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An Overview of the International Development of Marine Spatial Planning and Its Policy Application in Japan

Yoshitaka OTA *

Abstract

This paper aims to provide an overview of the international development of a new comprehensive marine management tool, Marine Spatial Planning (MSP), and its relevance to the development of Japanese marine governance. MSP is seen to have originated from two global trends in the development of ocean space, the implementation of marine energy resources such as offshore wind farms and the implementation of marine protected areas to conserve marine ecosystems, which arose due to international concern over the loss of marine biodiversity. In Japan, the former trend has been considered as a component of a new energy policy directed towards post-Fukushima development of renewable energy. Preceding the incident, a large-scale oil spill in the Gulf of Mexico triggered public demand for a more comprehensive mode of ecosystem-based management, leading the government to produce a new ocean policy incorporating the use of MSP. Meanwhile, the new Marine Act (Marine and Coastal Access Act) initiated in the UK has included a plan to implement spatial planning to ensure effective use and conservation of marine areas. Having considered these new developments, this paper focuses on the importance of MSP as a technical and political tool to advance comprehensive Japanese marine governance and management.

Key words: Marine Spatial Planning, Deepwater Horizon, USA Coastal and Marine Spatial Planning, Bioregional Planning of Australia, Marxan

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Global Trends in Ecosystem-Based Management for Ocean Governance and their Policy Implications for Japan

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Abstract

Despite the growing recognition worldwide of the importance of ecosystem-based management (EBM) for ocean management, serious discussion on introducing EBM has not yet been undertaken in Japan even though the Ocean Basic Act of 2007, which set out the national government's commitment to increasing the integrity and comprehensiveness of its ocean management, underscores the importance of considering ecological processes. This paper aims to identify important elements of EBM that Japan may need to consider in establishing a comprehensive ocean governance program. Based on case studies of progressive multi-scale EBM efforts in the United States and Australia, the paper examines their multi-level institutional arrangements; stakeholder participation; and accumulation, integration and communitization of marine data for adaptive EBM. Based on the analysis, the paper suggests some policy implications.

Key words: Ecosystem-based management; large marine ecosystems; marine spatial planning; multi-level management framework

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Integrated Coastal Management and Small-Scale Coastal Fisheries

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Abstract

The purpose of this research is to identify whether Integrated Coastal Management (ICM), increasingly promoted since the Basic Act on Ocean Policy came into force in 2007 and the Basic Plan on Ocean Policy was established in 2008, is effective in solving problems in coastal fisheries and the coastal environment. The research includes two subtopics: 1) to review the ICM concepts, definitions and policy trends of the UN, PEMSEA, EU and Japan at the international and regional levels and 2) to analyze ICM policy in the Philippines at the national level. The paper concludes with thoughts on an ideal policy for ICM in Japan.

Key words: Integrated Coastal Management (ICM), small-scale coastal fisheries, PEMSEA, EU, Philippines

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Marine Research Activities in the Area

Unresolved legal issues concerning Bioprospecting of genetic resources in the Area under International Law

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Abstract

This article focuses on the legal issues of bioprospecting conducted in the Area. Bioprospecting refers to exploration that targets only genetic resources for commercial purposes. While some scholars in the field state that since bioprospecting is fundamentally different from marine scientific research (MSR) as defined in the LOS, MSR-related provisions do not apply. Moreover, the Area and its resources, in principle, are governed by the International Seabed Authority (ISA), yet resources other than mineral resources, for example living resources including genetic resources, are beyond the ISA's jurisdiction. Consequently, bioprospecting in the Area could be done without regulation by ISA. However, there remain issues that need to be reconsidered concerning both MSR application and ISA's jurisdiction. Furthermore, some unresolved issues from the viewpoints of the Common Heritage of Mankind principle and the Convention on Biological Diversity also have a bearing on prospective bioprospecting. This article draws the following conclusions after examining relevant international treaties, academic theories, and State practice to the present day: 1) bioprospecting should be included in the MSR regime since MSR can't be interpreted to exclude research for specific purposes or to be conducted against specific objects based on the drafting process; 2) ISA can't regulate bioprospecting unless the intent of the Common Heritage of Mankind principle evolves to prevent the appropriation of living resources including genetic resources; 3) it is not possible for CBD and related instruments to exert effective influence over bioprospecting due to the indetermination of the applications .

Key words: UNCLOS, the Area, Bioprospecting, Marine Scientific Area, International Seabed Authority, the Common Heritage of Mankind, CBD

1. Introduction

Bioprospecting has been claimed as a useful method to sample genetic resources in recent years. The legal problem of how bioprospecting should be dealt with in relation to Marine Scientific Research (MSR) has arisen.

The United Nations Convention on the Law of the Sea (LOS), which was adopted in 1982, sets out detailed provisions concerning MSR. According to LOS, when States or persons undertake MSR in a territorial sea, Exclusive Economic Zone (EEZ) or on a

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Continental Shelf, they are required to acquire consent from coastal States¹. This is the result of securing freedom of MSR as far as possible in considering sovereignty or sovereign rights, which coastal States have in those areas. MSR can be freely conducted, in principle, in areas beyond the limits of coastal jurisdiction, such as the high seas². LOS, however, doesn't provide articles with regard to MSR conducted in the Area. In Part XIII, the only provision concerning MSR in the Area is that all States, irrespective of their geographical location, and competent international organizations have the right, in conformity with the provisions of Part XI, to conduct MSR in the Area where the water column is beyond the limits of the continental shelves³. It has been indicated so far that research in the Area is different from that in other areas; the Area and its resources are the Common Heritage of Mankind and no States shall claim or exercise sovereignty or sovereign rights over any part of the Area or its resources, nor shall any States or natural or judicial person appropriate any part thereof⁴. In addition, the International Seabed Authority (ISA) controls the activities in the Area.

From the 1960's, concern over the Area increased rapidly as nodules of rare metals such as manganese, nickel and cobalt were being discovered. These discoveries, however, were not sufficient to prompt major MSR in the Area due to the technical difficulties and high operating costs. Dramatic progress in technology since then, however, has greatly facilitated research in the Area, with new genetic resource discoveries as a result.

Similar advances in technology caused scientists to revise their opinion on life in the Area, which was not thought to exist until

1970's⁵. While the values of the various creatures, which have been discovered in the Area, is still unknown, there are possibilities that they might prove useful due to having evolved in severe environments characterized by darkness, low-nutrition and high water pressure.

In fact, a number of products such as medicine or detergent have been produced from the genetic resources sampled on land and in jurisdictional waters, including territorial waters, EEZs and continental shelves; therefore, expectations as to the potential of life forms in the Area are gradually increasing⁶.

In this article, bioprospecting as described above will be examined from the following perspectives: 1) MSR regime, 2) ISA's jurisdiction, including the common heritage of mankind principle, 3) CBD's influence. I know that there have been made a number of research and discussion on bioprospecting in the Antarctic Treaty System, and pharmaceutical, scientific, biological, intellectual property and patent realm. I, however, will limit the target to issues on Seabed area since referring to the above matters seems to stray from the major object of this article.

2. Bioprospecting and MSR

2.1 Bioprospecting

While the neologism of bioprospecting is often used these days, it lacks a fixed definition; although some scholars and organizations have made attempts to define bioprospecting, there is still no internationally agreed definition⁷. Nevertheless, there are two common factors in those attempts: 1) research sampling genetic resources, 2) re-

search for commercial ends⁸. For example, the following definition is offered by the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), the open-ended Inter-Governmental scientific advisory body of Convention on Biological Diversity (CBD):

Bioprospecting is the exploration of biodiversity for commercially valuable genetic and biochemical resources or the process of gathering information from the biosphere on the molecular composition of genetic resources for the development of new commercial products.⁹

In considering the above definition of bioprospecting, it might be useful to examine the case of “prospecting”, which is already defined in the Regulations of prospecting and exploration of polymetallic nodules that ISA adopted in 2000. Furthermore, ISA classifies the process of exploitation of “resources” into 3 stages in its Regulations: prospecting, exploration, and exploitation. It defines these as follows:

Prospecting means the search for deposits of Polymetallic nodules in the Area, including estimation of the composition, size and distribution of deposits of polymetallic nodules and their economic values, without any exclusive rights.

Exploration means searching for deposits of polymetallic nodules in the Area with exclusive rights, the analysis of such deposits, the use and testing of recovery systems and equipment, processing facilities and trans-

portation systems, and the carrying out of studies of the environmental, technical, economic, commercial and other appropriate factors that must be taken into account in exploitation,

Exploitation means the recovery for commercial purposes of polymetallic nodules in the Area and the extraction of minerals therefrom, including the construction and operation of mining, processing and transportation systems, for the production and marketing of metals¹⁰.

From the above definitions, it appears that prospecting refers to general research on “resources” in the Area. However, to date, it is unclear whether the ISA’s definition of prospecting can be reasonably applied to bioprospecting, since it is limited to mineral resources, including polymetallic nodules and polymetallic sulphides. In addition, prospecting and bioprospecting have different legal properties: on the one hand, prospecting is research at the plenary stage toward exploring and exploiting mineral resources and is legally binding on exploration and exploitation undertaken in the Area; on the other hand, bioprospecting targets marine life, which might have commercial potential. In this way, bioprospecting is fundamentally different from prospecting as defined by ISA.

2.2 Relationship between Bioprospecting and MSR

A core legal issue of bioprospecting is whether it can be considered MSR; if so, it would be subject to the MSR regime and thus MSR-related provisions would apply.

In considering this issue, we need first to examine the provisions concerning MSR in LOS, though it gives no explicit definition. While some examples of MSR are given in article 246, paragraphs 3 and 5¹¹, they are only supplied to illustrate the context in which coastal States might grant consent. Therefore, the above article shouldn't be read as defining or characterizing MSR.

During the Third Conference for the Law of the Sea (LOSIII), there was heated debate over the definition of MSR, the details of which are not included in this paper since they are sufficiently dealt with in a number of books¹². To sum up the debate, however, there was a conflict between delegations, led by the U.S.A., wanting to insert the U.S. definition, and delegations, mainly from developing States, rejecting it. In 1976, the Revised Single Negotiating Text (RSNT) included a definition of MSR as follows:

Marine scientific research means any study or related experimental work designed to increase mankind's knowledge of the marine environment¹³.

This definition was extremely ambiguous, allowing arbitrary interpretation. Subsequently, the definition was deleted in the Informal Combined Negotiating Text (ICNT)¹⁴. However, the deletion made the meaning of MSR even more unclear than originally. Therefore, the U.S. delegation proposed to insert a definition into the Draft Convention on September 13th, 1978, that was identical to that in the RSNT:

Marine scientific research means any study or

related experimental work designed to increase mankind's knowledge of the marine environment¹⁵.

Although this proposal was rejected, the U.S. delegation proposed the same modification again on April 2nd, 1979¹⁶, but this also was not adopted. This refusal to define MSR made it inevitable that MSR would be interpreted broadly in the future.

What influence did the above drafting history have on the legal characteristics of bioprospecting? In order to consider that, we need to remember the characteristics of bioprospecting, that is, research sampling genetic resources and research for commercial ends. We need to consider with care whether MSR recognizes genetic resources as research objects and if exploration undertaken for commercial ends might be regarded as a part of research.

As to the former, the above debate in LOS III and article 246, paragraph 5 indicates that sampling genetic resource may be considered one type of MSR, as it stipulates "...the exploration and exploitation of natural resources whether living or non-living." Even if bioprospecting does not target marine organisms themselves but only their genetic information, including genes, the capturing of marine organisms is essential. With respect to the latter point, the question is whether research types can be distinguished according to purpose, as asserted by some scholars¹⁷. In practice, however, such classification would likely prove extremely complicated. It is supposed that the data and information obtained by research will not vary significantly, since the devices and vessels used for research have many characte-

istics in common. Therefore, it is difficult to distinguish research types on the basis of ends¹⁸. In contrast, the report of the UN secretary general maintains that the only way to distinguish research types is by how the data and results are actually processed¹⁹. Even here, however, there is a potential problem: data and results might not be limited to a single process over time; one process might emphasize extraction of new scientific knowledge from the data, while other processes might focus on extracting military or commercial applications.

Consideration of the above theories from these viewpoints, therefore, is a good argument for using differences in processing, notwithstanding potential problems in application, recommending it over ends as a criterion to distinguish research types, indispensable to assigning bioprospecting to the MSR regime.

3. Bioprospecting in the Area

It should be noticed that very little bioprospecting has been carried out in the Area to date²⁰. Although some developed States have conducted research, most of them haven't focused on genetic resources. However, the possibility that bioprospecting will be undertaken in the near future is increasing due to the progress of technology and the commercial potential of genetic resources. The following discusses what legal difficulties are likely to occur when bioprospecting is carried out in the Area.

3.1 The Area regime

LOS defines the Area as “the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction²¹”; the Area is the floor beyond the coastal State's continental

shelf. This definition was provided in LOS for the first time and the Common Heritage of Mankind principle²² was also adopted as the notion governing there.

The first debate over the legal status of the Area began with the speech of Arvid Pardo, the Maltese Ambassador to the United Nations, before the General Assembly in 1967. In his speech, he warned States about the dangers of ocean pollution and conflicts over the distribution of riches from the seabed; he called for an effective international regime over the seabed and the ocean floor beyond a defined national jurisdiction²³.

After his speech, the UN began debate on the Area in earnest from 1968. The “Ad Hoc Committee to study the peaceful uses of the seabed and the ocean floor beyond the limits of national jurisdiction for exploration and use of deep seabed resources” was established by Resolution 2467A²⁴. Furthermore, “The Declaration of principles governing the sea bed and ocean floor, and the subsoil thereof, beyond the limits of national jurisdiction”, which included the actual regulations on the exploration and exploitation in the Area, was adopted in 1970²⁵. The preamble of the Declaration asserted that the current legal regime on the high seas did not provide a sufficient legal framework to regulate the exploration of the Area and the exploitation of its resources, and the Declaration included the following important principles:

- The sea bed and ocean floor, and the subsoil thereof (Area), beyond the limits of national jurisdiction, as well as the resources of the Area, are the common heritage of mankind

- the Area shall not be subject to appropriation by any means by States or persons, natural or juridical, and no State shall claim or exercise sovereignty or sovereign rights over any part thereof.
- No state or person, natural or juridical, shall exercise or acquire rights with respect to the Area or its resources incompatible with the international regime to be established and the principles of this Declaration
- All activities regarding the exploration and exploitation of the resources of the Area and other related activities shall be governed by the international regime to be established.

The Declaration is notable, as it enumerates the resources in the Area, the basic principles on the status of the Area, and guidelines for exploration and resource exploitation there; not surprisingly, it significantly affected LOS III. In fact, a number of provisions in Part XI of LOS make extensive use of the Declaration's wordings.

During LOS III, discussions among a number of delegations also affected the Area regime. For example, while the Area and its resources were to be considered the common heritage of mankind, ISA was established to organize and control the activities in the Area²⁶. This, however, does not mean that only ISA, through its mining arm the "Enterprise", may conduct explorations and exploitations in the Area. It is also recognized that States parties and States enterprises, and natural and juridical persons, under certain conditions, may carry out explorations and exploitations in associate with the Authority²⁷.

3.2 "Resources" in the Area

LOS provides no definitions on "resources" except that in Part XI. There, "resources" in the Area are defined as follows:

Resources means all solid, liquid or gaseous mineral resources in situ in the Area at or beneath the seabed, including polymetallic nodules²⁸

According to this definition, resources in the Area are limited to minerals irrespective of their shape. Though this definition, *prima facie*, is extremely clear, some scholars assert that the resources in the Area may include resources other than minerals, for example living resources²⁹. The main point of the assertions is that article 133 should be interpreted as the *status quo*³⁰, i.e., since living resources, especially genetic resources, in the Area had been little known until the 1990's³¹, they couldn't have been reflected in article 133. This interpretation is reasonable to some degree, as the conditions on which the making of laws is predicated might subsequently change. In support of this, we might refer to the Vienna Convention on the law of treaties, which recognizes that any subsequent practices in the application of a treaty that establishes the agreement of parties regarding its interpretation shall be taken into account for interpretation³². There are, however, no *ex post facto* States practices to support the above assertion. In considering the situation regarding minerals, it's hard to maintain that in article 133 resources implies anything other than minerals. As a result, resources other than minerals are not likely to be subject to the Area regime. This interpretation can be supported by the

travail préparatoire.

While there weren't many debates and proposals on article 133 during LOS III, an exception was the Maltese proposal, in 1971, before the Committee on the Peaceful uses of the Sea-bed and the Ocean Floor beyond the Limits of National Jurisdiction (the Sea-bed Committee). This proposal referred not to "resources" but "natural resources" as the resources in the Area³³. By this proposal, "natural resources" could be interpreted to involve resources other than minerals. In addition, the Draft, which was made by the working group of the first sub-committee in the Committee, said that the "resources" in the Area included not only non-living resources such as minerals but sedentary species as living resources³⁴; however, the proposal wasn't supported in the Committee. The debates on this issue were resumed in LOS III. The Informal Single Negotiating Text (ISNT), which was adopted in 1975, had a provision on the definition of resources:

"For the purposes of this Convention:

.

- (iii) "Resources" means resources *in situ*.
- (iv) "Mineral resources" means any of the following categorizations:
 - (a) Liquid or gaseous substances such as petroleum, gas, condensate, helium, nitrogen, carbon dioxide, water, steam, hot water, and also sulphur and salts extracted in liquid form in solution;
 - (b) Useful minerals occurring on the surface of the sea-bed or at depths of less than three metres beneath the surface and also concretions of phosphorites

and other minerals;

- (c) Solid minerals in the ocean floor at depths of more than three-meters from the surface;
- (d) Ore-bearing silt and brine³⁵,

As "for the purpose of this convention" was added to the beginning, this definition wasn't limited to the Area. Furthermore, the definition of minerals was left extremely broad and didn't strictly differentiate between legal terms and scientific terms; consequently, confusions in interpretation could easily occur³⁶. Against this concern, the U.S. delegation proposed the following modification:

For the purpose of this part: resources means mineral resources *in situ*³⁷

Although the U.S. delegation's intention was not clear, resources were limited to mineral resources *in situ* by this modification, and it was apparent that the definition was only used in the context of the Area. The proposal by the First Committee's Chairman, in 1977, largely maintained the U.S. modification. In his proposal, it added a new sentence to make clear that the definition of "resources" referred only to those in the Area:

For the purpose of this part of the Convention:

- (ii) "Activities in the Area" means all activities of exploration for, and exploitation of, this resources of the Area.
- (iii) "Resources" means mineral resources *in situ*. When recovered from the Area, such resources shall, for the purpose of this Part of the Convention, be regarded

as minerals.

- (iv) Minerals shall be divided into the following categories:
 - (a) Liquid or gaseous substances such as petroleum, gas, condensate, helium, nitrogen, carbon dioxide, water, steam, hot water, and also sulphur and salts extracted in liquid form in solution;
 - (b) Useful minerals occurring on the surface of the sea-bed or at depths of less than three metres beneath the surface and also concretions of phosphorites and other minerals;
 - (c) Solid minerals in the ocean floor at depths of more than three metres from the surface;
 - (d) Ore-bearing silt and brine³⁸

By inserting (iii), it was possible for the definition to include resources such as hydrocarbon, which was not covered by (iv)³⁹. This proposal was largely carried over to both the RSNT and the ICNT; it was ultimately modified in the Draft Convention in 1981 as follows:

For the purpose of this part:

- (a) "Resources" means all solid, liquid or gaseous minerals resources in situ in the Area at or beneath the sea-bed, including polymetallic nodules;
- (b) Resources, when recovered from the Area, are referred to as "minerals"⁴⁰

The main effect of the Draft was that it simplified the content by deleting the enumeration of mineral examples. This resulted in it being adopted as the LOS.

Finally, in the above process, we might point out that economic factors also played a large role: States at LOSIII only considered objects whose exploitation might result in financial gain⁴¹. In the 1970's and 1980's, while many States sought actively to exploit petroleum, natural gas and rare metals such as manganese, cobalt and nickel, they didn't regard living resources, including genetic resources, as having significant economic potential.

3.3 MSR in the Area

As proposed above, bioprospecting should be dealt with in the context of MSR. At the same time, however, it would mean that regulations over MSR necessarily apply to bioprospecting. With regard to MSR in the Area, article 143 sets out the following regulations:

1. Marine scientific research in the Area shall be carried out exclusively for peaceful purposes and for the benefit of mankind as a whole, in accordance with Part XIII.
2. The Authority may carry out marine scientific research concerning the Area and its resources, and may enter into contracts for that purpose. The Authority shall promote and encourage the conduct of marine scientific research in the Area, and shall coordinate and disseminate the results of such research and analysis when available.
3. States Parties may carry out marine scientific research in the Area. States Parties shall promote international cooperation in marine scientific research in the Area by:

- (a) participating in international programs and encouraging cooperation in marine scientific research by personnel of different countries and of the Authority;
- (b) ensuring that programs are developed through the Authority or other international organizations as appropriate for the benefit of developing States and technologically less developed States with a view to:
 - (i) strengthening their research capabilities;
 - (ii) training their personnel and the personnel of the Authority in the techniques and applications of research;
 - (iii) fostering the employment of their qualified personnel in research in the Area;
- (c) effectively disseminating the results of research and analysis when available, through the Authority or other international channels when appropriate.

Article 143 says that although all States Parties can carry out MSR in the Area, in conformity with Part X III, it shall be 1) exclusively for peaceful purposes, and 2) for the benefit of mankind as a whole. Part X III has a number of provisions on MSR; while one of them, article 240, refers to the former concept as a general principle of MSR⁴², there is no article in Part X III referring to the latter concept. This implies that the latter concept is applicable to MSR undertaken in the Area. In this respect, what “the benefit of mankind as a whole” indicates is crucial, since the degree and the extent of regulations that MSR will be

subject to depends on the interpretation of the concept. LOS, however, does not define it; neither are there any agreements on its’ definite meaning among States. Generally speaking, “the benefit of mankind as a whole” concept reminds us that the benefit shall be distributed to all States, including developing States. Even this interpretation is likely to encounter some difficulties when the concept is practically applied, as it is not obvious whether “benefit” means only commercial potential or also includes scientific or other potential⁴³. An example of “the benefit of mankind as a whole” would be if all States take profits from medicines or industrial products developed from the knowledge or samples obtained by MSR. In any event, it’s difficult to presume that MSR is indeed regulated by the concept since it is nowhere defined clearly⁴⁴.

Apart from the above concept, paragraph 3 of article 143 provides that States parties shall promote international co-operation: by participating in international programs and encouraging co-operation by personnel of different countries and of ISA (paragraph a), by ensuring that programs for developing States strengthen their research capabilities and train their personnel (paragraph b), and by effectively disseminating the results of research and analysis when available, through ISA or other international channels when appropriate (paragraph c). While paragraph (a) and (b) have a direct link with the undertaking of MSR, paragraph (c) requires scrutiny as it refers to an obligation to disseminate results and analyses. In considering this issue, we need to pay special attention to the phrase, “the results and analysis when available”. The

question of who decides “when” these are “available” is left undefined. Moreover, heretofore States conducting research in the Area have seldom been required to carry out such dissemination. Practical procedures are thus necessary to encourage States to comply with these obligations.

3.4 The Jurisdiction of ISA

When MSR is undertaken in the Area, including bioprospecting, the issue arises whether it can be regulated by ISA.

Article 157 anticipates this in its statement of the nature and the fundamental principles of ISA. As to administering the resources of the Area, it says that ISA is the organization responsible for organizing and controlling activities in the Area. Furthermore, the jurisdiction and functions of ISA shall be expressly conferred upon it by LOS, and ISA shall have such incidental authorities consistent with LOS as are implicit in and necessary for the exercise of the jurisdiction and functions with respect to activities in the Area. In other words, the jurisdiction of ISA is limited to organizing and controlling “activities in the Area”. In article 1, paragraph 3, “activities in the Area” explicitly signifies “all activities of exploration for, and exploitation of, the resources of the Area”⁴⁵. Accordingly, ISA has the definitive jurisdiction to organize and control activities concerning exploration and exploitation of the resources of the Area⁴⁶. In light of this provision, ISA doesn’t have the authority to exercise its jurisdiction unless bioprospecting is related to exploration and exploitation of the mineral resources, a reasonable interpretation according to the drafting history of article 1.

Although article 1 defines activities in the Area, that definition was discussed as part of article 133 at the beginning of LOSIII. ISNT, which was adopted in 1975, expressed it as follows:

Activities in the Area means all activities of exploration of the Area and the exploitation of its resources and other related activities, including scientific research.⁴⁷

This draft characterized “scientific research” as an act in relation to exploration in the Area and exploitation of its resources, thus confirming that scientific research was controlled by ISA. In 1976, the U.S. delegation proposed the following modification against the draft:

Activities in the Area means all activities of exploration for, and exploitation of, the resources of the Area.⁴⁸

In this proposal, “scientific research” was deleted and the subsequent drafts basically followed the U.S. proposal as well. As far as the process of discussion in LOSIII is concerned, ISA wasn’t assumed to have the authority to control scientific research, including bioprospecting⁴⁹. In addition to this, ISA, *per se*, maintained a negative attitude towards regulating MSR. Former ISA Secretary - General Nandan announced in a press release in 2003 that “we are not looking to control or manage or regulate MSR”⁵⁰. Nevertheless, if MSR, including bioprospecting, involves the exploration or exploitation of the resources in the Area, it might be included in “activities in the Area”⁵¹ and consequently would be regu-

lated by ISA⁵². However, even in that case, ISA can hardly be said to regulate MSR, as it's unclear whether ISA can execute measures against MSR due to a lack of practical procedures regulating "activities in the Area". To date, there are only 2 regulations on exploration and exploitation of resources in the Area: 1) Regulation on Prospecting and Exploration for Polymetallic Nodules in the Area, and 2) Regulation on Prospecting and Exploration for Polymetallic Sulphides⁵³.

3.5 Can ISA regulate bioprospecting for protection of the marine environment?

As mentioned above, it is not possible for ISA to oversee MSR, including bioprospecting, unless it's related to "activities in the Area". However, there are some scholars who assert that ISA could regulate MSR by reason of its mandate for protecting the marine environment⁵⁴. They cited article 145 as the legal basis of that assertion:

Necessary measures shall be taken in accordance with this Convention with respect to activities in the Area to ensure effective protection for the marine environment from harmful effects, which may arise from such activities. To this end the Authority shall adopt appropriate rules, regulations and procedures for *inter alia*:

- (a) the prevention, reduction and control of pollution and other hazards to the marine environment, including the coastline, and of interference with the ecological balance of the marine environment, particular attention being paid to the need for protection from harmful effects of such activities as drilling,

dredging, excavation, disposal of waste, construction and operation or maintenance of installations, pipelines and other devices related to such activities;

- (b) the protection and conservation of the natural resources of the Area and the prevention of damage to the flora and fauna of the marine environment.

ISA has the authority to adopt regulations and procedures for protecting and conserving natural resources in the Area, and preventing damage to the flora and fauna of the marine environment. Based on this provision, if bioprospecting is likely to cause damage to natural resources or to flora and fauna, it would be possible for ISA to restrain it. However, as stated at the beginning of article 145, ISA can adopt appropriate regulations and procedures in order to protect the marine environment in the Area from harmful activities. Thus, the marine environment ISA has authority to protect is limited to that affected by the exploration and exploitation of the resources therein⁵⁵. This was recognized by the Pakistan delegation at LOS III, who proposed that ISA should be responsible for taking enforcement measures against unauthorized dumping. Although the proposal didn't receive adequate support⁵⁶, the drafting process showed that a number of delegations considered ISA's jurisdiction to be limited to the exploration and exploitation of the resources⁵⁷.

For these reasons, article 145 may not be regarded as grounds for regulating MSR, including bioprospecting; accordingly, ISA has no authority to regulate MSR⁵⁸. Nevertheless, it cannot be denied that the general obligation to protect the marine environment provided by

article 192 is applicable to the Area⁵⁹ and, therefore, article 192 must be observed when MSR is undertaken there.

3.6 The principle of the Common Heritage of Mankind

As the Common Heritage of Mankind principle governs the Area, what the principle means could affect the jurisdiction of ISA and the treatment of living resources in the Area.

While there have been a number of controversies over the meaning of the principle⁶⁰, no consensus has yet been reached. These controversies originated from a compromise between developing States, which were to manage resources in the Area through ISA, and developed States, which were to develop these resources freely. In consequence, it was inserted as a political concept regardless that it could not be considered a legal notion⁶¹. Nevertheless, it has been recognized that the principle prohibits the appropriation of the Area and its resources by States, and recognized that the profits produced by exploitation shall be distributed to States. A clue to examining the principle is likely to be article 137, since this is regarded as the clearest embodiment of the Common Heritage of Mankind principle⁶². It provides as follows:

1. No State shall claim or exercise sovereignty or sovereign rights over any part of the Area or its resources, nor shall any State or natural or juridical person appropriate any part thereof. No such claim or exercise of neither sovereignty or sovereign rights nor such appropriation shall be recognized.
2. All rights in the resources of the Area are

vested in mankind as a whole, on whose behalf the Authority shall act. These resources are not subject to alienation. The minerals recovered from the Area, however, may only be alienated in accordance with this Part and the rules, regulations and procedures of the Authority.

3. No State or natural or juridical person shall claim, acquire or exercise rights with respect to the minerals recovered from the Area except in accordance with this Part. Otherwise, no such claim, acquisition or exercise of such rights shall be recognized.

It is apparent that article 137 focuses on the Area and its resources. It is not obvious whether “the Area” means only the seabed in the physical meaning or living resources subsidiary to it as well. If “the Area” indicates the latter interpretation, the genetic resources could be regarded as part of the Area and bioprospecting could be affected.

Article 137 is basically unchanged from principles 1, 2 and 3 of the Declaration, which passed largely unmodified to the Committee and LOSIII. In order to examine the meaning of “the Area”, it’s necessary to consider what is indicated by the phrase “no State shall claim or exercise sovereignty or sovereign rights over any part of the Area or its resources”. So far, it hasn’t been absolutely clear whether the usages of “sovereignty” and “sovereign rights” are identical to those in other articles in LOS.

On the one hand, “sovereignty” is likely to refer to territorial rights in territorial seas; on the other hand, “sovereign rights” indicate the right to exclusively explore and exploit the Area as far as the contents of article 55 and 77 are concerned. In other words, each right

implies those territorial rights or quasi-territorial rights. For these reasons, article 137 should be interpreted as forbidding the exercise of these rights in the Area. The features of sovereignty and sovereign rights remind us of the considerable exclusion, which limits or forbids appropriating the Area by other States, except in special cases. Consequently, the sovereignty and sovereign rights mentioned in article 137 aim at preventing a unilateral exercise of the State's jurisdiction. In addition, another reason why such interpretation can be deduced is the word "appropriation" used in the provision. This word was used in principle 2 of the Declaration as well⁶³. As mentioned above, there were no significant changes in the wording of article 137 in the course of the *travaux préparatoires* of LOSIII. Therefore, it is reasonable to presume that the interpretation of article 137 does not differ from that of the Declaration.

In this respect, we need to focus, for reference, on the *travaux préparatoires* of Principle 2 of the Declaration. The main aim of Principle 2 is to indicate that general international law on acquiring territory shall not apply to the Area: "appropriate" is used in order that no part of the Area can be possessed by any States. When the Declaration was enacted, a number of States were concerned with mineral resources including petroleum, natural gas and rare metals. To exploit and acquire commercial benefit from these, vast areas of more than at least 10,000 square kilometers need to be occupied for more than at least 10 years. In contrast, bioprospecting doesn't require such excessive conditions to sample genetic resources⁶⁴.

For these reasons, the Common Heritage

of Mankind principle cannot be invoked as the legal basis for regulating bioprospecting.

4. The applicability of CBD

4.1 The genetic resources in CBD

CBD defines genetic resources as "genetic material of actual or potential value" and defines genetic material as "any material of plant, animal, microbial or other origin containing functional units of heredity"⁶⁵. CBD confers sovereign rights on coastal States with respect to genetic resources within jurisdictional zones⁶⁶. However, in "areas beyond the limits of national jurisdiction" such as high seas or the Area, only activities that are subject to States' control and jurisdiction are regulated by CBD⁶⁷. Moreover, it has no provisions on genetic resources in the Area. This presumes that CBD is applicable as far as States can regulate genetic resources sampling by their nationals. Therefore, where the above activities aren't subject to the State's control or jurisdiction, CBD, in principle, is not applicable to genetic resources sampling⁶⁸. Moreover, even if the sampling is carried out under the State's control, it is unclear how to access genetic resources or share the benefits (ABS), since article 15 is not explicit concerning how to treat genetic resources that are sampled outside jurisdictional zones⁶⁹.

As for ABS, the Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arising out of their Utilization, which was adopted at the COP6 in 2002, established sophisticated clauses in order to equitably distribute profits, which are produced by the access and use of genetic resources, to States or bodies concerned. The guideline is very important in order to undertake clear distribution of benefits.

However, there are some issues to be resolved. Whether the guideline would be complied with is dependent on the intention of States Parties due to the guideline's arbitral characteristic⁷⁰. Furthermore, I -A-2 says that "nothing in these Guidelines shall be construed as changing the rights and obligations of Parties under the Convention on Biological Diversity"; the guideline must be applied within the CBD framework. In addition, the guideline never refers to the Area and bioprospecting.

In 2010, COP 10 adopted the Nagoya protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity, which is legally binding over the profits produced from access and use of genetic resources. As to the scope of the application, article 3 provides "this Protocol shall apply to genetic resources within the scope of Article 15 of the Convention and to the benefits arising from the utilization of such resources". The explicit reference to Article 15 of the CBD rather than "to the scope of the Convention" implies that States Parties did not wish to connect the geographical scope of the Nagoya Protocol with Article 4, paragraph (b) of the CBD, since this clause might raise the question of whether the Nagoya Protocol would apply to bioprospecting in the high seas⁷¹.

In any event, there are no provisions on the treatment of genetic resources sampled beyond jurisdictional areas in the Protocol; this proves that unresolved issues of CBD remain in the Protocol.

4.2 The new movement on treatment of genetic resources

In order to deal with these defects of CBD, the Action Plan on implementation of CBD for ocean and coastal biodiversity (Jakarta Mandate) was adopted at COP2 in 1995. In the Mandate, it called for the Secretary of CBD, together with DOALOS, to survey the relationship between LOS and CBD regarding preservation and sustainable use of genetic resources⁷². As to this issue, SBSTTA played an important role. After 8 years of debate, SBSTTA proposed a recommendation on the above issue⁷³. The recommendation was most useful in that it considered bioprospecting in the Area from a number of viewpoints; however, regarding bioprospecting therein and the genetic resources sampled, it merely clarified the difficulties. In the last phrase of the recommendation, it proposed 3 available options for the treatment of genetic resources in the Area:

1. Maintaining the *status quo*;
2. Application of the regime under Part X I of the United Nations Convention on the Law of the Sea, currently limited to the management of mineral resources;
3. Application of the regime of conservation and sustainable use of genetic resources under the Convention on Biological Diversity⁷⁴.

While each option aimed to fill the legal vacuum of both Conventions, the recommendation avoided drawing a conclusion. In this respect, the instrument hoped that the UN General Assembly along with Contracting Parties would debate which selection should be adopted⁷⁵. Based on the recommendation, the UN General Assembly established the "Ad

Hoc Open-ended Informal Working Group to study issues relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction” by means of the Resolution 59/24 in 2004⁷⁶; the debate over the treatment of genetic resources in the Area has continued to this day in the Working Group. The recommendation, which the Working Group proposed in 2010, supposed that genetic resources in the Area and bioprospecting there should be dealt with by applying LOS and policies based on the precautionary and ecosystem approaches, which are needed to preserve biodiversity in the Area⁷⁷. Whereas debates on this have continued, the Working Group has commented that CBD doesn’t regulate genetic resources in the Area and bioprospecting⁷⁸.

5. Conclusion

While bioprospecting in the Area should be included in the regime of MSR, genetic resources need to be treated within the framework of LOS as a whole rather than within the regime of the Area, including the Common Heritage of Mankind principle.

Apart from bioprospecting in the Area, another important point, which should be considered hereinafter, is the attribution of genetic resources sampled by bioprospecting. So far, the only legal principle governing genetic resources may be high seas freedom⁷⁹, since these are beyond the jurisdiction of ISA and have never been categorized as mineral resources⁸⁰. As a consequence, sampled genetic resources will be attributed to those who carry out the bioprospecting. However, it is the contention of the author that bioprospecting should be involved in MSR. Therefore, bio-

prospecting will be also subject to article 241, which provides that MSR shall constitute no legal basis for any claim to any part of the marine environment or its resources. Following this provision, no claim against the sampled genetic resources would be permitted. However, there are some untreated points on the issue; namely, what does the “marine environment”, “its resources” and “legal bases for claim” signify? In this respect, we can obtain some insight from analysis of the *travaux préparatoires* on article 241. This article originated in principle 10 of the Declaration and, at the beginning, was discussed in the context of high seas and the Area during the Committee; afterwards, it came to be applied to other areas⁸¹. At the beginning of the Committee, the article clearly aimed to prevent the monopoly of the exploration and exploitation of mineral resources in the Area. As the object of application expanded, the purpose of the article became relatively unclear. It would, therefore, be unreasonable to interpret the article uniformly due to the widely varying characteristics of the areas. For example, if MSR were carried out in territorial waters, EEZs and continental shelves, it would not be permitted for States carrying out research to claim any rights over the areas or resources. In contrast, it would be different if such research were conducted on the high seas. When fishing is undertaken on the high seas, the fishermen may assert rights over the resources obtained by fishing under certain conditions. However, when MSR is carried out there, no one can claim any rights. This seems an unreasonable interpretation of LOS.

Moreover, we should observe the phrase, “the legal basis for any claim” in article 241.

The wording, “the legal basis for any claim”, rather than “claim”, implies that research activities alone could not be the legal basis for a claim; but do not prohibit claiming rights *per se*: research activities shall not be quoted to justify their claims if conflicts against other States occur. This view is likely to be proved by States practices: when developed States carry out research over non-living objects such as rocks on the high seas or in the Area, they subsequently apply for various patents based on samples obtained by their research irrespective of article 241. Surprisingly, there has been no opposition to these acts from other States⁸². In considering the above practices, the author concludes that article 241 should be, without exception, interpreted in conformity with the nature of the respective areas.

¹ The United Nations Convention on the Law of the Sea, Article 245 and 246, paragraph 2.

² Article 257.

³ Article 256.

⁴ Article 136 and 137.

⁵ K.Lochte, “The deep sea floor-new discoveries and visions” in P.Ehlers et al eds, *Marine Issues – From scientific, political and legal perspective*, Kluwer Law International, (2002), p.236.

⁶ M.Synnes, “Bioprospecting of organisms from the deep sea: scientific and environmental aspects”, *Clean Technique and Environmental Policy*, vol.9, p.56.

⁷ R.Warner, “Prospecting the diversity of the depths: environmental regulation of bioprospecting and marine scientific research beyond national jurisdiction”, *Ocean Yearbook*, vol.22, p.413. Hereinafter cited as *O.Y.*

⁸ L.A de La Fayette, “A new regime for the Conservation and Sustainable use of Marine Biodiversity and Genetic Resources beyond

the limits of National Jurisdiction”, *International Journal of Marine and Coastal Law*, vol.24, p.264. Hereinafter cited as *I.J.M.C.L.*

⁹ Doc. UNEP/CDB/SBSTTA/8/INF/3/Rev.1, 22 February 2003, para.49.

¹⁰ Regulations on Prospecting and Exploration for Polymetallic Sulphides have resembled provisions.

<http://www.isa.org.jm/en/documents/mcode>

¹¹ Allen states that MSR can be definitely distinguished “research exclusively for peaceful purposes and in order to increase scientific knowledge of the marine environment for the benefit of all mankind” from “research having a direct significance for the exploration and exploitation of natural resources”. C.H.Allen, “Protecting the Oceanic Garden of Eden: International Law Issues in Deep-Sea Vent Resource Conservation and Management”, *Georgetown International Environmental Law Review*, vol.13, p.643.

¹² For example, A.H.A.Soons, *Marine Scientific Research and the Law of the Sea*, Kluwer Law and Taxation Publishers, (1982), pp.118-125.

¹³ A/CONF.62/WP.8/REV.1/PART III reproduced in *Third United Nations Conference on the Law of the Sea: Official Records*, vol.5, p.182. Hereinafter cited as *UNCLOS III*.

¹⁴ Article 247 of ICNT, A/CONF.62/WP.10 reproduced in *UNCLOS III*, vol.8, p.42.

¹⁵ *UNCLOS III*, vol.10, p.190.

¹⁶ R.Platzöder ed., *Third United Nations Conference on the Law of the Sea: Documents*, Oceana Publications, vol.10, p.386. Hereinafter cited as *Platzöder*.

¹⁷ For example, Glowka says, “MSR is distinguishable from other investigative activities that are undertaken purely to uncover commercially useful information and natural resources, in that, while these activities are also characterized by information, data, and sample collecting, they are conducted primarily for economic purposes.” L.Glowka, “The Deepest of Ironies: Genetic Resources, Marine Scientific Research, and the Area”, *O.Y.*, vol.12, p.172.

¹⁸ T. Scovazzi, “Minig, Protection of the Environment, Scientific Research and Bioprospecting: Some Considerations on the role of the International Se-Bed Authority”, *I.J.M.C.L.*, vol.19, p.403.

- ¹⁹ Oceans and the law of the sea, report of the secretary-general, A/60/63/Add.1, 15 July 2005, para. 202.
- ²⁰ Ibid, A/66/70, 22 March 2011, para.63.
- ²¹ Article 1, paragraph(1).
- ²² The insertion of the Common Heritage of Mankind principle into the Declaration means that the legal status of the Area as *res communis* governed by the freedom of the high seas was translated into another one. That is, it included the exploration and exploitation of the Area and its resources, and the equitable distribution of its right. B.Larschan and B.C.Brennan, "The Common Heritage of Mankind Principle in International Law", *Columbia Journal of Transnational Law*, vol.21, p.319.
- ²³ UN.Doc.A/C.1/PV/1515,1516, 1 November 1967.
- ²⁴ A/RES/2467(X X III)A, 21 December 1968.
- ²⁵ A/RES/2749(X X V), 17 December 1970.
- ²⁶ Article 157, paragraph 1.
- ²⁷ Article 153. In any event, those facts demonstrated that LOS regime was the only legitimate regime governing the Area. M.Gorina-Ysern, *An International Regime for Marine Scientific Research*, Transnational Publishers, (2003), p.323.
- ²⁸ Article 133, paragraph (a).
- ²⁹ E.Mann Borgese, *The Oceanic Circle: Governing the Seas as a Global Resources*, United Nations University, (1998), pp.170,171. In addition to this, Elferink asserts that "resources" in article 133 doesn't mean an exhaustive provision. A.G.O.Elferink, "The regime of the Area: delineating the scope of application of the common heritage principle and freedom of the High Sea", *I.J.M.C.L.*, vol.22, p.152.
- ³⁰ C.H.Allen, op. cit., p.639.
- ³¹ L.Glowka, "Genetic Resources, Marine Scientific Research and the International Seabed Area", *Review of European Community and International Environmental Law*, vol.8, p.58. Hereinafter cited as *R.E.C.I.E.L.*
- ³² The Vienna Convention on the law of treaties, Article 31, paragraph 3(b).
- ³³ S.N.Nandan, M.W.Lodge and S.Rosenne, eds, *United Nations Convention on the Law of the Sea 1982 A Commentary*, Martinus Nijhoff, vol.6, p.71. Hereinafter cited as *Virginia Commentary*.
- ³⁴ *Report of the Committee on the Peaceful uses of the Sea-bed and the Ocean Floor beyond the Limits of National Jurisdiction*, vol.2, p.52.
- ³⁵ A/CONF.62/WP.8/Part.1, reproduced in *UNCLOS III*, vol.4, p.137.
- ³⁶ *Virginia Commentary*, vol.6, pp.72, 73.
- ³⁷ *Platzöder*, vol.7, p.153.
- ³⁸ *Ibid.*, vol.6, p.121.
- ³⁹ *Ibid.*, p75.
- ⁴⁰ *UNCLOS III*, vol.15, p.194
- ⁴¹ L.A de La Fayette, op. cit., p.268.
- ⁴² Article 240, paragraph (a).
- ⁴³ Article 155, paragraph 1, (f) sets out "benefit" from activities in the Area as financial and other economic benefits. It, however, is indefinite whether "benefit of mankind" is identical to above benefits.
- ⁴⁴ W.S.Scholz, "Oceanic Research-International law and national legislation-", *Marine Policy*, vol.4 p.114.
- ⁴⁵ As to activities contained in "activities in the Area", Advisory Opinion by Seabed Disputes Chamber on the International Tribunal for the Law of the Sea in 2011 indicated as follows: "these activities include: drilling, dredging, coring, and excavation; disposal, dumping and discharge into the marine environment of sediment, wastes or other effluents; and construction and operation or maintenance of installation, pipelines and other devices related to such activities". *Advisory Opinion on Responsibilities and Obligations of States sponsoring persons and entities with respect to activities in the Area*, the International Tribunal for the Law of the Sea, 1 February 2011, para.87. Even in that case, we shall remember that the objective of "activities in the Area" is only mineral resources and that marine life including genetic resources is not the objective of those.
- ⁴⁶ R.Wolfrum and N.Watz, "The interplay of the United Nations Convention on the Law of the Sea and the Convention on Biological Diversity", *Max Plank Yearbook of United Nations Law*, vol.4, p.458. Hereinafter cited as *M.P.Y.U.N.L.*
- ⁴⁷ *Platzöder*, vol.7, p.110.
- ⁴⁸ *Ibid.*, p.153.
- ⁴⁹ L.van Meurs, "Regulations relating to marine scientific research conducted for the purpose

- of preservation of the environment or aimed at locating natural resources”, *South African Yearbook of International Law*, vol.10. p.111.
- ⁵⁰ ISA, Press Release, UN Doc no SB9/13, 7th August, 2003,
- ⁵¹ D.K.Leary, “Bioprospecting and the genetic resources of hydrothermal vents on the high seas: what is the existing legal position, where are we heading and what are our options?”, *Macquarie Journal of International and Comparative Environmental Law*, vol.1, p.152.
- ⁵² D.R.Rothwell and T. Stephens, *The International Law of the Sea*, Oxford and Portland, (2010), p.334.
- ⁵³ In addition, Regulations for Prospecting and Exploration of Cobalt-Rich Crusts will be issued soon.
- ⁵⁴ For example, H.Th.Wegelein, *Marine Scientific Research-The operation and status of research vessels and other platforms in international law-*, Martinus Nijhoff, (2005), p.211.
- ⁵⁵ C.H.Allen, op. cit., p.631, footnote 412.
- ⁵⁶ *UNCLOS III*, vol.6, p.114.
- ⁵⁷ K.Hakapää, *Marine Pollution in International Law Material Obligation and Jurisdiction*, Suomalainen Tiedeakatemia, (1981), p. 286.
- ⁵⁸ M.C.Wood, “The International Seabed Authority: Fifth to Twelfth Sessions(1999-2006)”, *M.P.Y.U.N.L.*, vol.11, pp.59,60.
- ⁵⁹ R. Warner, op. cit., p.422.
- ⁶⁰ D.K.Leary, *International Law and the Genetic Resources of the Deep Sea*, Martinus Nijhoff, (2007), pp. 95-98.
- ⁶¹ The utterance by Belgian delegation at the Sea-bed Committee, UN.Doc.A/C.1/PV.1781, p.20.
- ⁶² *Virginia Commentary*, vol.6, p.99.
- ⁶³ Principle 2 says, ” the Area shall not be subject to appropriation by any means by States or persons, natural or juridical, and no State shall claim or exercise sovereignty or sovereign rights over any part thereof”.
- ⁶⁴ L.A de La Fayette, op. cit., p.264.
- ⁶⁵ The Convention on Biological Biodiversity, article 2.
- ⁶⁶ Article 4.
- ⁶⁷ Article 4, paragraph (b).
- ⁶⁸ Even if States can regulate activities in the Area, they have never done this so far. United Nations Informal Consultative Process on Oceans and the Law of the Sea, “An update on Marine Genetic Resources: Scientific Research, Commercial Uses and a Database on Marine Bioprospecting”, 8th meeting, 25-29 June 2007, section 5.1.
- ⁶⁹ R.Wolfrum and N.Matz, op. cit., p.471.
- ⁷⁰ I -A-7.
- ⁷¹ M. Buck and C. Hamilton, “The Nagoya Protocol on access to genetic resources the fair and equitable sharing of benefits arising from their utilization to the convention on biological diversity”, *R.E.C.I.E.L.*, vol.20, p.57.
- ⁷² UNEP/CBD/COP2/19, Decision II /10, 30 November 1995, para.2
- ⁷³ UNEP/CBD/SBSTTA/8/INF/3/Rev.1, 22 February 2003
- ⁷⁴ *Ibid.*, para.128.
- ⁷⁵ *Ibid.*, para.129.
- ⁷⁶ A/59/24, 17 November 2004, para.73.
- ⁷⁷ A/65/68, 17 March 2010, para.19.
- ⁷⁸ R.Warner, op. cit., p.426.
- ⁷⁹ J.Mossop, “Protecting Marine Biodiversity on the Continental Shelf beyond 200 nautical miles”, *Ocean Development and International Law*, vol.38, p.294.
- ⁸⁰ B.H.Oxman, “The high seas and the international seabed area”, *Michigan Journal of International Law*, vol.10, p.536. However, even in that case, it never mean that bioprospecting can be carried out without any reservations.
- ⁸¹ *Virginia Commentary*, vol.4, pp.464, 465.
- ⁸² C.H.Allen, op. cit., p. 635. United Nations Informal Consultative Process on Oceans and the Law of the Sea, op. cit.

A Study on Dynamic Behavior of Sharks in Sagami Bay and a Possible Application of the Outcome to the Management of Fishery Resources

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Abstract

Most shark species are predators at the top of the food chain, and trends in their reserves thus have a large impact on the marine ecology. They are vulnerable to high fishing pressures because they are slow growing species with low fecundity. Recently, various problems related to sharks have triggered international controversy. How human society addresses these problems while balancing the impact of sharks on fisheries and the marine ecology is crucial. In this study, the history of shark fishing and the damage to fisheries caused by sharks in the seas under the jurisdiction of Japan are reviewed, as is the dynamic behavior of the demersal shark *Squalus mitsukurii*, which was recently analyzed with a bio-logging system under natural conditions in Sagami Bay. Finally, a fishery management method in coastal areas is discussed from a standpoint different from conventional approaches, and a possible future management scheme is proposed for sustainable utilization of shark resources.

Key words: Elasmobranchii, Management of Fishery Resources, Acceleration Data-logger, Shortspine Spurdog, *Squalus mitsukurii*

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