

Summary Report on the Joint Kuroshio Workshop*

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Introduction

At the initiative of the Graduate School of Kuroshio Science(GSKS), the first multi-country workshop on various aspects relating to and affecting the Kuroshio Current and the regions it transverses was held at the Asakura Campus of Kochi University from 21 to 23 November, 2007.

In recent years there has been increasing concern over the impact of internal factors, typically a result of human intervention and activity in both the sea and land and external factors, such as climatic change and global warming, impacting on the ecological health of the marine environment of the Kuroshio Current. A growing body of research evidence suggests a continuing deterioration of this delicate ecosystem which will eventually adversely affect the economic and physical well being of coastal communities, particularly those dependent on the resources of the marine environment.

The three countries involved were Japan, Taiwan and the Philippines, parts of all of which directly border along the flow of the Kuroshio. These three countries represent the temperate, sub-tropical and tropical zones of the Kuroshio respectively. This first step towards establishing research collaboration by way of convening the Workshop is in recognition that in order to be effective, strategies for rehabilitation and conservation must transcend national borders.

The primary content of the Workshop was the presentation of a number of technical papers and consequent discussions on various aspects relating to situational conditions and changes in the marine ecosystem in the regions affected by the Kuroshio. The underlying theme and purpose was to lay the foundations for a multi-country research collaboration effort aimed towards providing scientific information necessary for policies and strategies required for the protection, rehabilitation and conservation of the marine ecosystem in the whole Kuroshio region.

1. Significance of the Kuroshio current

Japan: Of the three countries bordering the Kuroshio it is without question that its historic, cultural, physical and socio-economic significance is greatest in Japan. Its seaweed beds constitute important breeding and nursery grounds for fish, hence it is being referred to as the “Cradle of Fishes”. Its flow transports with it rich marine resources which have been referred to as the “blessings of the Kuroshio” which have historically been the basis of the economy of the coastal communities especially in the southern parts of Japan. Awareness of the Kuroshio in Japan stretches back many centuries and in some regions such as Kochi Prefecture is believed to have influenced the economy, lifestyles, foods and culture of the local people besides also having an effect on the natural environment. Consequently, we find that there exists a great appreciation and awareness of the need to conserve and sustain this important economic and historical resource and heritage. This has logically led to a large and growing body of scientific research over a long period and culminating recently, in 2004, with the establishment of a dedicated multi-disciplinary GSKS at Kochi University.

Taiwan: ‘Kuroshio awareness’ is somewhat less significant in Taiwan as compared to Japan owing possibly to a relatively more recent history of development and a comparatively shorter tradition of research institutions. However, realization of its importance as a natural resource with many economic spin-offs has been on the rise in recent years. Consequently there is also already a considerable body of advanced research output and growing interest in scientific research in various aspects of the marine sciences in the Kuroshio current. A special Kuroshio Research Group has been established within the Asia Pacific Ocean Resources Center at the National Sun Yat-Sen University. The research program is well advanced and forms a good base for research collaboration.

*Edited by chairpersons of the workshop.

The Philippines: The situation is rather different in the Philippines. Although the eastern seaboard of the Philippines is the source of the Kuroshio, being the area in which the upwelling of the current occurs, it in itself bears no significant or special meaning to the region or the coastal communities. Technically it is considered as little more than an offshoot of the North Equatorial Current. Exploitation of marine resources in this region of the Philippines constitutes a vital and important source of the livelihood of coastal communities but compared to Japan and Taiwan the most distinguishing feature would be the greatly different socio-economic status of the coastal communities.

However, as various documents of Bureau of Fisheries and Aquatic Resources under the Department of Agriculture indicate, the marine ecosystem continues to be a source of food supply but fish are caught much faster than the ability of fish stocks to replenish themselves. Recent developments in the local and scientific community are seriously considering this deterioration of coastal environment. As a result, the issues arising concerning the interaction of man and the marine environment are rather more basic issues of the people. Consequently, research undertaken locally thus far relate more directly to such issues. The University of the Philippines at Visayas, as well as Bicol University at Tabaco Campus are presently conducting intensive studies including the Marine Protected Area(MPA).

3. Overviews of the workshop

Ten technical papers were presented on the first day of the Workshop and covered a very diverse range of topics as can be seen from the list of presented papers. When viewed as a whole the diversity of topics presented in these papers indicate the very great complexity of issues in technical and socio-economic dimensions that face the regions of the Kuroshio. Further, the topics covered by the papers presented show that the nature of issues concerning developments in the Kuroshio vary considerably from country to country. Japan lies at one end of this spectrum with Taiwan closely placed, whereas issues of present concern in the Philippines are rather different and would place it at the other end. This is largely a consequence of the different status and level of the socio-economic conditions in the countries involved as well as those of their coastal communities in regions adjacent to the Kuroshio. As a further consequence, the status and scope of research activities and outputs relating to the Kuroshio region in Japan and Taiwan are considerably well advanced both in scope

and depth. This contrasts with the Philippines where the current research status appears to be more basic and comparatively broad in the coverage of issues.

The Workshop was convened with very specific objectives and expected outputs as follows:

- i. to understand the present status of the seaweed ecosystem;
- ii. to identify the problems and constraints; and
- iii. to identify priority collaborative study areas aimed at providing recommendations and strategies for seaweed-based ecosystem rehabilitation and protection.

However, given the constraints of time as well as the range of topics that could be reasonably covered in a workshop such as this it has to be recognized that the actual attainment of the objectives in (i) to (iii) above could only be partially met. It appears that the real achievement of the Workshop in this initial stage of joint multi-country discussion was in creating an awareness that:

- i. the rehabilitation and conservation of the marine ecosystem of the Kuroshio will be to the mutual benefit of all three countries along its flow;
- ii. inter-country collaboration in a program of scientific research will yield valuable scientific data required for formulating rehabilitation and conservation strategies; and,
- iii. the sustainability of the marine ecosystem of the Kuroshio will ultimately depend on how all three countries concerned, given different institutional and resource conditions, can effectively address both country specific issues affecting the health of the marine ecosystem within national boundaries as well as collaborate on matters requiring joint action on a trans-national level.

4. Summary of discussions

The detailed record of discussions undertaken after the presentation of the ten scientific papers is provided in a later section of these Proceedings. The following is a concise summary of the major topics and issues discussed based on the detailed discussions:

1) Deterioration of the marine environment

Deterioration of the marine environment along the Kuroshio with special reference to seaweed beds have been observed in all three countries. This could be a consequence of internal factors, i.e., a result of human intervention and activities, and external factors such as climate change and global warming. It is presumed in

the context of this Workshop that remedial and rehabilitation efforts can only be implemented for internal factors.

A common phenomenon in all three countries is the increase of barren areas devoid of marine flora, in particular seaweed and seagrass beds. In Japan this is referred to as *isoyake* whereby seaweed beds no longer grow resulting in areas of barren rock. The term 'beach scorch' is also commonly applied. This is of major concern in all three countries as these seaweed beds constitute the breeding and nursery grounds for fish and other marine fauna, and continued destruction would have serious consequences. The causes of the *isoyake* or beach scorch phenomenon have not been fully researched but are believed to be very varied based on early observations. Among the factors suggested are:

- ♦ Grazing by sea-urchins and other seaweed-feeding marine fauna. In addition, species of tropical marine fauna including herbivorous weed feeders not previously recorded have been found in temperate areas and this could be a result of rising ocean temperatures from global warming. However, high ocean temperatures cannot explain the *isoyake* phenomenon in the Philippines owing to previously existing high temperature conditions there.
- ♦ Eutrophication caused by human activities may be one factor contributory in the decline and loss of seaweed beds. However, its level and significance needs to be clarified by research as in many conditions eutrophic seawater can be favourable to the growth of seaweeds owing to the presence of dissolved nutrients. It may be simplistic to suggest a direct relationship between eutrophication and loss of seaweed beds.
- ♦ A clearer relationship between human activities on land and their negative impact on seaweed beds can be assumed for all three countries. In particular there is the effect of soil runoff into the sea resulting from land based activities. Deforestation and land clearing in the hinterland as well as coastal dredging of rivers for sand construction material was noted to be an especially important factor in the Philippines. In all three countries coastal reclamation work and the spread of urban and industrial development into coastal zones have been observed to decrease the transparency of seawater. This results in reduced photosynthetic efficiency which adversely affects weed growth.
- ♦ Over-exploitation of many types of marine fauna and flora by coastal fisher communities for livelihood purposes can be considered contributory in the Philippines.
- ♦ The impact of increasing tourism-related activities in the marine areas on the health and sustainability of the overall marine ecosystem, including seaweed beds needs to be better researched. This is particularly so in the case of Japan and Taiwan where recreational use of the ocean for diving and leisure is rapidly increasing and believed to be exerting pressure on the marine environment.
- ♦ In Taiwan typhoons have been observed to be causing damage to seaweed beds as the course of the Kuroshio lies directly in the path of typhoons. Increasing severity of typhoons possibly as a result of climate change is also noted.

2) MPA in relation to conservation and rehabilitation

Increasing pressure on the use of the marine environment and exploitation of marine resources is common to all three countries. A number of approaches and initiatives towards the protection and conservation of marine environments have been instituted through the establishment of Marine Protected Areas (MPAs), national and local marine parks as well as special conservation areas. The organization and institutional structure of these vary from country to country.

- ♦ In Japan and Taiwan, in addition to commercial fishing, there is increasing demand for recreational uses such as ecotourism and diving which pits the interests of local fishermen against tourists and local businesses dependent on tourist patronage. Japan has a well developed network of national and semi-national marine parks with rules governing their use. In addition there are examples of initiatives undertaken by local fishermen's associations to regulate tourism activities which can be a viable model of a type of MPA to accommodate the different interests of fishermen and tourists such as that in Kashiwa-jima in Japan. In addition, in some areas of Japan fishermen's associations are active in working to rehabilitate seaweed beds. In Taiwan, the funding and management of MPAs is seen to be a government responsibility with little voluntary participation from local fishermen's associations. This approach has also been shown to be effective as demonstrated by the experience of Green Island.

- ♦ The Philippines has a large number of various forms of MPAs. Some are established by local governments, others by concerned NGOs and still others by local universities as a component in research projects. For the majority, the concern in the Philippines is protection from over exploitation of fishery resources and destructive fishing methods. The effectiveness of these MPAs has not been well studied and often adequate resources for proper monitoring and enforcement of regulations may be lacking.
- ♦ The effectiveness of MPAs and marine parks as part of a strategy for conservation and rehabilitation may be different according to country. Both Japan and Taiwan, besides having higher levels of income and socio-economic development, also have well developed institutional frameworks in place to support efforts at conservation. The situation is much less favorable in the Philippines.

3) Initiation of joint studies and inter-country collaboration

As a starting point for joint studies and inter-country collaboration towards rehabilitation, conservation and better marine environmental management in all of the regions bordering on the Kuroshio Current it was unanimously agreed that the topic of seaweed and seagrass beds be adopted first, in view of the fact that deterioration of seaweed and seagrass beds is a problem common to all three countries. With this agreement the following additional points were noted:

- ♦ The key persons to initiate this first phase of studies were selected as follows:
 - a. Dr. Hin-Kiu Mok, National Sun Yat-sen

University, Taiwan.

b. Dr. Kazuo Okuda, GSXS, Kochi University, Japan.

c. Professor Victor S. Soliman, Bicol University, Philippines.

- ♦ The actual research topic relating to seaweed beds would be developed by the above three key persons through joint consultation. It is also desirable that as far as possible common research methodologies be adopted by all researchers.
- ♦ The existing organisational framework for joint studies is considered adequate for future collaborative work. Kochi University has concluded agreements with the relevant Philippine universities and state organizations which permit short-term assignments of Japanese scientists and students to undertake research with Philippine counterparts. A similar agreement to support the collaboration was also set up between Kochi University and National Sun Yat-sen University last May. A bilateral agreement is required in the case of collaboration among counterparts between Taiwan and the Philippines since there is no MOU between these two parties.

4) Other matters

A periodic evaluation mechanism to allow for the presentation and discussion of on-going research needs to be put in place. For a start, an annual Workshop could be such a mechanism. The kind offer to host the next Workshop at National Sun Yat-sen University, Kaohsiung in Taiwan, was well received by the Workshop participants.