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Status of scientific exchange in capture fisheries under the JSPS-DOST CUP Program

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Abstract

The thrust of Team 2 under the Japan Society for the Promotion of Science (JSPS)-Department of Science and Technology (DOST) Core University Program was to 'Study the use and management of fisheries resources around coastal water in the Philippines'. The defined research thrusts over a 10-year period were: 1) Capture processes and catch characteristics of coastal fishing gears; 2) Lost of gear and its influence in coral reef area, 3. Scientific evaluation of traditional gear; 4) Physiology and ecology for fisheries resources; 5) Characteristics of movement and seaworthiness on traditional coastal fishing boat; and, 6) Mechanisms of fish aggregation around anchored fish aggregating devices.

Team 2 was responsible for organizing two seminars that were both held in Miagao, Iloilo. The first, held in September 2001, was an international seminar on 'Responsible Capture Fisheries in Coastal Water of Asia'. In August of 2005, the team held another scientific but mini-conference on 'Recent Developments in Payao Research'. For both conferences, *Kagoshima-maru*, a training vessel of Kagoshima University, dropped by in Iloilo, allowed Japanese students to attend the conferences, gave UPV students the opportunity to board the vessel, and promoted exchange between students of the two universities.

In an effort to deepen and expand the scientific collaboration, a training workshop was also arranged and conducted in August 2007. Through this initiative, Team 2 considerably expanded the derivable benefits of the cooperation not just to participating scientists but also to students. Indeed, JSPS-DOST exchange program firmed up the foundations of research and academic exchange in capture fisheries between Japan and the Philippines.

1.0. Introduction

The thrust of Team 2 under the Japan Society for the Promotion of Science (JSPS)-Department of Science and Technology (DOST) Core University Program was to 'Study the use and management of fisheries resources around coastal water in the Philippines'. The research thrusts during this 10-year period were: 1) Capture processes and catch characteristics of coastal fishing gears; 2) Lost of gear and its influence in coral reef area, 3. Scientific evaluation of traditional gear; 4) Physiology and ecology for fisheries resources; 5) Characteristics of movement and seaworthiness on traditional coastal fishing boat; and, 6) Mechanisms of fish aggregation around anchored fish aggregating devices.

A total of 11 institutions, five each from Japan and the Philippines, were originally involved in the activities of Team 2. The Japanese universities involved were Nagasaki University, Kinki University, Tokyo University of Marine Science and Technology, Kochi University, and Kagoshima University. In the Philippines, the participat-

ing institutions were Cagayan State University, Central Luzon State University, Davao del Norte State College, University of the Philippines in the Visayas and the Bureau of Fisheries and Aquatic Resources, the Philippines' fisheries agency. However, not all researchers, especially from the Philippines, from the different institutions were able to participate in the different activities. This was partly due to the decision to shift the focus of Team 2's thrusts to payao research about halfway through the duration of the JSPS-DOST Core University Program.

This report presents the results of Team 2 under this program between the Philippines and Japan, which ran for 10 years from 1998 to 2007. The presentation is divided into three parts: 1) Research exchange; 2) Education Exchange; and, 3) Prospects for continuing cooperation.

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2.0. Researcher exchange in Team 2

The research exchange visits between Team 2 scientists from the Philippines and Japan can be divided into two phases. For these scientific exchanges, scientists from Japan used a total of 598 man-days while their counterparts from the Philippines used 681¹ man-days. The first phase covers the period 1998 to 2004 while the second phase covers the period from 2005 until 2008.

Phase 1: 1998 to 2004

The purposes of the scientific visits dealt with fishing technology, capture fisheries, and the use fishing technology for the management of fisheries resources and the environment in the Philippines. Implicit in this arrangement is the transfer of technology from Japan to the Philippines and indeed, many of the Filipino scientists were exposed to the state of the art in Japanese fishing technology research. Some underwent focused training activities, sometimes combined with field trips. However, the scientific exchanges also allowed Japanese scientists to

have a first-hand view of traditional fishing technologies and fishing techniques in the Philippines.

The main outputs of the scientific cooperation between Team 2 scientists were presented in the international conference on Responsible Capture Fisheries in Coastal Water of Asia¹, which was held in Miagao, Iloilo in 2001. During this conference, Team 2 scientists made 15 presentations, nine by Japanese scientists and the rest by their Filipino counterparts (Table 1). Also during this conference, Team 2 facilitated the participation of 36 other presentations (Table 2). Of these 21 were presented by Filipino scientists, 13 by Japanese scientists, and one each by scientists from Thailand and Indonesia. A total of 96 participants attended this conference. Most (11 or 73%) of the presentations by Team 2 scientists and fifteen (42%) of the 36 other presentations, during the 2001 International conference on Sustainable Fisheries were published in Volume 6 of the UPV Journal of Natural Sciences. This compilation of scientific publications that covers a broad range of topics in fishing technology and capture fisheries provides a useful reference, especially

Table 1. Scientific manuscripts presented resulting directly from Team 2 collaboration under the JSPS-DOST presented during the International Conference on Sustainable Fisheries in 2001 in Miagao, Iloilo, Philippines.

Session	Number	Title
General Overview	1	Review of scientific and technical studies toward responsible fishing and Country Report for Japan
Science for Capture Fisheries	2	A Diffusion-Advection Model for the Propagation of Odor Plumes from Stationary Baits
	3	Crab Trap Fisheries: Capture Process and an Attempt on Bait Improvement
	4	Evaluation of Fish Reaction to Esophageal Introduction of Laglang (<i>Anamirta cocculus</i>), a toxic plant used in fishing
	5	Experimental Studies on the Influence of Turbulence on Fish Behavior
	6	Gustatory response of Nile Tilapia to Saponin determined electrophysiologically
Resource and Environment	7	Physical damage of fish hooked and restricted by longline tuna fishing
	8	A comparative study on the diversity of catch between set-net (fish corral) and small type stationary trap net
	9	Development of Methods to Assess Impacts of Fisheries on the Coral Reefs of the Philippines
Capture fisheries and technology	10	Experimental Study on Seakeeping Performance of Philippines Traditional Outrigger Craft
	11	Improvement of efficiency of fishing gears in the Philippines - Survey of fishing gear characteristics of gillnet in Pany Island
	12	Influence of lunar cycle on set-net catch
	13	Measurement of Model Lift Net
	14	Resistance Characteristics of Philippine Outrigger Fishing Craft
	15	Turning Performance of Outrigger Craft in the Philippines

Table 2. Scientific manuscripts related to fishing technology and capture fisheries non-JSPS-DOST collaborations but presented during the International Conference on Sustainable Fisheries in 2001 in Miagao, Iloilo, Philippines.

Session	#	Title
Science for Capture Fisheries	1	A new method for activity estimates of free-ranging fish by using acceleration data-logger
	2	Biology of Oval Squid (<i>Sepioteuthis lessoniana</i> Lesson) Caught in the Coastal Waters of Bolong, Zamboanga City
	3	Electrophysiological taste responses in fishes: An Indicator of environmental quality
	4	Some Aspects on the Biology of Major Tuna in Northwestern Coast of Luzon
	5	Territoriality and seed releasing of the red sea bream
	6	Visual acuity and Spectral sensitivity of Pacific ribbed sculpin <i>Pleurogrammus azonus</i>
Resource and Environment	1	Abalone Ranching in Kagoshima, Japan and its Implication to Philippine Situation
	2	An Assessment of Established Marine Protected Areas in Southern Guimaras, Central Philippines
	3	Assessment and Management of Seven Major Invertebrate Stocks in Bicol Region (Phil.)
	4	Community Structure of Talangan Mangrove Forest, Cauayan, Negros Occidental
	5	Cephalopod Rhythmic Movement in Ichthyofauna Movement in Ichthyofauna in Seagrass Beds in Ormoc Bay (Philippines)
	6	Brown Alga Genus <i>Sargassum</i> (Phaeophyta) from Palawan, Philippines
	7	Economic Contribution of Women in Fishery Development
	8	Eutrophication control in coastal aquaculture area
	9	Evaluation of CBCRM Projects and Programs in the Philippines
	10	Field studies on ghost fishing and impacts of lost gillnet to fishing grounds
	11	Fish Catch Monitoring in Bala Bay, Apo Island and Sanlayan, Negros Oriental, Philippines
	12	Hydroacoustic Survey along the Northern Bicol Shelf
	13	Marine Fishery Reserves: their Relevance in Sustaining Fisheries Utilization
	14	Marine Fishery Reserve-Sanctuary Assessment and Management in Bicol Region
	15	Observation of the state of the fish near the artificial fish reef using a scientific echo sounder
	16	Pacific Sea Cruises of MNV DA-BFAR: Charting a New Fishing Ground
	17	Policy, Politics and Possibles: Insulation building for Sustainable Coastal Fisheries Management Experiences from Asian/Philippines
	18	Profile and Prospects of Legaspi City and Sto Domingo (Abay) Coastal Fisheries
	19	Satellite Tracking of male <i>Caretta caretta</i> mounted with ARGOS in Anani-Oshina
	20	Site preference and Spatial Distribution of Salmnet-Caught Fishes in Batan Bay, Philippines
	21	Socioeconomic Analysis of the Marine Fishing Industry in Ilocos Norte, Philippines
	22	Stock Assessment of Major Tuna Fisheries along the Northwestern Coast of Luzon
Capture fisheries and technology	1	Analysis of the Movement for the Trolling Depressor
	2	Effects of Current Direction on an Approaching Process to a baited Fish Pot for Mantis Shrimp <i>Oratosquilla oratoria</i>
	3	Implementation of selective fishing gear into fishermen community based on Bycatch and discard research
	4	Maximum girth and girth at the capture position of fish caught by gillnets of different twine thickness
	5	Selective Coastal Fishing Gears and Methods: Contribution to Sustainable Capture Fisheries
	6	Study on Juvenile and Trash Excluder Devices (TEDS) in Bunuel waters
	7	Technical factors analysis of gillnet fisheries in Muara Angke (North Jakarta) Fish Landing Place
	8	Unorthodox Fishing Techniques of Davao Gulf and its Implications to Management

¹Rough estimate after completion of on-going trips.

for Filipino scientists.

Phase 2: 2005–2008

Although the thrust of Team 2 continued for another two years after the conference in 2001, a decision was made before 2005 to change the focus to payao (bamboo fish aggregating device) research. This decision was reached after considering the general lack of scientific knowledge on how fish get attracted to or aggregate near payaos, which also seemed to be justified considering the widespread use of payaos in capturing tunas not only in Philippine waters but also in the world's oceans. Some initiatives that already commenced even before 2001 were pursued, and other fields of study were considered. Preliminary results of these initiatives were presented in a scientific conference on Recent Developments in Payao Research in 2005 in Miagao Iloilo, Philippines (Table 3). The number of attendees for this conference was 149, including students.

Since 2005, members of the team can potentially publish up to 14 additional manuscripts (Table 4). One manu-

script, which was submitted as part of an international conference, was accepted in *Bioacoustics Journal* and is already in press. Three other manuscripts were already submitted for publication this year while another four are in preparation. In addition, experiments for another five other studies were completed while another study is still in progress; the manuscripts for these studies are still in their preliminary stages. These researches are significant because they provide new information that can help explain the fish attraction to and aggregation near payaos. One non-payao related research is still in progress. Many of these were presented in the penultimate conference of the JSPS-DOST Core University Program in Kagoshima University in November 2008.

Table 3. Scientific papers presented during the mini-conference on recent developments in payao research held in Miagao, Iloilo, Philippine in 2005.

General Topic	#	Title
Status of payao fisheries	1	Assessment of the association of fish with payao based from ringnet catch data
	2	Overview of moored fish aggregation devices (FADs) fishery in Japan.
	3	Studies on moored fish aggregation devices (FADs) in Japan.
Biological studies related to payao	1	Frequency and abundance of fish larvae and eggs in Payaos: Preliminary results
	2	Depth distribution, size frequency and gut content analysis of <i>Brama orcin</i> captured near a payao
Some physics of payao	1	Measurement of vibrations
	2	Hydrodynamic drag profile of a payao based from model experiments
	3	Spectral analysis of payao vibrations
	4	Measurements of sound generated by a payao
Fish behavior with respect to payao	1	Distribution of fish around payao by acoustic survey
	2	Telemetry study on tuna around a payao in the Philippines
	3	A sensory orientation system to payao
	4	Behavior of <i>Trachurus japonicus</i> to vortex generated by a stick

Table 4. Status of initiatives related to payao research conducted through the JSPS-DOST Core University Program (2005–2007).

Status of manuscript or research activity	#	Title of Manuscript	Authors
1. In press (Bioacoustics)	1	Comparison of the auditory sensitivity of pelagic fish with sound generated by a fish aggregating device	R. Babaran, K. Anraku, M. Ishizaki, K. Watanabe, and T. Matsuoka
	2	Sound Generated by a Payao and Its Comparison with the Auditory Sensitivity of Jack Mackerel (<i>Trachurus japonicus</i>)	R. Babaran, K. Anraku, M. Ishizaki, K. Watanabe, T. Matsuoka, and H. Shirai
2. Submitted for publication	3	Lateral line morphology of Japanese jack mackerel <i>Trachurus japonicus</i>	R. Babaran, K. Watanabe, K. Anraku, and T. Matsuoka
	4	Feeding habits of bigtooth pomfret <i>Brama orcin</i> near payaos and in open water	R. P. Babaran, C. M. Solorio, Jr., K. Anraku and T. Matsuoka
4. Manuscripts in preparation	5	Telemetry study on young yellowfin tuna around a payao in the Philippines	Y. Mitsunaga, C. Endo, S. Okano, T. Yamana, K. Anraku, R. Babaran
	6	Behavior of early juvenile yellowfin tuna around payao in the Panay Gulf, Philippines	C. Endo, R. Babaran, C. Solorio, K. Anraku, Y. Mitsunaga
	7	Hydrodynamic Drag Profile of a Floating Fish Aggregating Device (FAD) based on Model Experiments	R. C. Cruz, M. Ishizaki and R. Babaran
	8	Assessment of fish distribution near payao	Y. Yamanaka and R. Babaran
5. Experiments completed	9	Target strength of fish associated with payaos	Y. Yamanaka and R. Babaran
	10	Sensory environment near a payao: Resonance frequency and sound intensity of a bamboo	R. Babaran, M. Ishizaki, K. Anraku and T. Matsuoka
	11	Sensory environment near a payao: Spectral analysis of payao anchor line vibration	R. Babaran, M. Ishizaki, K. Anraku and T. Matsuoka
	12	Initial Investigations of the micro-morphological differences of the cuttlebones of <i>Sepia recurvirostra</i> and <i>S. pharaonis</i>	M. Buen-Tumitba, K. Yamaoka, and R. Ihara
	13	Sensory environment near a payao: Payao leaf motions	R. Babaran, M. Ishizaki, K. Anraku and T. Matsuoka
6. In Progress	14	Reduction of goldfish olfaction when exposed to detergents	H. Monteciaro, K. Anraku, E. Ogino, J. Koyama, S. Uno and T. Matsuoka

3.0. Education Exchange

Student participation

Students from Kagoshima University Faculty of Fisheries (KUFF) and the University of the Philippines in the Visayas College of Fisheries and Ocean Sciences were invited to attend all conferences, including the final conference in Kagoshima University involving all teams, in order to realize more benefits from results of the collaboration. For the two conferences conducted in the Philippines, the participation of Japanese students from KUFF was made possible by coinciding the stopovers of *Kagoshima Maru* in Iloilo on the scheduled dates of the conference. This also gave UPV students the opportunity to board the vessel, and promoted exchange between students of the two universities, some of which are still continuing.

Training-workshops

In an effort to deepen and expand the scientific collaboration, Team 2 arranged in August 2007 two training-workshops that were conducted by two professors from KUFF. The participants of the training workshops were master course and undergraduate students of UPV, as well as some government employees of the Bureau of Fisheries and Aquatic Resources and a manager of a local government unit in Iloilo Province. The first training-workshop was on Sensor Technology, which was attended by 11 participants. The other training-workshop, which was attended by 16 participants, was on Fish Sensory Biology and Behavior. The trainers introduced some methods and techniques for fisheries scientific study. Without sacrificing the initial and main thrust of the scientific exchange, which is on capture fisheries research, the collaboration between scientists of Team 2 expanded considerably to benefit not just the participating scientists of Team 2 but also students.

4.0. Conclusion

Team 2 scientists directly published 11 manuscripts out of 15 collaborative initiatives. Together with 36 other manuscripts related to fishing technology and capture fisheries, these publications appeared in a single volume of the UPV Journal of Natural Sciences, which currently serves as a reference material for fisheries education in the Philippines. By venturing into payao research, an area that is still wide open for scientific study, some Team 2 scientists are on the threshold of producing 10 more scientific publications with global impact. Finally, the collaboration in capture fisheries and fishing technology expanded to address the needs of students in education and research. Thus, the JSPS-DOST Core University Program expanded the program's projected benefits to include the concerns of students from the Philippines and citizens of other countries studying in the Philippines.