

Turning the tide towards enhanced ecosystem management and conservation in the Kuroshio Region: the Philippine Perspectives¹

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Abstract

The foremost aim of doing good science is to sustain food security for the people. Obviously, this cannot be accomplished without healthy natural resources from which our economic activities depend upon. The present paper entitled “*Turning the tide towards enhanced ecosystem management and conservation in the Kuroshio Region: the Philippine Perspectives*” presents’ insights and analysis that illustrates the truth that we cannot ignore or segregate social science and economics in understanding the science of change.

A review of past symposia revealed Kuroshio Region from different context and perspective, all projecting changes from ecosystem to biodiversity, resources management and conservation to climate change adaptation and socio-economic and harmony between people and environment. Explicit about this is that much has been studied, known, shared, more experiences and lessons have been learned. However, few efforts have been done to transform scientific findings into concrete outcomes that benefit both the people and environment. For example in San Miguel Island which has been the subject of many studies with impressive publication, nothing has changed that makes a difference in their lives. Turning the tide is therefore the key word, a challenge for a new beginning, a strategy directed towards transformation, innovation and action for development.

A case in point is “Stock Assessment of Christian crab in San Miguel Bay”, which illustrates the need to harmonize social science and economics in understanding the science of change and the necessity to persuasively pursue scientific argument to obtain the desired outcome. Gleaning from the assessment results showed that overfishing is an on-going reality. Formulating doable crab fishery resource management options to save the stock is therefore an urgent need. To put value and meaning to science, a series of stakeholder’s consultation was conducted. The primary concern is to translate science into actions plans that benefit of the people and the resource. Findings showed that research-based options does not necessarily offer the best solution because fishers livelihood and food security is always at stake. While poverty cannot certainly be used as an excuse for sound judgment, their participation must be considered in decision-making and implementation. For instance, the reduction of fishing effort proportionate to excess exploitation level through mesh size regulation (use of >12 cm stretched mesh size), catch regulation (min. of 9 cm for *C. feriatius* and 11cm for *P. pelagicus*, based on size at maturity) and regulating fishing intensity turned out unacceptable to local government and fishers’ group as it directly affect their livelihood and employment. Regulating mesh size will mean buying another gear making it difficult for poor fishers. Regulating fishing intensity by shifting to deeper ground is also risky and expensive in terms of fuel cost.

In summary, results from good science must be harmonized with the people’s needs and priorities. Finally, all are in agreement of the need to take action, pool their resources, towards the management and recovery of crab fisheries.

Key words: Christian crab, Kuroshio, stock assessment and turning the tide.

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Introduction

Good day to everyone, particularly to all of our valued partners in development. First and foremost I would like to thank Dr. Farah Diva, the chairperson, and the members of the organizing committee for the invitation, accommodation and warm welcome. To Dr. Tominaga and Kochi University, for the support and logistics that made my coming here possible, thank you very much sir.

When Dr. Tominaga asked me to be one of the plenary speakers, I had no option but to say yes. I decided to answer in the affirmative because I am committed and very much supportive of this cooperative endeavor affecting both of our countries in one way or another. Having said this, the next part of the affirmation is choosing what to deliver in what I consider to be a forum of well-known experts and scientists in various fields though I am not one of them. To me this is the hardest part of my affirmation. So I looked at the theme for this year's symposium, "**Enhancing Management and Conservation of the Kuroshio Region through Harmony between People and Environment**". To my mind, the theme is very timely, as in many scientific meetings, the environment and ecosystem are always given special attention, and the emphasis, significance and the benefits are always directed towards the people.

At this point, let me bring you back to the place where I belong, the Philippines. It is an archipelagic country and has been endowed with vast fishery resources, with a total area of 115,831 square miles and with about 105.7 million people (2013 population data) having a population density of 797.2 inhabitants per square mile, thus, the environment and its life support system is always of paramount importance to food security, livelihood, employment and income. Obviously, we need to produce and provide food for our fast growing population and we cannot do that without the resource base upon which our economic activities depends – hence, the need for enhancing management and conservation of the environment for the people, a noble undertaking. Perhaps, most of you will agree with me that one of the foremost aims of doing good science is to sustain food security for the ever-increasing population.

Kuroshio Symposium Timeline

Reminiscing from the past symposium, the common playing field or subject of interest is the Kuroshio or "Black Current". According to Dr. Morooka and Dr.

Okuda (2008), the Kuroshio region refers in a broad sense to the parts of the East and Southeast Asia under the influence of the Kuroshio Current but, in a narrow sense, to the land and sea areas of the Philippines, Taiwan, and Japan, which are strongly affected by this ocean current. In short, the Kuroshio is and will long remain of paramount importance to these countries and its people. Setting aside political interests, Japan and Taiwan are more historically, culturally, economically and socio-economically attached to the Kuroshio than in the Philippines where it bears no special meaning. In San Miguel Island, the Philippines, the term "Kuroshio" was made known when the collaborative effort started way back in 2006 despite the marine resources derived from this part of the Pacific Ocean. What is better known to fishers and most people is the damaging typhoons that originate from the Pacific, a recent one being the Super Typhoon Haiyan, which had maximum sustained winds of 315 kms an hour, one of the most powerful ever record, and which claimed more than 5,000 lives and inflicted serious damage on agriculture, infrastructure, and livelihood assets including the natural landscape.

Interesting to note is the 4th Joint Kuroshio Symposium where the Hon. Prof. Masaru Tanaka comprehensively discussed the linkage between the forest in the highlands, the human ecosystem and the marine ecosystem. Traditionally, these are studied separately but over the years, such practice was found to be a mistake as anthropogenic activities are everywhere with myriads of influences on the interrelationship and interconnectedness of what we call the ecosystem. In my perspective, the S-shape is tantamount to the inclusion of the "Coral Triangle," known for its marine biodiversity and productivity, and for being a home to more than 350 million people, 1/3 of which rely directly on marine and coastal resources for their food and livelihoods. Interactions with scientists and researchers from this region will therefore mean more information exchange, a move that is advantageous to the Philippines and the other areas affected by the Kuroshio Current.

Why turn the tide?

At this point, I would like to do justice to my talk specifically on the term "*Turning the tide*". The first question is "why turn the tide?" The simple answer is because the way we do things does not always produce the desired output that translates into an outcome that people want or need. In some cases, our way of doing things is short sighted, full of contradictions, and lacking

in harmony between the people and the environment. For example, while the Philippines is one of the world's great reservoirs of biodiversity and endemism, it is also one of the global biodiversity hotspots. Philippine beaches may be among the world's best, but the country's marine ecosystem is worsening year by year.

From past scientific symposiums, I have firmly believed that much has been studied and known, much has been shared, and more experiences and lessons have been learned in terms of R&D. However, my observation (in the Philippines) always points out that few efforts have been done to translate or transform scientific findings or results into concrete outcomes that benefit both the people and the environment. A case in point is San Miguel Island, the Philippines, which has been the subject of many studies with impressive publications. However, it is sad to note that these research findings have not been translated into something that makes a difference in people's lives. Perhaps, we need to rethink things and look back to the basics. It is therefore imperative that changes in the way we do things should be instituted to suit the needs of the time. "Turning the tide" is therefore the key phrase. Operationally, this means change, a challenge associated with a new beginning, and a strategy directed towards transformation, knowledge creation, innovation and action. To this end, I commend the present cooperation and friendship between parties who have opened up new possibilities beyond our borders. The fruits of this cooperation and friendship have turned the tide in many ways.

I remember, in one of our field survey interviews in SMI, one fisher folk respondent in his/her late 50's was asked "how is fishing today?" A quick response was the following: "*During our time, fish was so abundant, that several meters from the shore, fish could be caught. Now, it's too difficult to find any near shore. One has to sail far to catch fish, there aren't much fish nowadays*". This very statement presents the inevitable reality that the enhancement of management and conservation of environment is an urgent necessity. In fact, according to *Robert Swan*, "the greatest threat to our planet is the belief that someone else will save it" and that "old ways will not lead to a new solutions, it will just be business as usual", hence, turning the tide.

There are several key events that affect resources and people, that require innovation, and it is the factors listed here that we refer to as "turning the tide:" 1) there are changes occurring in the region; 2) social sciences and economics connected with the science of change cannot be ignored; 3) the changes now occurring affect

ecology and life support systems; 4) climate change is an eminent threat we need to understand and adapt to; and; 5) disaster risk reduction management is an option we have to explore in order to survive.

Case in point: Stock Assessment of Christian crabs (*Charybdis feriatus*, Linnaeus, 1758) in San Miguel Bay"

In one of the conferences where the fishers and local government officials were present, the speaker said "most of the bays in the Philippines are overfished" and the fisher's battle cry was "We need more fish; we need more income; we need livelihood and employment and we need government support". Thus, the need to act now, pool our resources and expertise and forge a strong partnership to revitalize our fishery resources. I suppose that the theme for this year's symposium also speaks of the same situation. The case of **Christian crabs (*Charybdis feriatus*, Linnaeus, 1758) in San Miguel Bay**" is an example that illustrates the truth that we cannot ignore or segregate social sciences and economics in helping us understand the current changes going on in our environment. In addition, there is a necessity to persuasively pursue scientific argument or discourse to be able to obtain the desired outcomes. Gleaning from the result of the study the following is noteworthy of mention.

The locale of the study is situated in San Miguel Bay (SMB), the profile of which is shown in Box 1.

The project is concerned with Christian crabs (*Charybdis feriatus*, Linnaeus, 1758), a species continuously exploited for live crab trade mostly for export in East Asia. Without stock regulation in an already overfished fishing ground, the natural stock is under threat of collapse. Prompt action to save the species while it is still manageable is therefore an urgent need. An assessment of the status of the fishery is therefore important as input for formulating do-able crab fishery resource conservation and cohesive management strategy.

Specifically, the assessment seeks to determine the following: population structure; estimations of growth and mortality; the fishing gear used; an estimate of annual production and species composition; CPUE and exploitation rates; and description of the existing market and channels of distribution. Details of the methods used are shown in Box 2 and the results generated from the study are shown in Box 3.

Box 1. Kuroshio International Symposium's Timeline			
No.	Location	Theme	Outcome
1	Media Hall of Kochi University, November 21-23, 2007.	"Recent Changes in the Seaweed Ecosystem along the Kuroshio Current: Towards Collaborating Rehabilitation of the Cradles of Fishes"	Significant highlight in the initial cooperation was the indicative existence of tropical seaweed species in temperate ecosystem.
2	NSYSU, Kaohsiung, Taiwan in March 2009	"Biodiversity in Kuroshio Waters: A Perspective of Joint Study among Japan, Taiwan and the Philippines",	Marks the evolution of the Kuroshio Triangle concept of cooperation.
3	Bicol University Tabaco Campus, Albay, Philippines, March 2010	"Benefits and Balance along the Kuroshio Current: Marine Biodiversity and Resource Management"	The symposium concretized the creation of a scientific network among the three universities and formally establishing the "Kuroshio Triangle"
4	Kochi University, Japan in March 2011	"Effects of Recent Societal Changes on the Natural Environment in the S-Shaped Zone: Modifications to Marine and Land-based Ecosystems".	The idea of ecosystem-based approach to achieve total development of natural resources was explored. Universiti Malaysia Sarawak and Universitas Tanjungpura, West Kalimantan, Indonesia was invited and paved the way to the expansion of "Kuroshio Triangle" to an "S-Shaped Zone."
5	NSYSU, Kaohsiung, Taiwan	"Adaptation to Climate Change and Socio-Economic Changes".	The inevitable phenomenon of global change and ecosystems, biodiversity, marine resources and management, biomedicine, humanities and culture.
6	Bicol University Tabaco Campus, Albay, Philippines	"Management and conservation towards sustainability in the Kuroshio Region".	The main concern is toward resources management and conservation.
7	Universitas Tanjungpura, Pontianak, Indonesia, 21-23, Nov. 2013	"Enhancing management through Harmony between People and Environment"	Harmony between resource users and the resources are given emphasis.

Box 2. Study Profile and Research Methodology	
Profile	<ul style="list-style-type: none"> Northeastern part of Bicol Region along the Pacific Coast, bordered by two provinces and a total of 7 municipalities, with total surface area of 1,115 sq. km., 240 km coastline. 7,033 fishers; 1 fisher/27 m of coastline, making fishing is a way of life in SMB. Multi-species fisheries and multi-gear predominantly gill-net (32.8%), hook and lines (31.0%), fish traps (7.8%), seine nets (7.8%), squid jiggers (6.7%) and the rest are shared by other gears. More than 250 species distributed in 70 families. In terms of stock status, of the 17 species, 14 are exploited below the size at first sexual maturity, 11 species are exploited at sizes below 10 cm. Average municipal production is 11,103 MT (1992-1995), with baby trawl contributing 9.2 %.
Methodology	<ul style="list-style-type: none"> 300 specimens per species was collected and measured monthly from November 2011 to October 2012 (Total of 7,679 crabs measured: 3,612 are <i>C. feriatius</i> and 4,067 <i>P. pelagicus</i>). Length-frequency measures are from landings and market measurements in designated landing sites. Carapace Width (CW) was measured as the distance from tip to tip of the last antero-lateral teeth, Carapace Length (CL) was measured as the distance from the tip of the frontal teeth to the posterior end of the carapace and total and Body Weight (TW) measured using digital weighing scale (0.1 g). Data analysis: descriptive statistics and analysis of length frequencies using a commercial spreadsheet program; analytical length-based fish stock assessment using FAO ICLARM Stock Assessment Tools (version 1.2.2). Usage of the method to invertebrates (see Soliman and Dioneda (1998), Ingles and Braum (1989) for blue crab and Dineshbabu, A P (2010) for <i>Charybdis feriatius</i>). The length-weight relationship was estimated using the equation (Pauly, 1983): $W = aL^b$, where W is the weight, a is the intercept, L is carapace width and b is the slope. The value of a and b were computed from the log transformed values of length and weight. The co-efficient of determination (r^2) was used as an indicator of the quality of the linear regression.

To put value and meaning to science as well as harmony between environment and people, the project works closely with local government units (LGU's), fishers, the Integrated Fisheries and Aquatic Resources Management Council (IFARMC), the Bureau of Fisheries And Aquatic Resource Regional Filed Office 5 (BFAR-RFO 5), Department of Science and Technology

Regional Office (DOST-5), and World Fish Center via a series of stakeholders' consultations. The primary concern is to translate science into action plans that benefit the people -- being the ultimate clientele -- and the resource.

To sell the idea, findings (Box 3) were presented in a "Stakeholders Consultation and Presentation of

Box 3. Significant Research Findings	
Key Result Area	Findings
Species identified	<ul style="list-style-type: none"> Six species were identified: <i>Charybdis feriatus</i>, <i>Portunus pelagicus</i>, <i>Portunus sanguinolentus</i>, <i>Scylla oceanica</i>, and <i>Scylla serrata</i>.
Population Structure	<ul style="list-style-type: none"> Growth Formula (VBGF) for <i>C. feriatus</i> is 26.76 cm (0.63 year⁻¹) and 21.36 cm (0.87 year⁻¹) for <i>P. pelagicus</i>. Exploitation rate (E) for <i>P. pelagicus</i> and <i>C. feriatus</i> show overexploitation (E>0.50) of the species (Gulland, 1971). E optima from the Y'-PR (Yield-per-Recruit) indicates that exploitation rate of <i>C. feriatus</i> (35%) and <i>P. pelagicus</i> (10%) exceeded beyond the optimum exploitation (E_{0.5}), implying excess fishing effort/affirming an overfished fishery (FSP and SMB-REA report). The LC₅₀, the population length at which 50% of the population is harvested (the other 50% remains): LC₅₀ = 9.62 cm for <i>C. feriatus</i> and 10.53 cm for the <i>P. pelagicus</i>, is higher compared to the size at first maturity of 8.3 cm and 10.50 cm for <i>C. feriata</i> and <i>P. pelagicus</i>, respectively. This may contribute to recruitment overfishing when the number and size of the adult population (spawning biomass) are heavily caught to the point that the reproductive capacity to replenish itself becomes limited.
Estimate of Growth and Mortality.	<ul style="list-style-type: none"> The mean weight (MW) obtained is 375g ±207g for <i>C. feriatus</i> and 77.6g ±41.5g for <i>P. pelagicus</i>. Modal progressions of male and female sizes (CW) of <i>C. feriatus</i> crabs on a monthly basis ranges from 5.7 to 28.4 cm and 7 to 22 cm, respectively; the largest observed in September and the smallest in July. Male and female <i>P. pelagicus</i> sizes (CW) range from 3.5 to 19.6 cm and 5.9 to 18.8 cm, respectively; the largest observed in November and the smallest in June. Regression equations for the carapace width-weight relationship for both species revealed high correlation (0.79 – 0.83). The exponent 'b' value estimated for these species were below 3 indicating the allometric pattern of growth.
Size at first maturity	<ul style="list-style-type: none"> <i>C. feriatus</i> mean CW of (mean ± stdev) 12.50 cm ±2.20 cm higher than the maturity size of 8.30 cm reported by Ingles et al., (1989). <i>P. pelagicus</i> with mean CW of (mean 11.20 cm ±3.00 cm), maturity size of 10.50 cm higher than the reported by Ingles et al., (1989). About 15% gravid <i>C. feriatus</i> and 14% <i>P. pelagicus</i> was observed from the monthly samples, a factor believed contributory to recruitment overfishing.
Fishing gears used	<ul style="list-style-type: none"> Majority of the fishing gear used are crab gillnet and crab pots. Although crabbing is a multi-gear fishery (Ingles, J.A., 2004).
Production	<ul style="list-style-type: none"> A total of 524.90 MT annual production lower the reported by Soliman, et al.
Catch composition	<ul style="list-style-type: none"> Crab gill net consists of 58%-99% <i>P. pelagicus</i>, 1-24% <i>C. feriatus</i>, and by-catch species of 1% to 23% while 48%-92% <i>C. feriatus</i>, 21%-27% <i>P. pelagicus</i> and 8%-25% by-catch species for crab pot. Baby trawl fishing gear was also noted.
CPUE and exploitation rates by species	<ul style="list-style-type: none"> Setting and hauling of the gear lasted for 15 to 16 hours with an average catch of 7.25±2.41 kg/trip (CPUE=0.48) for gill net and 11.09±7.93 kg/trip (CPUE=0.69) for crab pot. Highest catch for crab pot was observed in December (CPUE= 2.11), while February and September (CPUE=0.63) for the crab gill net (Figure 5). About 1%-7% of the <i>C. feriatus</i> are captured undersized (CW=<8.3 cm.) which can be a factor to growth overfishing (Ingles, J.A., 2004).
Description of existing market and channel of distribution.	<ul style="list-style-type: none"> Market is characterized by competitive market structure where there are many sellers and buyers with free trading. Market players: crab fishers to traders ("factorador") or local crab meat processors ("beneficiador"), and traders or street/market vendor ("regaton"). Place of distribution: Metro-Manila or Cebu for domestic market or exported to China, Hongkong and Taiwan as live crabs, fresh frozen or processed crabmeat. The percentage of catch disposition; crab pot fishers usually bring 75% of their catch to "factorador", 15% to "beneficiador" and 10% to "regaton". While, crab gillnets fishers sold 90% of their catch to "beneficiador" and the remaining 10% to "factorador"/"regaton" The price range: "beneficiador" from Php100/kg to Php 120/kg ;rejected crabs (e.g. molting, small sizes, no longer alive, low weight, pinchers removed, etc.) are either consumed for food or brought to "factorador"/"regaton" at Php 50/kg. Live crabs, prices range from Php 300/kg to as high as Php 2,000/kgs depending on the size and species of crab.

Resource Enhancement Plan for Marine Crab in San Miguel Bay" held at BFAR-RFFC, Bula, Camarines Sur last January 30, 2013 attended by Department of Science and Technology-5 (DOST-V), Bureau of Fisheries and Aquatic Resources-5 (BFAR-V), Integrated Fisheries

and Aquatic Resource Management Council (IFARMC) and Local Government Units (LGU's) officials bordering SMB. A set of management options based upon the research findings that were generated (Box 4) were presented during the consultation. The same option

Box 4. List of Management options and its implications to science and socio-economics of crab resource management in San Miguel Bay		
Management Option (Research-based Options)	Scientific implication (Based-on R&D Findings)	Socio-economic implications (LGU-Fisher's Perspectives)
1. Reduction of fishing effort proportional to excess exploitation level.		
a. mesh size regulation (use of >12 cm stretched mesh size)	Better chances for mature crabs to breed at least during their size at 1 st maturity (<i>C. feriatius</i> - 8.3 cm and <i>P. Pelagicus</i> - 10.50 cm)	Would mean a reduction of 14% and 15% from the catch of fishers and income. Besides the claws may still be entangled even with stretched mesh.
b. catch regulation (minimum of 9 cm for <i>C. feriatius</i> and 11cm for <i>P. pelagicus</i> , based on size at maturity)	Better chances for mature crabs to breed at least during their size at 1 st maturity (<i>C. feriatius</i> - 8.3 cm and <i>P. Pelagicus</i> - 10.50 cm)	Would mean a reduction of 14% and 15% from the catch of fishers and income but at least no deprivation of the fisher's livelihood
c. regulating fishing intensity (e.g. shifting to deeper ground, lessen fishing time, etc.	Lessen fishing pressure on wild population	Unacceptable to fishers as it implies increased cost of fuel, longer fishing time and more risky
d. Closed season during periods of peak reproductive activity for <i>C. feriatius</i> particularly in December and January where higher percentage of GSI, mature, and gravid crabs were observed.	Does not have much impact on the resource but 14% and 15% gravid female crabs are given the chance to propagate without much fishing pressure	Acceptable to fishers since at this point in time fishing is not favorable due to bad weather. Fishers have nothing to lose after all it has been a practice.
2. No taking of egg-bearing swimming crabs. Gravid crabs caught will be released in fishing ground immediately after caught.	Better chances of breeding biomass to reproduce to sustain the fishery	Unacceptable to fisher's as they perceived it as a reduction to their CPUE and income
3. Egg-bearing swimming crabs will be held in a spawning tank and monitored until it hatches. Larvae will be returned in fishing ground, or in marine protected areas.	No scientific evidence of success but releasing larvae in fishing ground or in MPA's is a sound resource conservation practice	Unacceptable to fisher's as they perceived it as a reduction to their CPUE and income. The practice may soon be a habit for resource conservation and management; Doable and acceptable to LGU's in collaboration with the buyers
4. Increase the number of protected areas and widen the functional and well-managed protected areas in the bay.	Very essential not only to swimming but other species as nursery, feeding, and spawning grounds.	More MPA's more "no fishing zone" from the fisher's perspective
5. Diversification of alternative livelihood, especially those non-fisheries related.	Will lessen fishing pressure	Acceptable to fisher's will very few success stories

was presented and deliberated upon during the SMB-IFAMRC meeting held at Mercedes School of Fisheries last January 18, 2013 where all LGU's in SMB were represented.

From these gatherings, it turned out that research-based options may not necessarily offer the best solution. One must always consider the socio-economic implications of such options for livelihood and food security of the fishers. While poverty cannot certainly be used as an excuse for sound judgment at least the sentiments of resource users should be considered prior to decision-making. For instance, the reduction of fishing efforts proportionate to excess exploitation level through mesh size regulation (use of >12 cm stretched mesh size), catch regulation (min. of 9 cm for *C. feriatius* and 11cm for *P. pelagicus*, based on size at maturity) and regulating fishing intensity (e.g. shifting to deeper ground, lessen fishing time, etc.), turned out to be unacceptable to LGU-representatives and the fishers group since it would

affect their only means of livelihood and employment. In addition, regulating mesh size will not work because the crabs become entangled in the net. In addition, the option will mean buying more fishing gear, making it very difficult for resource-poor fishers. Regulating fishing intensity by shifting to deeper ground is also risky and expensive in terms of fuel cost.

It is interesting to note that LGU's and fishers group expressed unanimous acceptance of closed seasons as an option during periods of peak reproductive activity for *C. feriatius* particularly in December and January where a higher percentage of GSI, mature, and gravid crabs were observed. Another acceptable option was the holding of egg-bearing crabs in a spawning tank to spawn and the larvae released in fishing ground or MPA's. Unfortunately, no scientific evidence as regards to its success is available but the practice may eventually be the basis for future sound management practice for

responsible fisheries.

The last option is the diversification of alternative livelihoods, especially non-fisheries related. This has been the usual quick answer to most coastal resource management projects (CRMP), unfortunately with stories of few successes and more failures as experienced in many CRMP in the country.

To cope with the present realities and changes, we plan to make a change in the way we do things. We commit to excellence and innovation as catalysts of economic growth and development, care for nature and the environment and make a difference in the lives of the people locally and regionally.

Summary, Conclusion and Recommendation

In summary, all (i.e. IFARMC, LGU's, BFAR, DOST-5 and Academe) are in agreement of the need to take action and pool their resources towards the management and recovery of the SMB fisheries. The BFAR for its part drafted a Fisheries Administrative Order (FAO) adopting the options presented for subsequent implementation in coordination with concern LGU's, fishers' and IFARMC, a manifestation of intent to translate research findings into concrete action plans where outcomes are monitored, evaluated and scaled up for replication in other areas.

In conclusion, let me take this opportunity to reassure you of Bicol University's commitment to the deepening and expanding relationship and cooperation between our universities. Our wish is for our institutions to continue doing the best with our respective mandates, for more power and success and that we continually make a difference as a medium for mutual cooperation and friendship.

Finally, in behalf of the Bicol University administration, faculty and staff, thank you very much for accepting us as a partner in development, for sharing your dreams and including us in your vision, for the friendship, cooperation and support and for everything. *According to a Peruvian proverb "little by little, one walks far"* Good day to everyone.

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