Dokdo

Plate 2. A seal which reads "Korean Territory" in Chinese characters was carved onto a stone face on Dokdo.

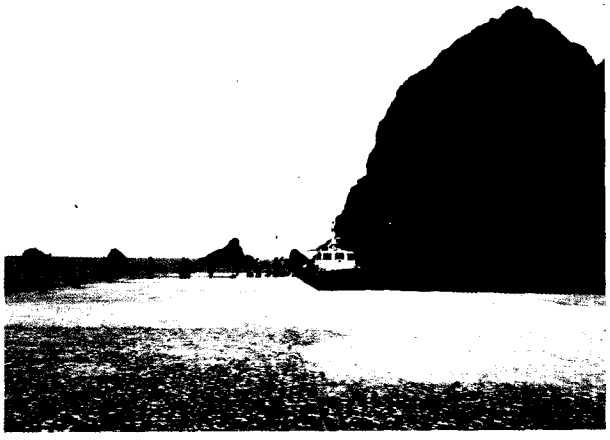

Plate 4. An administrative vessel of Ullŭng-County conducting oceanographic experiments is anchored alongside the pier at Dokdo.

defended Dokdo by recruiting "The Righteous Army of Our Age". The Japanese secretly invaded Dokdo during the Korean War, and destroyed a memorial stone which consoled the fishermen of Ullŭngdo who had been sacrificed in the practice bombardment of a U.S. Air Force plane near Dokdo in 1948 and then they put up a sign which read: "The Japanese mountain pass." Hong, Soonchil organized "The Guard of Dokdo" by recruiting retired soldiers from Ullŭngdo in April, 1953, to guard Dokdo securely, and was supplied with equipment including trench mortars, carbines, M-16, and ten-thousand rounds of ammunition to defend Dokdo completely.

Choi, Jongduc had been back and forth to catch fish near Dokdo since 1965. As soon as the Japanese asserted their sovereignty in 1980, he moved his residence registration to Dokdo. He then placed underwater stores, developed a special net and method of ear-shell fertilization, and discovered a wall-Moolgol on the West Island; doing his best for the development of Dokdo. He died as a result of a cerebral hemorrhage in 1987.

THE NATURE AND GEOGRAPHY OF DOKDO ISLAND

Dokdo is located at 131 °52′ 33″ East longitude, and 37 °14′ 18″ North latitude and is constituted of 87 islands including the East and West Island, 31 small islands, and 56 sunken-rock islands. The total area of Dokdo is 0.186 km^2; the length of its coastline is only 4 km. And it is just 175.7 m between the East

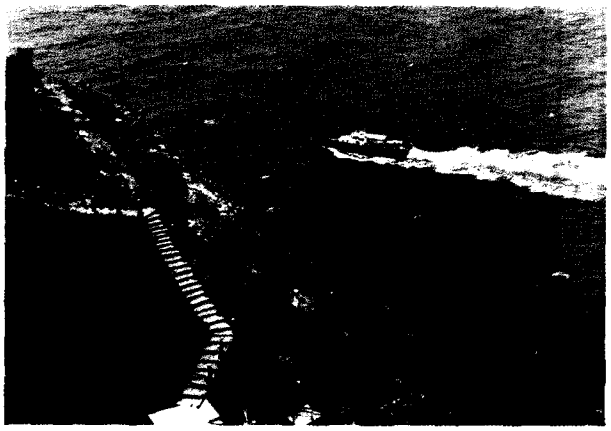

Plate 5. An administrative vessel of Ullŭng-County conducting oceanographic experiments as it circles the sea around Dokdo.

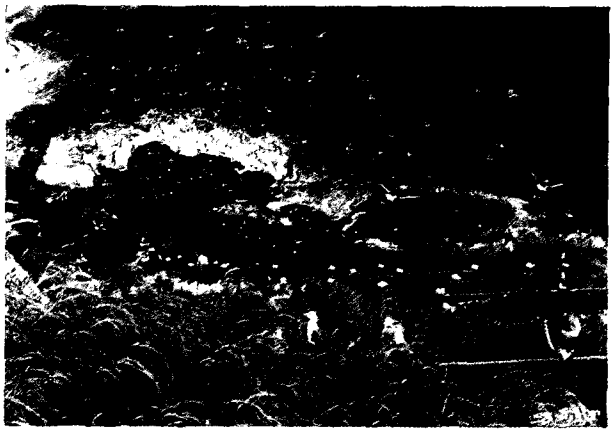

Plate 8. A spectacular scene on Dokdo: the view of the ocean and the soaring seagulls (black-tailed gull) is extremely beautiful.

Plate 6. A scene of pollutants which have washed up on the coast of Dokdo due to the strong currents which bring up human sewage from the ocean below.

Plate 9. A view of the many varieties of grasses which grow naturally on Dokdo. The vegetation (flora) is quite beautiful, through the number of varieties is neither great nor extensive.

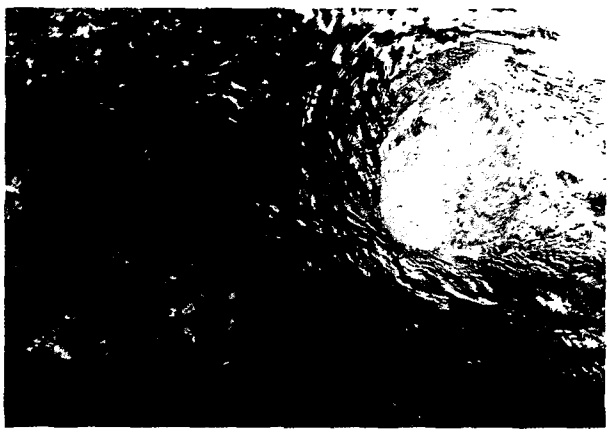

Plate 7. Chlorophyta, Phaeophyta and Rhodophyta grow naturally in the waters off the coast of Dokdo.

Plate 10. *Lysimachia mauritiana* which grow naturally on Dokdo.

Island and West Island. The area of the East Island is 0.07 km^2 : and the elevation is 98 m, while the area of the West Island is 0.11 km^2 and the elevation is 168 m.

Dokdo is part of Kyungsang-Bukdo, Ullŭng-gun, Ullŭng-ŭp, Do-dong in the Korean administrative district division system. It is 215 km from the Uljin-gun, Joocbyun - the shortest point on the East Sea - 92 km from Ullŭngdo and 262 km from Pohang.

Dokdo is a volcanic island and its formative geological age was at the end of the Pliocene Epoch, from the close of the 3rd to the beginning of the 4th Cenozoic Era. The constituent rock is volcanic conglomerate, and the mushroom rock layer is oppressive at the top, while the pyroclastic layer is oppressive in the middle and bottom. Dokdo is an eruptive volcanic island which erupts from the deep sea 2,000 m or more. The crater is on the East Island and a part of the crater is on the surface, so the sea water enters and leaves through it.

This island is the manhood or ultra-manhood geological type. The whole island is composed of a cave and searock, with no river, plain, sand, or gravel. So it is impossible to use as land or to obtain underground water or surface water. Underground water flows out of the bottom of the rock crack on the west end of the West Island, but it is too salty to use as drinking water.

The Nature Preservation Association of Korea has investigated the biota of Dokdo, but it is fragmentary and done only in the summer. There has been no systematic or comprehensive investigation of the seasonal variation of the marine ecosystem up to now.

To summarize the scientific investigation papers which the ecologists of Korea have researched and published: the plants living on Dokdo are of 31 families, 50 genus, 69 species, and 6 variants; a total of 75 kinds. About 20 types: the plantain, the Japanese silverleaf and others have already been exterminated as stock. Just 50 kinds of plants survive now, so the flora is very poor.

The characteristic of the flora is that there are no trees; woody plants are rare, while the coastal plants which belong to the herbaceous genus are common. That is because the creative history of Dokdo is comparatively short, so there has not been enough accumulation of soil through weathering. The various conditions and time required for the maturity of the flora and the invasion of species is extremely limited because of the great distance from land.

On the ecological change step, it is at the first stage, while means difficult conditions for plants to survive in because of the powerful sea and is influenced by the wind and hard volcanic rocks.

As for the birds, the back-tailed gull, the stormy petrel, Seum-Se(bird, seum) and others, totalling 17 species, are designated as a precious natural resource and live by making nests. The black-tailed gull, which makes a sound like a cat crying, inhabits and propagates as a large group and is a resident bird. The stormy petrel has been confirmed to inhabit at times the coastline of the East Sea. One of the rare species, the Seum-Se, also inhabits there. Insects have been collected and categorized in 7 orders , 26 families and 37 species. There are not any animals living now on Dokdo.

THE MARINE ECOLOGY OF DOKDO

Dokdo, which is located in the central area of the deep sea section of the East Sea, is a treasury of fish resources where many kinds of fish including squid and Alaska pollack live abundantly. It has great value in its function as a wintering and resting place; as a tourist resort; and development base for underground resources under the sea bed. Actually, the amount of the catches around the fishing grounds of Dokdo influences the supply and demand of Korea.

The Curosio Warm Current and the Riman Cool Current cross at the seas adjacent to Dokdo. Dokdo has only a 4 km coastline, which runs in and out as a rias coast. Varied and rich fishes including the squid of the Daehwatoi fishing ground are caught in the fishing grounds of Dokdo.

Dokdo is a forward fishery base. The amount of the catches of squid was about 200,000 tons (live fish: 20,000 tons, fresh fish: 180,000 tons) last year (1995), but the amount of the catches off

Table 1. The sea area by depth of the Ullŭngdo coast (Unit: ha)

	0 ~ 5 m	5 ~ 10 m	10 ~ 20 m	20 ~ 50 m	50 ~ 100 m	Total
Ullŭng	366.3	311.6	492.8	1,309.5	1,447.9	3928.1

Table 2. The area of the fishing grounds and length of coastlines (Unit: ha)

	0 ~ 5 m	5 ~ 10 m	10 ~ 20 m	20 ~ 50m	Total	length of coastline
Ullŭng	366	312	493	1,310	2,481	44
Uljin	1,309	1,013	2,749	8,972	14,043	82
Yeungduk	1,477	896	1,360	4,488	8,221	53
Pohang city	1,499	1,936	4,804	8,117	16,356	91
Kyungju city	381	436	804	7,056	8,777	33

the Dokdo coast and the Daehwatoi fishing ground amounts to as much as 60% of the total. On the other hand, Dokdo is a forward base for catching small fish including the ray, and bastard halibut by drift net; red king crabs and shrimp by fish trap.

Presently the fishermen in Kyungbuk Province including Kangwondo and Kyungnam Provinces and Pusan work in the fishing grounds of Dokdo. A total of 200 fishing boats between 20-150 tons go out fishing just from Pohang and in the case of the Jeudong harbor on Ullŭng Island, the forward fishery base, about 450 fishing boats including boats to catch squid go out fishing in the high-demand season.

The benthos: ear shell, conch, sea cucumber, ascidian, and others, live abundantly in the coastal area off Dokdo. The fishing villages of Dokdo and Ullŭngdo catch sea food of up to 8 tons off the Dokdo coast, earning about US $ 10,000.

The marine products department of Pohang and Ullŭngdo claim the Korean fishermen including the people of Ullŭngdo received direct earnings of about US $ 200 million per year, as well as indirect earnings of about $ 400 million, but these facts are simple numerical value of the amount of the catches off Dokdo. Actually, Dokdo is enormously commercially-viable as a territory and a forward fishery base.

The squid caught in abundance near Dokdo is one representative special product, as is the Alaska pollack which likes the cool water of the pelagos. These are very tasty and nutritious, and are the best-known main sea food products because of the large quantity of their catches. In addition, a variety of fishes including sardines, chub mackerel, saury, Japanese horse mackerel, yellow tail, tuna, globefish, Atka mackerel and cherry salmon are caught there. The benthos which live off the coast of Dokdo are shrimp, sea cucumbers, sea urchins, conches, mussels, and shells, which live in the natural uncontaminated waters.

As of now investigations have determined the number of species of algae as: bluegreen algae: 5 species, rhodophyta: 67 species, phaeophyta: 19 species, chlorophyta: 5 species and others for a total of 102 species; which are collected in this sea area. Observing their vertical distribution, there are in the following order: *Sp. green laver, Corallina pilulifera, Laurencia sp., Dictyopteris prolifera, sargassum sp.*, and sea oaks which grow thick as a forest on the bottom. These are designated as a precious natural product and laver, sea mustard, sea tangle, *sargassum sp.* and agar-agar which are used as a food, are a tasty sea food from these uncontaminated waters. The fur seal which lived there as a group until the early years of the 1940's moved to a habitat on Sakhalin or were exterminated because of bombing by the U.S. Air Force in 1948, and overfishing by the Japanese. But presently they have begun to appear again. It is said that Dokdo will once again become a habitat of the fur seal.

One person who knows the Dokdo ecosystem is of the opinion that we must prevent the destruction of nature, and need to designate a reservation for this natural ecosystem. Presently, many people are rushing to Dokdo, so the natural environment of Dokdo is being damaged. Indiscriminate and excessive development, or even misinformed protection could destroy the nature of Dokdo itself.

At this point in time, continued investigations and research of the ecological environment of its marine nature, both animal and plant, is a basis to build up national strength. This means that basic science is needed to resolve the sovereignty dispute over Dokdo with Japan, which will determine who will effectively control the marine resources off Dokdo's coast, and will have an effect on the preservation of the marine ecosystem, the development of marine resources, marine sightseeimg, and other ventures at the same time.

THE MARINE ECOLOGY AND FISHERIES OF ULLŬNGDO ISLAND

Ullŭngdo located in the deep sea section of the East Sea with its heavenly blessed uncontaminated seas, is a treasury of marine bio-resources which have rich and various fishes including squid, and Alaska pollack and many others. Actually, a variety of marine products caught in the fishing grounds off Ullŭngdo influence supply and demand in Korea. On the other hand, the natural environment of Ullŭngdo is not only unique and beautiful but also functions as a wintering and resting place. Ullŭngdo is, also, of great significance as a development base for the underground resources underwater.

Ullŭngdo is located at 37 °27′ ~ 37 °33′ North latitude and 130 °47′ ~ 130 °56′ East longitude. This island, which belongs to Kyungbuk Province as an administrative district, is one of its counties. The area of Ullŭngdo is 72.92 km^2 and the length of its seashore is 44.21 km. The seashore is a rias type and smooth. The shape of the island is similar to a pentagon. It is 217 km from Pohang. On the evidence of its diameter, the length from east-west is a little longer than that of north-south. It is about 10 km. Ullŭngdo, located in the middle of a deep sea, is the peak of a huge marine mountain range whose height is 984 m, "Sungin-bong"

The climate is comparatively mild. The average temperature is about 12°C. The amount of rainfall and snowfall is 1,500 mm per year. It's so abundant that trees grow thickly and plants are plentiful. It has an oceanic climate, so there are many rainy, cloudy, foggy and snowy days. It's not windy and has no high waves in the summer. In other seasons, it has heavy seas with heavy days amounting to 180 days per year. This restricts fishery activity.

Currently, one third of the total population, 3,249 persons out of a population of 11,102, is in the fishery industry. Most of the natives, jobs are in the fishery industry. Its principal function is as

a fishery base.

As for fishing boats, according to the 1994 statistics there were 474 ships, a total of 5,183 tons (15% of Kyungbuk's total of 34,284 tons) on Ullŭngdo. All but 1 ship (1.07 tons) are powered ships. Tonnage distribution is : 1~10 tons: 350 ships, 10~50 tons: 70 ships, and 50 tons or more: 25 ships. There are 29 ships under 1 ton and 6 ships of 100 tons or more.

The total marine product of Ullŭngdo (1995) is 9,066 tons (M/T). The largest is squid, 8,900 tons. Additionally, there are sea urchins: 42 tons, the common octopus: 32 tons, fishes: 52 tons, clams : 16 tons, and marine algae: 5 tons.

The sea area of the depths near the Ullŭngdo coast can be found in table 1. The area of 50 m or less is 2,480 ha and that of 50 ~ 100 m is 1,448 ha. This fact tells us that it is so deeply sloping that the Ullŭngdo coast is directly linked to the deep sea. The sea area by depth presented in tables 1 and 2 indicates an average by planimeter of 5 times and is from the fishing ground map of Kyungbuk, the coastal fishing ground inspection map of the National Fisheries Research and Development Agency: the basic marine map.

Comparisons of the coastal fishing grounds of Uljin-gun, Yeungduk-gun county in Kyungbuk, Pohang and Kyungju City with the costal fishing grounds by depth with Ullŭngdo are in table 2. The data of the two cities and two counties is very different from the data for Ullŭngdo County on a numerical value. It tells us that there are many oceanographic differences.

The coast line of Ullŭngdo is 44 km, much longer than that of Kyungju City (33 km), and shorter than that of Yeungduk-gun County (53 km): but if we compare the sea area up to 50 m deep: Kyungju City at 8,777 ha, and Yeungduk-gun at 8,221 ha, Ullŭng has only 2,481 ha. This fact indicates that the length of the continental shelf of the Ullŭngdo coast is far shorter than the others.

There is no extensive area of the shallow sea, which is directly connected to the deep sea. It is this deep sea character which is related to the present fishery condition of Ullŭngdo County. So there aren't any "Jungchi" net fishing grounds in the sea area off the coast of the other counties or sea culture fishing grounds or coastal Gadoori culture farms. Because there aren't any o cho (fishing banks) drop-off fishing grounds, the coastal fishing ground of Ullŭngdo is pure nature itself. On the other hand, the fishing grounds don't develop because the stream of the ocean current is too strong and there are many typhoon days. These marine environments create many difficulties and an excessive cost for the construction of a harbor and breakwater.

SOVEREIGNTY DISPUTE OVER DOKDO BETWEEN KOREA AND JAPAN

What is the reason that Japan incessantly asserts its sovereignty over Dokdo at every opportunity? The Japanese government has asserted its sovereignty over Dokdo through an accumulation of political and diplomatic justifications from the beginning. Whenever a sensitive diplomatic issue such as the past history between Korea and japan or the problem of North Korea emerges, Korea is bitterly criticized. But the past Korean government simply refuted these claims with no counter-moves against the assertions of Japan.

Primarily, Japan strongly claims sovereignty because of the fishery rights. The Korean opinion is that Dokdo has been our land since Lee, Saboo subjugated the Woosankuk in the Silla Dynasty. However, Japan has continuously asserted its sovereignty because of enormous economic reasons including fishery rights and has adhered to a baseless position that "Dokdo is Japanese land" since Japan incorporated Dokdo into Japanese territory in 1905 without any foundation, saying it was "ownerless land which Korea had thrown away."

In particular, many Hyun (a kind of city) on the East Coast of Japan including Simena Hyun which set up a sisterhood relationship with Kyungsanbukdo in Korea take the position of never giving it up because Japanese fishermen require the safety of working adjacent to Dokdo. So the recognition of Dokdo as Japanese territory has spread. Eventually it has taken root in the consciousness of the Japanese. An unfounded stubbornness has given place to a kind of conviction in proportion to the passing of time and the resulting actual profits. So it is very difficult to solve the problem of Dokdo which is analogous to a twisted thread.

From the beginning, Japan tried to solve the Dokdo problem through the International Court of Justice using its extensive national power as a basis. But Korea did not reply to this, and Japan backed out taking the position of accepting fishing by Korean fisherman off the coast of Dokdo. Though Japan has made a concession in its own way to the Korean position, it is the same as taking another's property and then allowing them to use it. Japan, also, proposed the joint ownership of Dokdo, but, of course, it was not worth Korea's while to consider this at all. The Japanese reason to adhere especially to Dokdo is found in its relationship with other countries in the region. Japan has strongly requested the return of the northern 4 islands (the Kuriles) from Russia since the old Soviet Union disappeared. Japan also has brought up the sovereignty dispute over the Senkaku chain of islands with China. In contrast to Dokdo, Japan has possession of Senkaku now, but China still asserts its sovereignty over Senkaku.

It's a very difficult situation since the problem of who has sovereignty over Dokdo has international ramifications for the Japanese government to work out. The Japanese government is attached to their claim of sovereignty over Dokdo with its implications for the Senkaku chain of islands and the return of the northern 4 islands (Kuriles) in its dispute between China and Russia.

It is imperative that the Korean government build a marine

institute on Dokdo where it would be beneficial to maintain research and to combat this unjustified claim.

If Korea didn't stake out Dokdo in its EEZ of 200 nautical miles, it would be blamed by the Japanese, also. First of all, it is suggested that entry to Dokdo be made easier so that it can be accessible to ordinary people or students for nature research as a part of their education. Of course, it must not be forgotten that in the defense of Dokdo we have to know more about its history, ecology and economy than any other nation. This should be part of a general plan to establish control.

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