

Keynote Lecture

Education on ICOM (Integrated Coastal and Ocean Management) for Undergraduate Students: Background, Needs, and Prospects

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ABSTRACT

Although the land territory area of Japan is the 61st largest of any country, the country has 12 times greater territorial and EEZ (exclusive economic zone) waters than land, the 6th largest in the world. Acknowledging this fact, the Japanese Government established the “Basic Act on Ocean Policy” in 2007, and enacted the revised 2nd “Basic Plan on Ocean Policy” in 2013. This plan promotes the development and use of ocean resources, comprehensive management of the sea, and improvement of marine-related education. In accordance with the Plan, in 2016 we started the “Four-Dimensional Kuroshio Marine Science (4D-KMS)” research project at Kochi University. This aims at the creation of a four-dimensional integrated (space and time) study on marine resources in the Kuroshio region. The project aims to harmonize development and sustainable use (management) of natural ocean resources (biological, energy, and mineral resources) with conservation of marine environments. We will try to apply new scientific findings obtained during the course of the 4D-KMS project to education for undergraduate students. In the newly established “Department of Marine Resource Science” at Kochi University, we have three courses; Aquaculture (fishery); Marine Resources and Environment (geology); and Marine Biological Chemistry (microbiology and chemistry). Regardless of the course to which a student belongs, all will study general ocean management. We named this study curriculum ICOM (Integrated Coastal and Ocean Management) program. Kochi University will develop students with “ICOM”-oriented outlooks, knowledge, techniques, and networks, who will play an important role in contributing to the national commitment to the ocean.

Key words: ICOM, ICM, Coastal and Ocean Management, Undergraduate Education, Conservation of Marine Environments in Kuroshio Region

BACKGROUND AND NEEDS OF OCEAN MANAGEMENT

Japan is a country surrounded by the sea and has a long history of using it for fishery, marine transportation, and tourism, among other things. All in all, the Japanese have enjoyed many benefits from the sea. Although the land territory area of Japan is ca. 0.38 million km², which is the 61st largest of any country, the country has 4.47 million km² of territorial and EEZ (exclusive economic zone) waters, which is 12 times greater than the land area and represents the 6th largest in the world (Fig. 1).

However, recently Japan’s ambient waters have experienced many problems, for example pollution of marine

environments (red tides outbreak, shellfish poisoning, etc), a decrease in marine biological resources (ie. tuna, eel), and the occurrence of serious maritime accidents (collisions, oil spills from tankers, etc). For us, and for all human beings in the world, in order to secure and maintain food, energy, and resources, and/or to keep global environments in good condition, the role of the sea will undoubtedly be more and more important.

In addition to practical ways of using the sea, the importance of coastal management is also increasing. Acknowledging this fact, the “Basic Act on Ocean Policy” was established by Japanese Government in 2007 (see following URL. http://www8.cao.go.jp/ocean/policies/law/pdf/law_je.pdf). Following that, in 2008, the 1st “Basic Plan

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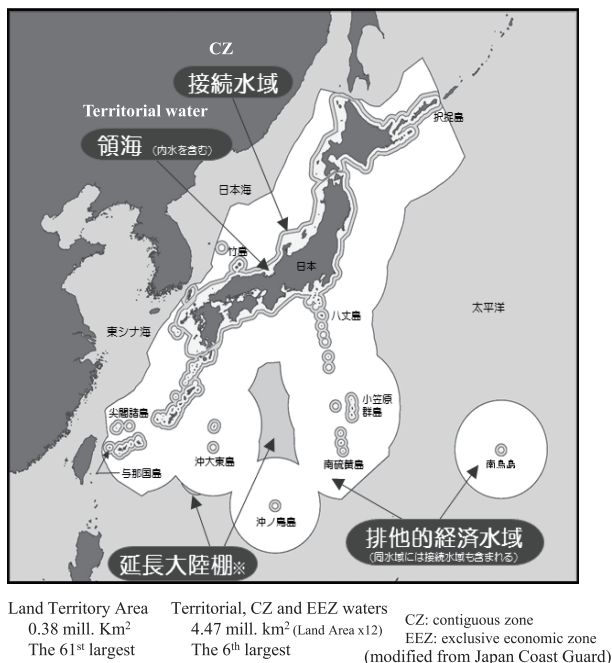


Fig. 1. Land territory area and territorial, CZ, and EEZ waters of Japan.

on Ocean Policy” was enacted, which was later revised in 2013 (http://www8.cao.go.jp/ocean/english/plan/pdf/plan02_gaiyou_e.pdf). This 2nd version of the Basic Plan on Ocean Policy promotes the development and sustainable use of ocean resources in harmony with conservation of the marine environment, comprehensive management of the sea, and improvement of marine-related education and the heightening of understanding of the oceans. Recently the government has started to use the term ICM (integrated coastal management) and has recommended the implementation of a comprehensive management system for the sea.

A 3rd revision to the Basic Plan on Ocean Policy was made very recently on May 15, 2018. (http://www8.cao.go.jp/ocean/english/plan/pdf/plan03_gaiyou_e.pdf). This revised plan emphasizes the promotion of comprehensive maritime security; however, its fundamental policy was carried over from the 2nd one.

“4D-KMS” PROJECT IN KOCHI UNIVERSITY

In accordance with the Plan, we started the “Four-Dimensional Kuroshio Marine Science (4D-KMS) (<http://www.kochi-u.ac.jp/4d-kuroshio/index.html>)” research project at Kochi University in 2016 (Fig. 2). This aims at the creation of a four-dimensional integrated study on marine resources in the Kuroshio region. The project aims to harmonize development and sustainable use of natural ocean resources (biological, energy, and mineral resources) in parallel with

“Four-Dimensional Kuroshio Marine Science (4D-KMS)” PROJECT

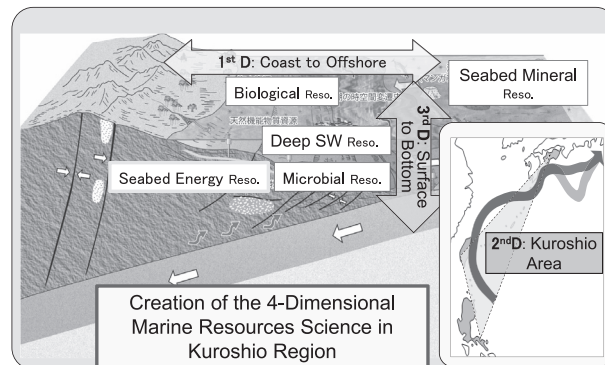


Fig. 2. The 1st, 2nd, and 3rd dimensions in four-dimensional studies on Kuroshio Marine Science Project.

conservation of marine environments. The most novel point of our project is that we try to consider development and use of new natural resources from a 4-dimensional perspective. This means that it is necessary to elucidate the spatial distribution and variation of resources (the “3Dimensions”). Besides such information, in order to manage marine resources properly and to use them sustainably, we must acknowledge the changing tendencies of resources in both the short- (“differential”) and long-terms (“integral”), including future perspectives (the 4th Dimension) (Fig. 3).

For example, when we study mineral resources such as methane hydrate, we have to understand its microbial production process (over a very short daily, or weekly, time span) in addition to the global and spatial distribution (long-term perspectives of millions of years). This means it will be a collaborative study between geologists and microbiologists.

Recently we often hear the expression “Think globally, AND act locally”. In the 4D-KMS project, however, we will carry out global studies using materials in the Kuroshio region. Therefore, our attitude is “Think local, BUT act globally!”.

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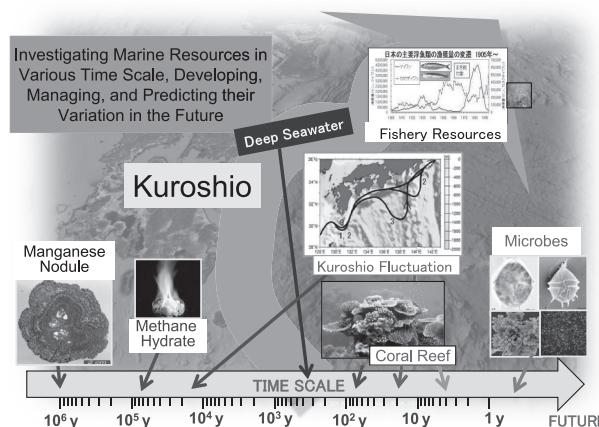


Fig. 3. Marine resources studies in various time scale (the 4th dimension).

ICOM EDUCATION FOR UNDERGRADUATE STUDENTS

As mentioned before, the 2nd version of the Basic Plan on Ocean Policy emphasizes the dual needs for comprehensive management of the sea, and for improvements in both marine-related education and in the citizenship's understanding about the ocean. Therefore, we will try to apply new scientific findings obtained by 4D-KMS project to education for undergraduate students. Recently, in 2016 Kochi University reorganised its educational faculties and established a new “Department of Marine Resource Science” within a newly-established Faculty of Agriculture and Marine Science (Fig. 4). In the Department, there are three courses; Aquaculture, Marine Resources and Environment, and Marine Biological Chemistry. Students in the first course will study biological resources (fishery), those in the second course about sea floor mineral resources (geology), while microbial genetic resources (microbiology and chemistry) form the focus for the third course. However, regardless of whichever course to which a student belongs to, all will study general ocean

Educational Faculties Reorganizing in 2016 in Kochi University

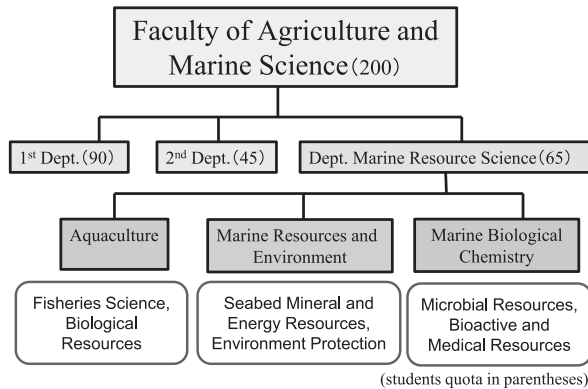


Fig. 4. Structure of newly established Faculty of Agriculture and Marine Science in Kochi University.

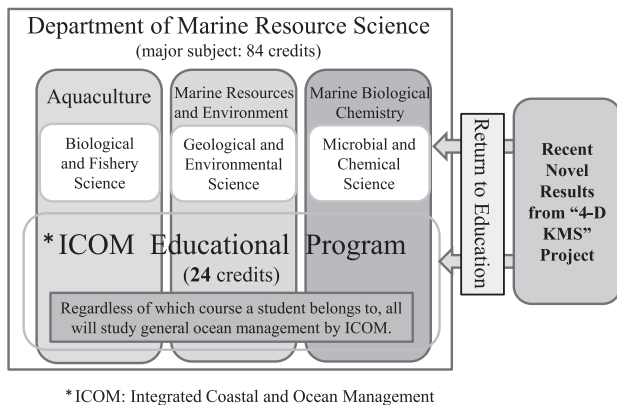


Fig. 5. Curriculum structure and ICOM program in Department of Marine Science.

management. We named this study curriculum ICOM (Integrated Coastal and Ocean Management) program (Fig. 5).

Although a few universities in Japan have already started such ICM (Integrated Coastal Management) education programs at their graduate schools, no such education had been carried out at undergraduate level. At Kochi University, we added “Ocean” to ICM and started ICOM educational program in 2016 - the first instance of it being implemented at undergraduate level at a Japanese University. The reason we do not begin ICOM education in graduate school but rather at undergraduate level is a wish to develop young students who are still in flexible in thinking. ICOM education program consists of subjects of both natural and social sciences. Through ICOM, we seek to develop students possessed of the following; various knowledge and techniques relating to the sea from both natural and social sciences; a mindset and network capable of integrating such knowledge and techniques, and readiness capability.

PROSPECTS

In the future, people possessing an ICOM mind set will surely be required in Japan. Japanese society, however, has not yet nurtured such talented people. According to a survey conducted with high school students, only 4.4% students know the meaning of ICM. However, after gaining an understanding the concept of ICM, more than 50% of these students considered ICM as important. At the same time, the results of a survey with local governments, business companies, and corporations show they still felt little need to employ people with ICM consciousness. These facts show that unfortunately society has yet to acknowledge the need for ICM (ICOM)-minded people, but we are sure the time will soon come when society will actively seek and moreover employ such people.

According to Dr. Chua Thia-Eng, who for 15 years was regional program director of PEMSEA (Partnerships in Environmental Management for the Seas of East Asia) (<http://pemsea.org/>), a person who is ICM (ICOM) minded is someone who can; think like a scientist, work like a manager, speak like a diplomat, (and drink like a horse?!). To conclude, Kochi University will develop students with such mindsets, knowledge, techniques, and network, and will thereby play an important role in contributing to the national commitment to the ocean.

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