South East Asian Global Ocean Observing System (SEAGOOS)'s Activities and Its Role on Ocean Observation

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Introduction

The establishment of the Southeast Asian- Global Ocean Observing System (SEAGOOS) was initiated under the IOC sub-commission for the Western Pacific (IOC/WESTPAC) since 2001 at one workshop on the Establishment of SEAGOOS in the Wider Southeast Asian Region during the Fifth IOC/WESTPAC International Scientific Symposium, 27-31 August 2001,Seoul, Republic of Korea.. A wide range of topics covering climate and tropic cyclones, coastal dynamics and pollution, ecosystem and fisheries, and data and information exchange were discussed and suggested for the future SEAGOOS activities. SEAGOOS was officially adopted as a programme of IOC/WESTPAC in the Fifth Session of WESTPAC in Fremantle Australia, 9-13 September 2002, by setting up one IOC/WESTPAC Coordinating Committee for SEAGOOS. The preparation process of SEAGOOS towards its implementation and operation were conducted through numerous of consultative meetings during the period of 2003-2007 with a number of information updated and suggestion proposed towards the implementation of SEAGOOS. The key outcomes from the meeting were (a) the development of operational guideline for SEAGOOS, which was fully adopted by IOC/WESTPAC Session in 2008, (b) a number of activities proposed for SEAGOOS (pilot projects and projects) , and (c) capacity building on operational oceanography and ocean observation needed of the region etc. Due to lack of expert in the field of physical and chemical oceanography in the region, The need for capacity building in these fields were therefore emphasized . The assessment of status and capacity of member country on oceanographic work was carried out during 2008 in order to provide background information for further development of SEAGOOS in the field of ocean observing system and operational oceanography including data and information exchange. But few responses have been received. In this context, demonstrating the value of ocean observations and operational oceanography for the social-economic benefit of the societies obviously become an immediate and practical task for SEAGOOS at its inception phase. In doing so, several pilot projects were initiated and implemented since 2009 such as the Monsoon Onset and its Social & Ecosystem Impacts (MOMSEI) and Ocean Forecast Demonstration (OFD) project.

Role of SEAGOOS and its value to Southeast Asia

The results from the first workshop in 2001 on the establishment of SEAGOOS in the wider Southeast Asian region in Seoul, Republic of Korea, identified three different topics, which

SEAGOOS may need to focus its activities on, Coastal Dynamics and Pollution, Ecosystems and Fisheries, and Climate and Tropical Cyclones. It became recognized as an activity of SEAGOOS to implement when it was officially established at the Fifth Session of the IOC Sub-commission for the Western Pacific (IOC/WESTPAC), Fremantle, Australia, 2002. The Session recognized (a) the value of SEAGOOS to promote regional cooperation and coordination and that such an approach enhances opportunities for benefits to accrue to regional Member States, (b) the importance of sustained, high-quality ocean observations in the wider Southeast Asian region in its efforts for sustainable development together with disaster mitigation and for the understanding and ultimately prediction of regional and global climate variability, (c) the need for effective collaboration with international organizations and member states in the establishment of a regional capacity in operational oceanography and marine meteorology.

Operational Guideline and Data Exchange for SEAGOOS

The Operational Guideline for SEAGOOS was adopted at the 7th Session of IOC/WESTPAC in 2008, Malaysia. Besides the content on membership, coordination committee, and daily operation/management of SEAGOOS, data and information exchange was also emphasized in the operational guideline. In view of the importance of data and information exchange to maximize the benefit of ocean observations, It is therefore clearly state in the guideline that "Free and unrestricted data exchange among SEAGOOS members and SEAGOOS projects, in line with IOC data policy, are primary requirements for participation in SEAGOOS".

Data exchange policies in the region vary greatly from one country to another. Even within one country, the policy is also not clear and not uniform. Since most of the countries in the region still do not have their national oceanographic data center. The collection, processing, and management of data and information is still scattered among various government agencies which take responsibility for different ocean related mandates. Therefore, there is still a long way to go for date exchange in the region. This is also one of reasons that the pilot project approach need to be adopted to the development and promotion of SEAGOOS. Meanwhile the capacity building on data processing, standardization, and data base management is highly needed for the region.

SEAGOOS's Pilot Projects

A number of subjects and activities were discussed and proposed as SEAGOOS projects since the first workshop on the establishment of SEAGOOS in 2001 and consecutive consultative meetings during 2003-2007. However, to implement those activities requires a lot of fund and input from member countries, thus resulting in great difficulties in getting SEAGOOS started in the beginning. Therefore, pilot project approach was adopted by IOC/WESTPAC in light that pilot projects are much easier to be implemented with small budget and only require moderate input from members who are ready to contribute to the project. It will also encourage the member countries to participate in and contribute to the activities of SEAGOOS in the future. As such, there were two pilot projects proposed during IOC/WESTPAC Session in 2008 (Kota Kinabalu, Malaysia) and 2010 (Bali, Indonesia), Two

pilot projects started their implementation in 2009 and 2010, namely the Monsoon Onset Monitoring and Its Social and Eco-system Impacts (MOMSEI) and Ocean Forecast Demonstration (OFD). The main components of pilot projects are composed of (a) the development of observation and cruise in the region to serve operational oceanography and ocean & climate forecast, (b) the capacity building for ocean observations, model development and analysis to serve various needs of member countries, (c) data and information exchange/sharing practice among participating countries.

Monsoon Onset Monitoring and Its Social & Eco-system Impacts (MOMSEI)

It is well understood that Monsoon, especially summer monsoon, plays an importance role in the weather and climate system in the region (rainfall). Monsoon brings rainfall for the wider Southeast Asian Basin and its neighboring countries. It could cause floods/droughts if the monsoon deviates from its normal pattern (early or late monsoon onset), thus finally resulting in the disruption of agricultural production, even displacement of inhabitants. It has been well documented that there may exist some possible links between summer monsoon onset and the high peak of sea surface temperature (SST) in the central part of the Bay of Bengal, birth place of Summer Monsoon, during Aril-May. Monitoring of SST in near shore and open ocean, together with other oceanographic and meteorological parameters is very important. It could help us understand the processes of high SST in the central part of the Bay of Bengal, and provide direction for the development of forecast model in the future. The SST in tropical region is also one of very important parameters to marine living resources. Since the SST in the tropical oceans is close to the optimum level for most of living organisms. Increase of SST within 1-2°C has a big influence to marine organisms such as coral (coral bleaching), spawn time (metabolism) etc. To understand the processes and trend of SST change in a short and long term could help us understand the situation and trend of marine resources and further take adaptive management for resources conservation.

MOMSEI has been implemented since March 2009 when the first expert meeting was held in Phuket (Thailand). It has sought support from China, Thailand, Malaysia, and Indonesia when the project was started. The number of member countries to participate in MOMSEI increased to 6 countries (China, Thailand, Myanmar, Malaysia, Indonesia, and Philippines) since the second expert meeting in Qingdao (China) in August 2009. The third, fourth, and fifth MOMSEI expert meeting was organized in Manila (November 2009), Maleka (December 2010) and Yogyakarta (September 2011) respectively. With these series of project meeting make a lot of progresses to the project.

The deployment of oceanographic buoys and cruise survey in the southwest of Sumatra (south of Bay of Bengal) and Andaman Sea were conduct in 2010 and 2011 under with cooperation of First Institute of Oceanography (China), Phuket Marine Biological Center (Thailand), and Center for Marine and Coastal Resources Research and Development (Indonesia) including the monitoring of SST and others biological parameters (coral habitat etc.) in coastal water by participating members. MOMSEI still looks forward to extending

its cooperation in the region and increasing the number of observing systems in the future. The results generated from MOMSEI are presented and discussed during each expert meeting. The information and results of the activities will be published or informed to public through the website and other public medias, such as the warning of high SST and its relation to coral bleaching in 2010 etc. The results of the project will also be published as scientific paper. The participants in MOMSEI are scientists from various disciplines of ocean science. The results of MOMSEI are also expected to be widely used by scientists and public. In the recent MOMSEI's expert meeting in August 2011, the preparation of MOMSEI website on oceanographic data and information, though it is unfinished yet, was presented to the meeting.

The capacity building under MOMSEI is designed as MOMSEI Summer School. It was planned for the first phase of 3 years, 2010-2012. First Summer school on Monsoon Onset Monitoring and Its Social and Eco-system Impacts was held in 2010 at the First Institute of Oceanography, Qingdao, China, with focus on the scientific knowledge on air- sea interaction and hand-on practice on the deployment and operation of oceanographic equipments. The second summer school on MOMSEI was held in 2011 at Phuket Marine Biological Center, Thailand with emphasis on climate variability and its impacts on coral reef ecosystem. The summer school is expected to build up the capacity and network for young scientist in the region on oceanographic and atmospheric science.

MOMSEI's work is mainly emphasized in the BOB and its vicinity where the Asian Monsoon originates. The activities of MOMSEI are therefore beneficial to all country around the BOB. Since Bay of Bengal Large Marine Ecosystem (BOBLME) is implementing and many of their activities could be harmonized with MOMSEI activities. MOMSEI and BOBLME therefore becomes the partner in 2011. BOBLME did fund the scientists from four countries (Bangladesh, India, Sri Lanka, and Maldives) form other side of the Bay, which are not the member of MOMSEI, to participate in the second summer school in Phuket. All participants from BOBLME expect to have joint activities with MOMSEI in the future, including data and information support from MOMSEI to BOBLME. The cooperation between MOMSEI and BOBLME will also create a network of scientists of Indo-Pacific oceans (countries rim of BOB, Gulf of Thailand and South China Sea). The network could provide knowledge and promote cooperation among member countries, and utilize the outcome of the project in order to bring more benefits to their societies and informed decision of their government policies

The main task of MOMSEI has been working since last year is to develop the comprehensive science plan. The science plan will provide long term vision and implementation plan for MOMSEI's role and its activities in the region. Meanwhile MOMSEI is endeavoring to generate more benefits to the public. It therefore plans to provide information such as seasonal outlook of the region every year in the near future.

Ocean Forecasting Demonstration (OFD)

The project started in mid 2010 with selected study site in the Gulf of Thailand and South China Sea. Currently there are three countries (China, Thailand, and Malaysia) willing to join and contribute to the project.

Gulf of Thailand and South China Sea is one of richest areas in marine resources and energy (oil and gas) in the world. They are now facing unprecedented pollution from economic development of countries rim including an increase of offshore oil and gas exploration and utilization. Natural disaster from ocean phenomenon is also one of the big issues in this region such as typhoon, storm-surge, wave and circulation etc. Physical oceanographic processes are therefore very important to improve the understanding on the mechanism and trend of those issue including coastal erosion, sea level, and climate variability etc. Ocean model for forecasting is a tool that could be able to provide information of sea state. There are quite a number of ocean model having been implemented around world. MUSNUM (Marine Science and Numerical Model), develop by the First Institute of Oceanography, was selected to be used in this study. The main outcome of project is expected to increase capacity of young scientist of member countries in ocean modeling and ocean forecasting system including build up cooperation and network. Finally the member countries would be able to further develops and do down scaling study in their waters with higher resolution. The capacity building is therefore one component of this project.

There were two workshops of the project conducted in October 2010 and May 2011. The first workshop was to share the information on on-going ocean forecasting systems in the region and identify possibility towards the implementation of the pilot project, including the finalization of work plan during intersession period of IOC/WESTPAC (2010-2012). There are scientists from four countries having participated in the meeting (China, Thailand, Malaysia, and Singapore). The second workshop was held with discussion on the model validation and cruise plan. The results for the workshop was implemented in August 2011 by China, Thailand, and Malaysia with cruise conducted in the South China Sea and Gulf of Thailand (Thai and Malaysian waters) respectively.

The training course on Ocean Models was held at IOC Regional Training and Research Center on Ocean Dynamics and Climate, Qingdao, China during 10-16 June 2011 as a part of capacity building of the project. The training would provide the scientists, who work in the project, to have the same principal knowledge of MUSNUM that will be used in the project. The knowledge will help a group of scientists in the project further study and exchange the outcomes of their study. The final outcome of project will provide an information and forecast of ocean state, such as sea surface temperature (SST), wave, and circulation etc. The product, ocean forecast of Southeast Asian Seas, from OFD could be widely used through the website in the near future. It can be useful information for management, disaster prevention and preparedness, and conservation /protection of marine resources. For example, water circulation, wave, and SST play an important role in biological, chemical, and biogeochemical processes.

The results will be presented and discussed as the final conclusion of the first phase of the project in the workshop by late of this year and early of next year. The next phase of this project will aim to improve the ocean forecast products.

Future plan and development of SEAGOOS

Since pilot project is just the first step of SEAGOOS to move forward. Participation and contribution of member countries is therefore very important. It could not be realized without the support from all parties interested. However, there are still quite a number of SEAGOOS activities to be conducted and its role need to be further enhanced in the region as suggested during the workshop on the establishment of SEAGOOS in 2001 and other consultative meetings during 2003-2007. The development of SEAGOOS therefore needs a big input from the members in the region.