

Meanwhile, a comparison between locally-established MPA and nationally-established MPA relative to implementation effectiveness reveals that strong collaboration among the community, the government and the voluntary participation among local residents is critical for effective MPA implementation. But the need to balance resource management and economic development also necessary.

MPA is not only about enhancing species biomass or abundance; it can also offer solution to reduce fishing pressure and provide alternative income sources in coastal area. The Thai success story presents a good example of community-based initiatives that harmonize environmental management and economic development.

The last presentation covers the life and natural resource use in Sagurong Marine Fishery Sanctuary and Reserve (SMFS-R) in San Miguel Island (SMI) where catch restriction is enforced. Because fishing is a way of life in the island, the sea including its resources is of paramount importance to food security, livelihood and income. With restricted fishing, the option is off shore fishing catching tuna and tuna-like fishes, engaged in seasonal siganid fry fishery and to a certain extent macro-invertebrates gleaning along sea grass beds and reef flats.

The field work in SMI provided a clear picture of the island's resources and people. An interactive discussion about the Sagurong Marine Fishery Sanctuary and Reserve (SMFS-R) was exhaustive. The views and insight about MPA management and experiences was the discussion points. Deliberations made reveals that their management objectives are not actually met for various reasons which include limited capacity, availability and allocation of resources, natural disaster as well as the perceived influence of politics. Special mention was given on the Japanese Territorial Use Rights for Fisheries (TURF) which seems to gain more success than failures compared to open access nature of Philippines Fisheries.

An informal forum type discussion about the field visit in SMI was done in BUTC, the highlights of which centered on the MPA effectiveness.

An interactive discussion among the participant points out the element of strong collaboration between local government unit and the participation of the community in meeting the objectives of the MPA is of critical importance.

Reports of Participants

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Being a common-property and open-access resource, the coastal and marine ecosystem is vulnerable to unsustainable use which resulted in its degradation. This worldwide phenomena opened the consciousness of many experts to develop strategies to cease the increasing tide of destruction of critical habitats and the decline of fisheries productivity. The establishment of marine protected areas (MPAs) has been a popular management initiative as response to these occurrences. It limits the uses of a specific marine area to protect the resources thereby giving it a chance to recover from earlier

damages, thus providing long-term benefits for the environment and local communities.

The concept of MPA as a way to regulate and manage fisheries has been advocated globally for many years. Several countries established their respective legal and policy frameworks as basis in carrying out MPAs. Many researches have been conducted since then to study appropriate approaches for the establishment and operation of MPAs. In the recent years, researchers from the member countries along the Kuroshio Region (Philippines, Taiwan and Japan) had been engaging in several studies which looks into identifying best practices of MPA management. As these countries share related resources, the need to deal the growing challenges is of paramount importance.

The emerging trend of globalization has made the movement and integration of ideas and views to be more accessible. The execution of Cross Border Education (CBE) on MPAs as part of the 10th International Kuroshio Science Symposium held in Bicol Region, Philippines on 24-26 November 2016, has provided a platform for sharing of information that promote learning and for creating networks among people working towards ensuring the sustainability of coastal resources through MPAs. Comprising of lecture series and field study, the CBE on MPA has the goal of creating mutual understanding with emphasis of the processes and dynamics of MPA as a strategy to coastal resource management.

The lecture series served as an avenue for putting together recent studies on MPAs as a way to manage the coastal resources. It lay down various information ranging from ecological aspects (e.g. MPA networking; conservation effectiveness of partially protected areas considering the size and design; incorporation of seagrass and seaweed beds) to management strategies (e.g. private ownership; community-based co-management; territorial use rights for fishers; prospects for ecotourism). These discourses brings out the issues and challenges in the promotion of MPAs as well as recommendations to resolve these matters. It opened our thoughts on viewing coastal resource management on a multi-disciplinary structure and presented various concepts on MPAs. Given the multiplicity of regulations and governance of the environment in the different countries, this learning experience provided a venue to exchange ideas that would also be applicable to other places.

The field work in San Miguel Island in Tabaco City, Albay has shown us first-hand accounts on how MPA is managed by the local community. Located at the western end of the strands of islands in the Lagonoy Gulf under the political jurisdiction of Sagurong village, the island is the abode of the San Miguel Island (SMI) MPA. The Bicol University Tabaco Campus (BUTC) served as the external agent that facilitated the establishment of the SMI MPA. The SMI MPA is a product of a community-academe partnership which is one of the many processes and mechanisms of MPA establishment in the countries. Nevertheless, the local government supports the initiative by providing funding to ensure enforcement of the regulations within the protected area. The field exposure imparted insights on how a community-

based MPA is carried-out in a particular coastal community.

In the Philippines, MPAs as a coastal management initiative, has a long history developing a variety of systems from biological or physical variables to social dimensions. However, despite the recognized legal grounds in the establishment of MPAs in the country, the implementation remains to be dependent on the character of coastal people and communities which is diverse and heterogeneous across the nation. Nevertheless, several generalities about coastal communities can be taken into consideration for the effective implementation of integrated management of the resources. Aside from considering the technical feasibility to ensure the attainment of MPA objectives such as biodiversity conservation and increase in fisheries production, the social factors are also an important contemplations for the implementation of integrated management of coastal resources. Enhancing the motivation and increasing the awareness of the local residents as well as encouraging the cooperation among key stakeholders are seen to foster effective implementation of integrated coastal resource management. The strong leadership and commitment of the local government in addition to a compelling political will should also be reflected. Since enforcement of environmental laws entails conflict among stakeholders, dispute resolution needs to be laid down. Monitoring the management plans and tracking of the specific actions should also be given importance.

As an individual interested in addressing the influences and connections between social economies and natural ecosystems, I am looking into the application of economic theories in the analysis of environmental problems in order to improve existing coastal resource management strategies and to provide implications for exploring other operational options. Specifically, studies on imputing values for the non-market goods and services in the coastal areas or the MPA itself would help in the conservation and protection of the natural resources by implying necessary financial costs desired for its preservation as valued by the people. Outcomes from this research theme may be used to draw support and attention from resource managers and policy makers in prioritizing programs towards conservation of biological diversity and sustainable use of resources. The incentive-based solutions in encouraging the sustained participation of local residents is another significant point to look into. Alternative livelihood opportunities, including ecotourism, which can lessen dependence to coastal resources is necessary to look on as a way to empower the community.

CBE is a useful approach to create a holistic body of knowledge on several information about MPA. By working together and exchanging information, we are breaking the borders among researchers and environmental enthusiasts and instead building bridges to extend information gathered and reach a common view on how to sustainably manage the shared ecosystem. This undertaking is commendable as it promotes opportunities for collaboration and it offers multi-disciplinary systems for effective and sustainable integrated coastal resource management.

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Marine protected areas have been recognized globally as one of the solution being used to address problems plaguing marine environment (e. g. over exploitation of marine resources, habitat degradation and destruction and pollution). The remarkable increase in the number of MPAs worldwide is a clear indication of the recognition of their utility as integral components of fisheries resources and marine biodiversity management (Pauly et al., 2002). This is one of the most achievable modes of protection particularly in the Philippines in relation to coastal resource management (CRM) (White et al. 2002, Alinño 2008). In coastal community multi sectors directly and indirectly benefits from a common resource. Human activities are largely for economic purposes such as tourism, and fisheries. Cooperation among these multi sectors were the key component for the Integrated Coastal Resource Management. This come from the realization of a common ambition focused around sustainability and the sense of obligation to one another within the area or region.

Management of coastal resources is multifaceted approach, it involves managing the biological resources and the community stakeholders. Integrated management of coastal resources by Marine Protected Area were diverse among region which varies in strategies to meet common goals. There is unorthodox type of MPA wherein portion of marine environment where “privately owned”, this unorthodox type of MPA were successfully managed that live coral cover was in good to excellent condition and fish biomass were impressive comparable to condition several decades ago (Soliman et. al, Unpublished data). Networking of MPAs can enhance its effectiveness, the ecological networks are based on complementary biological or oceanographic features of MPAs to meet ecological/biodiversity goals (White et al., 2005). Likewise, management of various habitat (e.g. seagrass, corals and mangroves) in MPAs and nearby area are equally important because these are interconnected. Similarly, reduction of fishing pressure should be coupled with introduction of alternative livelihood, in such way sustainability will still be achieved. Other forms co-management of coastal resources involves territorial used rights for fisheries (TURF's) which could not be implemented in some region because of traditional or cultural belief that marine environment should be an open access. MPA management structures, community participation, and institutional support were important component of successful implementation of management system.

Implementation of integrated management of coastal resources in developing countries can be viewed as holistic approach to provide solution on diminishing coastal and marine resources. Balancing between protection of ecosystems and development of coast-dependent economies, integrated management can set to prioritize the uses, taking into account the need to minimize the impact on the environment, to lessen and restore the coastal resources at the same time the needs of various stakeholders were achieved sustainably. Empowering various stakeholders especially the fishers (fishing household)

can be starting point, this can be achieved by providing means to increase the household income other than from fishing. Through such approach fishing pressure in the marine environment will be lessened, especially that major fishing ground in developing countries were already overfished way beyond the ecosystem can sustain (MSY).

Looking into different perspective of diverse group (Multi-Stakeholders) of individuals with common resources is vital in understanding the current condition and problem we already experiencing. Managing the coastal resources should involve legislation which will form part in the management framework system. Policy that are robust enough to sustain ever changing priorities of political leaders e.g. budget allocation for honoraria, and logistics of MPA guards to some region, while in other livelihood interventions. Monitoring system of MPA biological components should also be included in management framework.

Through the holistic approach of Integrated Coastal Resource Management, it could provide feasible solution to the continued decline of our fishery resources and its impending collapse if not addressed carefully.

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“Saving the environment has gone from being an option to being a suggestion to being a mandate. There is no other choice now. It’s either we save it or we’re done.” - Yasi R.

The 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs) which aims to conserve and sustainably use the oceans, seas and the marine resources for sustainable development towards food security and nutrition with sound evidence-based approach have been a great challenge in the context of climate change (FAO, 2016). Similarly, the diverse results that have been presented during the Kuroshio Symposium implied a variety of benefits Kuroshio Current had offered focusing on one yet complex

problem: “Addressing Coastal Resources Conservation and Food Security through Science-based Solutions and Innovations.”

Philippines, specifically Cebu and Bohol have been considered the center of the center of marine biodiversity. But, unfortunately, is also a hotspot area for extinction. Extinction partly caused by climate change, but also by anthropogenic source on resource exploitation, degradation and over extraction have contributed a major impact.

Establishing a Marine Protected Area (MPA) is a long-term strategy to provide solutions on the degrading marine and coastal environment to preserve and provide sustainable harvest for the coastal communities. The spillover effect of the inclusion has proven to offer a sustainable harvest. Fortunately, fishermen in San Miguel Island have relied other source of income on catching tunas from fish aggregating devices FADs or “payao” provided by the local government agencies, from which, does not affect the adjacent MPA in the area.

On the other hand, integrating the different sectors and players in the management of the coastal resources remained to be a problem in the Philippines. Establishing an MPA involves socio-political entities that have much influence on restructuring communities’ perception on coastal conservation and resource protection. Just in the case for San Miguel Island, regardless voluntary efforts and low income given by the wardens, still they believed that it is their duty to protect such resources as what they have observed on the benefits that they were provided.

The abundance of marine resources makes the Philippines a lucky state. Dependence on these resources could solve the daily ration of a regular family in the coastal community. Unfortunately, unregulated extraction and exploitation have caused the implementation of ICM, from which various issues arise. In the Philippines, ICM project cycle emphasizes broadened stakeholder involvement, multi-sector collaboration and the leadership of local governments (White et al., 2005). Despite promotion of ICM, the Philippines continues to face a significant decline in the fisheries sector leading to rising resource conflicts. Also, involvement of stakeholders where participation in programmes is low and formal recognition of community organization were problematic (Larsen et al., 2011).

Unlike other countries like Japan, a close system has to be implemented because of the seasonal reproductive cycle on the majority of their marine resources. In the Philippines, understanding the tropical nature, reproduction on most of the organisms is all throughout the year. The sato umi strategy in Japan may serve as a model and could be applicable in implementing such actions in the Philippines by providing scientific solutions on the different issues encountered.

On the other hand, the algal flora plays a crucial role in ecosystem interaction not just as food but also as indicators of reef health. Particularly, the green seaweed *Ulva*, serve as an indicator to the changing environmental condition. The increase in nutrient levels, temperature, etc. could provide a suitable condition for a “bloom,” in return depletes dissolved oxygen (DO) in the water.

Moreover, introduced species, either brought by natural or

anthropogenic sources are also one of the factors in changing the landscape of the reef ecosystem. Introduced or invasive marine species threaten biodiversity, marine industry (including fishing and tourism) and human health (Bax, 2003). Introduced species have higher growth capabilities, thus, outcompetes the local flora and fauna gradually changing the food preferences of the resident organism in the reef. In Australia and San Francisco, USA, anthropogenic vectors had contributed to the higher percentage of introduced species (Bax, 2003). The Kuroshio Current being a major current connecting Philippines, Taiwan and Japan has contributed much on the distribution of alien species, thus, intra/ interspecific relationships among organisms could possibly occur. In effect, the possibility of interbreeding introduced with wild species may pose threats on the reef ecosystem not just by changing the landscape but could also change the genetic makeup of the wild types, slowly declining their adaptation to changing environments and thus a candidate for extinction.

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My sincerest thanks to bicol university Tabaco Campus, Philippines for holding the 10th International Kuroshio Science Symposium from 24 to 26 of November in 2016, professor Shinbo and other teachers, students for providing assistance on this trip. This is my first time to attend the international kuroshio symposium and this symposium brings many scholars whose study on kuroshio current from Taiwan, Japan and Philippines together, discussing and exchanging the various views or opinions on coastal resources and food security through science-based solution and innovation. Lots of new views from different participants broaden my eyes. Kind and friendly students, teachers of Bicol University, simple local people in bicol city, delicious local food, unique means of transportation etc. leave me deep impression.

The theme of lecture series in this symposium is cross-border education session on intergrated management of coastal

resources on Marine Protected Areas. This is a new idea for me because I am studying on identification and classification of green macroalgae from different countries and usually work in the laboratory. Inexperience on oceanographic survey, marine resources research and marine environment protect. Meanwhile I am interested in those study fields. That is why I have a strong interest on marine protected areas when I first see the theme.

Many scholars have reported on integrated management of ocean resources and marine protected areas. The management of marine protected areas, the face opportunities and challenges of marine protected areas, the survey on biocommunity and biospecies in the marine protected areas. From those presentation, let me know about the importance and urgency of setting marine protected areas. The species richness and abundance in the marine protected areas are significantly higher than marine open areas. and increased sea plants help to improve the quality of sea water, and then attracts more and more sea animals to live and breed in marine protected areas. Biodevisity was enhanced. This virtuous cycle will obviously improve ocean bioresources, recovering the supply-demand balance of ocean ecosystem, and then contributing to sustainable development and utilization of ocean resources. In addition, there are thousands of marine protected areas in philiplines. This also show that the Philippine government and scientist attach importance to protection of ocean resources. I think that Philippine people will benefit from this measure in the future.

We also have an interesting activity, which is visiting the marine protected areas in Sammiguel Island and interview the fishermen in Tabaco City, the president and local people in barangay island, during this symposium in Philippines. because the fishermen are most easily affected by marine protected areas. I get some informations from the interview. The life of fishermen in tabaco city is not very rich. Catch fish is their only life style, they work hard on the sea two to three days for one trip, and selling price of fish is only 100 pesos, that is very cheap compared to Japan and China. The most income of fishermen is 30-50 thousand per month. However, some month they have no income because of bad weather or no fish. we also know about there are about 500 families and 3000 person who lives in barangay island from the president of barangay island. The average personal income is about 2000 pesos per month. Most of families make a living by fish, and there are also some families planting vegetable or fruit for household. We also interview a local person, which is called Edgardo, 42 years old man, in barangay island. He is also a fisherman but work in distance water fishing support for his family. He can earn 5-10 thousand peso per month for his wife and four children. His family is rich compared to others in barangay island. Meanwhile, I think the barangay island people is still not rich from their wearing, food and house etc. the big problem of what they think is how to catch more fish, how to earn more money for their life, like Edgardo tell us: the big problem in barangay island is the live fish become few and few.

For the marine protected areas in the island, I think the selected area is not good enough, because the marine protected

areas is not only small, but also the position is very near the seashore. In near-shore, the species and biomass of marine organism is not too many, and few people come to catch fish for living. I think that is why the 75% people in the island approve of setting marine protected areas. The marine protected areas is a good measure for solving the problem of over developed and utilized ocean resources in theory. But in fact, this measure will face many challenges and obstructions. Thus, we should call on people from every walk of life to join the project, let people to know about it, to understand it, then to approve it. It may take a long time, but if we insist to do and work hard, the theory will become fact.

In China, we are also facing many maritime problems which needs to be solved, such as, over developed ocean resources, serious polluted marine environment, endlessly marine disasters etc. But now, Chinese government have realized already the problem and taked many measures to protect marine environment, reasonable develop and utilize the ocean resources. The successful measure is closed fishing season, which usually is from March to June of every year, last four months in spring season. This measure is also successful in China. So, I think Chinese government should take closed fishing season combined with marine protected areas measure to integrate management of ocean resources.

My study is on green macroalgae. And algae is very important for marine ecosystem and environment. Firstly, algae is an important primary producer in the ocean. They have characters of high growth rates and rapid reproduction. So, algae can support enough food for marine animals. Secondly, algae is also cleaner in the ocean. They can absorb many pollutants (especially N, P) which be discharged into sea by human activities. Therefore, if we want to integrated manage coastal resources, I think, first of all, we should pay more attention on protecting marine plants, even marine algae. When select marine protected areas, it is better to select the place where there is suitable for algae to grow.

Lastly, I wish to extend my sincerest gratitude to all workers for 10th international kuroshio science symposium, I have a nice and unforgettable symposium since you work hard with sincere and enthusiastic service. Dr. Hsu-Sen Chen, Dr. Tien-Yi Chen from the national Sun Yat-sen University of Taiwan and Profersson Shinbo, other teachers, students from Kochi University of Japan for helping and supporting me. I have a nice trip in the Philippines.

Tien-Yi Chen

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Establishing the Marine Protected Areas (MPAs) is the latest strategy for marine protection. However, it is difficult to set up the MPAs in Taiwan. We encountered a lot of problems like how big MPAs are appropriate? How to communicate with local people? How to manage the MPAs? Until now, there is no MPA in Taiwan. In contrast, there are up to 1800 MPAs in the Philippines. In the 10th Kuroshio Symposium, we visited one of the MPA in the San Miguel Island. The MPA has a total area of 2.25 km² and is separated into two parts. One part is prohibited for all fishing activities and the other part is allowed fishing activities with limitation for association members only. We also interviewed the residents and the manage department of the MPA. The MPAs in the Philippines are all small so that it would not influence the lifestyle for the local people. Therefore, the residents would not reject establishing the MPAs. This is the main reason for why there are so many MPAs in the Philippines. Although we wonder that how effective of the small MPAs, it is a good beginning for marine protection.

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Marine protected areas (MPAs) are presently one of the most active topic in marine science. During the 10th International Symposium on Kuroshio Science in Bicol University of Philippines, essential management along Kuroshio region was addressed such as featuring diverse aspects of MPAs. The discussion on strategic measures and planning were open to all including young researchers that enhances the capabilities to contribute in building a suitable society beyond borders. I would like to extend my sincerest gratitude to the Kochi University for the supports and all Kuroshio Science members for a successful Symposium. During the period of the Symposium, more than just presenting the research, I was very lucky to get more knowledge and experience in MPA theme, which is important to me in future. Moreover, I have a great time with friendly Filipinos and their interesting culture and food. Thank you very much.