



國立中山大學海洋科學院亞太海洋研究中心海洋事務與治理研究群組主辦、行政院海岸巡防署合辦「2014 年南海東北部海洋生物多樣性 – 印尼主導召開南海會議架構下研提共同計畫可行性研討會」報告

(A Summary Report of the 2014 MAOGRG WORKSHOP ON MARINE BIODIVERSITY STUDY IN THE NORTHEASTERN PART OF THE SOUTH CHINA SEA: Possibility for A Joint Project under the Indonesia-led Workshop Framework, December 4-6, 2014, College of Marine Science, NSYSU, Kaohsiung, Taiwan, Republic of China)

Organizer: National Sun Yat-Sen University Asia-Pacific Ocean Research Center

Co-organizer: Coast Guard Administration,
Taiwan, the Republic of China

一、會議召開背景

保護海洋生物多樣性是南海重要法政議題之一。由印尼所主導並自 1990 年開始召開至今長達 24 年之「處理南中國海潛在衝突非正式研討會」(the Informal Workshop on Managing Potential Conflicts in the South China Sea, 以下簡稱「南海會議」)當中,與會各國科學家一再強調有必要研提以調查和保護南海生物多樣性為目的之共同計畫的必要性。2002 年,在「南海會議」架構下,南海周邊國家執行由印尼與新加坡主辦之阿南巴 (Anambas) 南海中部海洋生物多樣性共同調查計畫。此計畫相當成功,因此,與會者建議也應在南海東北和西北邊同樣進行共同調查計畫,但中國大陸與越南表示時間未到。之後,在歷屆所召開之「南海會議」期間,主辦會議之印尼大使 Hasjim Djalal 教授一再呼籲應進行南海中部海洋生物多樣性共同調查計畫,但都沒有任何與會國提出共同調查計畫。

2014 年 8 月,Hasjim Djalal 教授在出席於中國大陸海南海口南海研究院所主辦一場有關落實東協與中國大陸所簽署《南海各方行為宣言》的研討會當中再度提出在南海東北和西北邊進行共同生物多樣性調查計畫的重要與必要性。與會的中國大陸、菲律賓、越南、馬來西亞、以及我國學者專家均表示支持此提議。同年 10 月在印尼巴里島所召開之第 24 屆「南海會議」當中,Hasjim Djalal 教授再度提出

同樣呼籲。

我國與中國大陸自 2010 年開始在「南海會議」架構下共同提出 SEA-NET 海洋科學訓練合作計畫，一年在台灣舉辦，一年在中國大陸舉辦，是「南海會議」架構下進行合作計畫的成功案例。鑑於近期菲律賓與中國大陸因南海爭端關係緊張，而我國在東沙成立海洋研究站，開放國際研究人員參加相關研究計畫。此外，東沙群島位於南海東北邊，無領土主權爭議問題。基此，為積極參與「南海會議」，推動海洋合作計畫，加強東沙海域生物多樣性之調查，我國有必要研提在南海東北邊進行海洋生物多樣性共同調查計畫的可行性。

基此，國立中山大學海洋科學院亞太海洋研究中心與行政院海岸巡防署合辦「2014 年南海東北部海洋生物多樣性－印尼主導召開南海會議架構下研提共同計畫可行性研討會」，外交部也提供經費贊助會議之召開。

1. Background and Purpose of the Workshop

The South China Sea (“SCS”) is a large marine ecosystem and is one of the world’s four richest biodiversity areas, with abundant and diverse marine resources. There is indeed a need to build a scientific basis for protection, management and sustainable use of the biodiversity resources in the SCS. Despite the joint efforts taken by the countries bordering the SCS, either under the Indonesia-led SCS Workshop process

in implementing the Anambas Expedition, or other studies conducted outside the Workshop process, such as Joint Oceanographic and Marine Scientific Research Expedition in the South China Sea (JOMSRE–SCS) Phase 1 (Philippines-Vietnam), the entire status of marine biodiversity in the SCS remains unclear. Accordingly, there is a need to promote further marine biodiversity studies in different parts of the SCS, in particular in its northeast and northwest waters.

At the 14th Informal Workshop on Managing Potential Conflicts in the South China Sea (“the SCS Workshop”), that was held in Batam on November 24-26, 2004, the participants from mainland China, the Philippines, Taiwan, and Vietnam were encouraged to consider the possibility of conducting biodiversity study in the northeastern and northwestern parts of the SCS. At the 16th SCS Workshop in Bali in November 2006, the participants from mainland China and Vietnam indicated that they were not ready to conduct the biodiversity expedition in the suggested area. This was followed by a decision made at the 17th SCS Workshop in Jogjakarta on November 23-24, 2007 that the continuation of the biodiversity cooperative programs under the workshop process would be kept under review.

At the 22nd SCS Workshop in Bandung on November 23-24, 2012, Prof. Dr. Hasjim Djalal, the founding father of the SCS Workshop process, suggested again to continue the biodiversity expedition project. The workshop expected the project proposal to be submitted to the 23rd workshop for consideration, particularly in the northeastern part (around the Pratas Island), the northwestern part (around the Paracel Island), or the central part (around the Spratly Islands and Taiping Island/Itu Aba) of the SCS. At the 23rd SCS Workshop in Jogjakarta on November 1-2, 2013, however, there was no specific proposal was made on the continuation of the joint marine biodiversity study.

In August 2014, the idea of promoting a joint marine biodiversity study in the northeastern or northwestern parts of the SCS was raised again at the Workshop on Implementing the DOC and Cooperation Mechanism in the South China Sea that was organized by the National Institute for South China Sea Studies and held in Haikou, Mainland China. The idea was also discussed at the 24th SCS Workshop held in Bali,

Indonesia on October 14-15, 2014.

The purpose of this MAOGRG (Marine Affairs and Ocean Governing Research Group) workshop is threefold: (1) it reviews the previous joint marine biodiversity projects in the SCS; (2) it exams recent developments in promoting marine tourism and biodiversity conservation in the SCS; and (3) it explores the possibility of proposing a joint marine biodiversity study, in particular, in the northeastern part (around the Pratas Island) of the SCS under the Indonesia-led workshop process. International participants from Indonesia, Mainland China, Malaysia, the Philippines, Sweden, and Vietnam are invited to join with domestic marine and political scientists to speak and discuss on relevant topics at the workshop.

二、會議召開情形

此次會議邀請到素有「南海會議之父」之稱的 Djalal 教授參加，除做主題報告外，並主持一場研討。其他與會國、內外學者專家都是知名海洋科學家或研究人員，此包括中山大學陳宏遠院長、陳鎮東教授、宋克義教授、劉莉蓮教授、中央研究院邵廣昭教授、宋燕輝與夏復國教授、台灣大學海洋研究所陳韋仁教授、臺灣海洋大學陳義雄所長、海生館樊同雲研究員、海洋國家公園管理處副處長呂志廣、海巡署科長詹啟民、菲律賓教授 Ed Gomez and Perry Alino、越南 Nguyen Chu Hoi 教授、馬來西亞 Cheryl Rita Kaur 研究員、瑞典 Ramses Amer 教授、中國大陸李建偉研究員等。

賈拉 (Djalal) 大使針對南海會議架構下有關南海生物多樣性

之研究做基調演講。議程一由陳鎮東教授主持，Prof. Gomez 、 Prof. Chu Hoi、以及臺灣海洋大學陳義雄所長針對過去參與或執行南海生物多樣性研究計畫作報告。議程二由陳宏遠院長主持，馬來西亞 Cheryl Rita Kaur 研究員、中國大陸李建偉研究員、以及菲律賓 Alino 教授就南海海洋生態觀光提出報告。午餐時間，海洋國家公園管理處副處長呂志廣針對東沙環礁公園做簡報。議程三由 Prof. Gomez 主持，三位台灣學者 -- 中山大學宋克義教授與劉莉蓮教授、以及台灣大學海洋研究所陳韋仁教授分別就南海生物多樣性作報告。議程四由邵廣昭教授主持，三位中央研究院研究員-- 邵廣昭、宋燕輝與夏復國教授，分別就南海海洋和平公園、南海海洋科學訓練計畫（SEA-NET）、以及南海會議架構之下有關生物多樣性之討論情形作報告。議程五是圓桌論壇，由 Djalal 和宋燕輝教授主持，參加討論學者包括：宋克義教授、邵廣昭教授、菲律賓教授 Ed Gomez and Perry Alino、越南 Nguyen Chu Hoi 教授、馬來西亞 Cheryl Rita Kaur 研究員、以及瑞典 Ramses Amer 教授。

會議結束後，國外與會者參訪國立海洋生物博物館，進一步瞭解我國有關海洋生物多樣性之研究。

2. Agenda of the Workshop

Venue: 2nd Floor, Meeting Room MA 2016, College of Marine Sciences, National Sun Yat-Sen University

DAY 1 (Thursday - December 4, 2014): Arrival of Participants

DAY 2 (Friday - December 5, 2014)

8:30 - 9:00 am Registration

**9:00 - 10:00 am Welcome Remarks by Professor Houng-Yung Chen, Dean,
College of Marine Sciences, NSYSU**

**Keynote Speech: Prof. Dr. Hasjim Djalal, Former
Ambassador-at-Large for the Law of the Sea and Maritime Affairs,
Indonesia**

**“The Process on the Study of Biodiversity in the South China
Sea Informal Workshop Process on Managing Potential
Conflict in the South China Sea”**

10:00 - 10:20 am Group Photo and Coffee Break

**10:20 - 11:20 am **SESSION I: Previous Joint Marine Biodiversity Studies in the
South China Sea****

Moderator: Professor Chen-Tung Arthur Chen

Speaker 1: Professor Edgardo Gomez (Palawan Expedition)

**Speaker 2: Professor Nguyen Chu Hoi (Joint Philippines
/Vietnam Study)**

Speaker 3: Professor I-S. Chen (Anambas Expedition)

**11:20 am –
12:20 pm**

****SESSION II: Marine Tourism and Biodiversity Conservation
in the South China Sea****

Moderator: Professor Houng-Yung Chen

Speaker 1: Ms. Cheryl Rita Kaur (Layang-Layang Island: The Malaysian experience)

Speaker 2: Deputy Director Jianwei Li (Marine Tourism: The Chinese Hainan's Experience)

Speaker 3: Professor Porfirio M. Alino (Marine Tourism and Biodiversity Conservation: the Philippine Experience)

12:30 - 2:00 pm

LUNCH

Speech: Deputy Director Chi-Kwong Lui, Marine National Park Headquarters

2:00 -
3:00 pm

SESSION III: Marine Biodiversity Studies in the Northeastern Part of the South China Sea

Moderator: Professor Edgardo Gomez

Speaker 1: Professor Li-Lian Liu (Biodiversity and conservation of giant clams in Taiwan)

Speaker 2: Professor Wei-Jen Chen (Biodiversity Study in the South China Sea)

Speaker 3: Professor Keryea Soong (Dongsha Atoll Research Station)

3:00 -
4:00 pm

SESSION IV: Joint Projects under the South China Sea Workshop Process: Existing Example and Possible Proposals

Moderator: Professor Kwang-Tsao Shao

Speaker 1: Professor Kwang-Tsao Shao (Marine Peace Park in the Spratlys)

Speaker 2: Professor Fuh-Kwo Shiah (SEA-NET joint project)

Speaker 3: Professor Yann-huei Song (Joint Marine Biodiversity Study under the SCS Workshop Process)

4:00-
4:30 pm

COFFEE/TEA BREAK

4:30 -

5:30 pm

**ROUNDTABLE DISCUSSION: Possibility for A Joint Project
under the Indonesia-led Workshop Framework: Marine
Biodiversity Studies**

Moderator: Professor Hasjim Djalal/
Professor Yann-huei Song

Discussants: Professor M. Alino
Professor Ramses Amer
Professor Wei-Jen Chen
Professor Ed Gomez
Professor Nguyen Chu Hoi
Ms. Cheryl Rita Kaur
Professor Kwang-Tsao Shao
Professor Keryea Soong

5:30 –

5:45 pm

CLOSING REMARKS

6:30-

8:30 pm

WORKSHOP DINNER (at the River Side Restaurant)

**DAY 3 (Saturday – December 6, 2014): Local Tour for International
Participants**

DAY 4 (Sunday – December 7, 2014): Departure

三、會議重要討論與結論

此次會議之討論主要圍繞在是否有必要在南海東北邊進行「南海會議」架構下進行生物多樣性合作計畫的必要性與可行性，以及在南海進行海洋生態觀光和大碑磔（又稱巨蚌, giant clams）之復育或再生合作計畫。與會學者專家支持此計畫之進行。Djalal 教授在會議結論中強調，鼓勵我國、中國大陸、以及菲律賓在 25 屆「南海

會議」召開前 90 天提出合作計畫提案。他建議我國和中國大陸、以及菲律賓與會學者應積極探詢外交部或相關政府單位是否支持此合作計畫。此外，我國與會學者尤其對與菲律賓進行東海巨蚌復育或再生合作雙邊計畫表示高度興趣。

四、政策建議

外交部與海巡署應儘速就我國在「南海會議」架構下推動提出在南海東北邊進行生物多樣性合作計畫的可行性與政策效益。如果對我參與南海事務與區域合作有助益：應編列經費，委託學術單位研擬合作計畫提案，並在第 25 屆「南海會議」召開前 90 天提出。

五、與會學者簡介

Participants



Porfirio M. Aliño

Academic title: Ph.D. / Professor

Field of competence/Discipline: Marine Ecology

Present position(s): Community Ecology (ComEco) Lab

Affiliation/Organization: Marine Science Institute

University of the Philippines Diliman

1101 Quezon City, Email address: alinoperry018@gmail.com

Dr. Porfirio M. Aliño is a marine ecologist investigating the nature of coral reefs and associated ecosystems. He has been recently accepted as a member of the Philippine National Academy of Science & Technology. His co-authorship of over 70 technical publications of which over 45 are ISI, is matched with his keen sense of citizenship and service to the local and global community. He works in conservation research, extension outreach initiatives and development assistance and heads the Community Ecology Laboratory of UPMSI.

Participants



Ramses Amer

Ramses Amer— Associate Professor and PhD in Peace and Conflict Research – is Associated Fellow, Institute for Security & Development Policy, Sweden (ramsesamer@gmail.com, ramses_a@163.com). Major areas of research include a) security issues and conflict resolution in Southeast Asia and the wider Pacific Asia and b) the role of the United Nations in the international system. He is the author of *The Sino-Vietnamese Approach to Managing Boundary Disputes*, Maritime Briefing, Vol. 3, No. 5 (Durham: International Boundaries Research Unit, University of Durham, 2002). He is Co-editor, with Carlyle A. Thayer, of *Vietnamese Foreign Policy in Transition* (Singapore: Institute for Southeast Asian Studies; and, New York: St Martin's Press, 1999).

He is Co-editor with N. Ganesan, of *International Relations in Southeast Asia: Between Bilateralism and Multilateralism* (Singapore: Institute of Southeast Asian Studies, 2010), and with Zou Keyuan, of *Conflict Management and Dispute Settlement in East Asia* (Farnham, Surrey: Ashgate, 2011). He is also Co-editor, with Ashok Swain and Joakim Öjendal, of *Globalization and Challenges to Building Peace* (London, Chicago and New Delhi: Anthem Press, 2007); of *The Democratization Project: Opportunities and Challenges* (London and New York: Anthem Press, 2009); and of *The Security-Development Nexus: Peace, Conflict and Development* (London and New York: Anthem Press, 2012). He has also contributed to international journals and books and has written reports on issues of Southeast Asian Affairs and on the United Nations.

Participants



Chen-Tung Chen

Professor Chen has been a Professor of the Department of Oceanography since 1985. He has sat on numerous international committees, including the International Geosphere-Biosphere Programme, the IGBP/IHDP/WCRP/DIVERSITAS GCP, MAIRS, SCOR and WOCE. He also served as one of the executives of the JGOFS SSC between 1992 and 1995. Just prior to that, he had helped to form the Joint JGOFS/LOICZ Marginal Seas Task Team in 1991, and served as its chairman until 1995.

Prof. Chen is at present an associate editor of *Mar. Chem.* (since 1993), and a member of the editorial board of *J. Marine Syst.* (since 2001), *Acta Oceanol. Sin.* (since 2004) and *Cont. Shelf Res.* (since 2007), all SCI journals. He also served as an editor of the *J. Oceanogr.* between 1998 and 2010. His recent work is across disciplines toward integrated Earth System science on the regional to global scales. Besides having 300 of his own scientific papers published (<http://www.mgac.nsysu.edu.tw/ctchen/Publications--2013-0121.htm>), He was awarded the highly-coveted 5M¥ Biwako Prize for Ecology from Japan in 1997 and is a Chair Professor of the NSYSU since 2006.



Participants



Houng-Yung Chen

Houng-Yung Chen is a Professor in the Department of Oceanography and the Dean of the College of Marine Sciences, National Sun Yat-sen University in Kaohsiung, Taiwan. He graduated from National Taiwan University with a BS degree in Zoology in 1975 and a MS degree in Oceanography in 1978 and received his Ph.D. with the work on crustacean nutrition in 1983 from Texas A & M University. He since has worked for the University studying fish and crustacean nutrition and biological oceanography. He has been Principal Investigator of projects investigating nutrient (amino acids, vitamins, phospholipids, etc.) requirements and interactions for *Penaeus monodon* as well as nutrient requirements and interactions with immunity for groupers and cobia. His recent works include adiposity, adipocytes and adipogenesis-related gene expression in cobia and other fishes. He has also engaged in tropho dynamics study in Taiwan Strait and Kuroshio in the East China Sea, as well as iron-deficiency study in nitrogen-fixing organisms. As a professor, he teaches graduate and undergraduate courses including fish nutrition, physiological ecology of marine organisms and marine ecology. He also works with graduate students in researches mainly in fish and shellfish nutrition. Currently his laboratory has 1 postdoctoral researcher, 1 PhD students, 3 MS students. His research work deals with interactions between nutrition and health, and adiposity in aquaculture animals. He has also worked with Professor Yu-ling Lee Chen in studies on nitrogen fixers, and nitrogen fixation dynamics in the Kuroshio and South China Sea. Over the years, Chen has authored more than 50 papers published in refereed journals. Chen has been an active member of the Asian Fisheries Society and the American Society for Nutrition. He has served in the 9th (2004-08) and 11th (2013-16) Councils.

Participants



I-Shiung Chen

Vice Dean, Research & Development Office, National Taiwan Ocean University,
Keelung, Taiwan

Director, Institute of Marine Biology, National Taiwan Ocean University, Keelung,
Taiwan.

Education Ph.D., University of Bristol, UK 1996-1999.

Specialty Systematics of fishes, ecology of freshwater fishes, molecular evolution,
molecular phylogeography.

Positions:

Director, 2009. 08 till present, Institute of Marine Biology, National Taiwan Ocean
University, Keelung, Taiwan, ROC.

Professor, 2008. 08 till present, Institute of Marine Biology, National Taiwan Ocean
University, Keelung, Taiwan, ROC.

Associate Professor, 2005.02 ~ 2008. 07, Institute of Marine Biology, National Taiwan
Ocean University, Keelung, Taiwan, ROC.

Associate Professor, 2004.08 ~ 2005.01, Institute of Wildlife, National Pingtung
University of Science and Technology, Pingtung, Taiwan, ROC.

Awards and Honor:

2002 Ten Outstanding Young Person Award.

2003 Outstanding Alumni of National Sun Yat-Sen University.

2011 Annual Research Outstanding Award, The Chinese Biological Society.

Research Area:

1. Systematics of marine fishes and inlandwater fishes of Taiwan and China.
2. Molecular phylogeography of freshwater fishes and marine teleosts.
3. Molecular phylogenetics and evolution of E Asian marine and freshwater gobies.
4. Ecology and conservation biology of freshwater and marine fishes.

Scientific Publications About 130 SCI papers concerning fish taxonomy, fish
phylogenetics and fish ecology and conservation.

Participants



Wei-Jen Chen

Academic Background:

- 2013 - present Associate professor at Institute of Oceanography, National Taiwan University (IO NTU), Taiwan
- 2009 - 2013 Assistant professor at Institute of Oceanography, National Taiwan University (IO NTU), Taiwan
- 2006 - 2009 Postdoctoral Research Fellow at Saint Louis University (SLU), USA
- 2003 - 2005 Contract Researcher (CR1 level) at National Institute of Agronomical Research (INRA, Bordeaux), France
- 2002 - 2003 Postdoctoral Research Fellow at University of Konstanz, Germany
- 2001 -2002 Postdoctoral Research Associate at University of Nebraska-Lincoln (UNL), USA
- 2001 Ph.D. of Biological Sciences, Evolutionary Biology, University of Paris 6 (UPMC)
- 1997 DEA of Biodiversity: Genetics, History and Mechanisms of Evolution, University of Paris 6 (UPMC)
- 1993 B.S. of Zoology, National Taiwan University (NTU)

Research:

- Application of molecular and computational tools within a phylogenetic framework to interpret organismal diversity and to understand mechanisms of evolution
- Phylogenomics
- Tree of Life project and large scale phylogeny
- Molecular systematics of ray-finned fishes, and marine gastropods
- Marine biogeography of the Indo-West Pacific fishes
- Evolution of deep-sea fauna
- Evolutionary mechanism of fungicide resistance in grapevine downy mildew



Participants

Award & Funding:

- Teaching performance award from National Taiwan University (2013) (40,000 NTD)
- Research performance award (excellent journal paper) from National Taiwan University (2011) (50,000 NTD)
- Bilateral cooperation research funding from National Science Council, Taiwan (2013 – 2015) (NSC 102-2923-B-002 -001 -MY3) (9,166,000 NTD) and ANR, France. Project title : Taiwan France marine diversity exploration and evolution of deep-sea fauna (TFDeepEvo)
- Personal research funding from National Science Council, Taiwan (2012 – 2015) (NSC 101-2611-M-002 -016 -MY3) (5,966,000 NTD). Project title: Evolution and marine biogeography of fish of Taiwan and South China Sea islands in an Indo-West Pacific context
- Subcontract of the cooperation research funding from National Science Foundation, USA (2013 – 2014) (30,800 USD). Project title: Collaborative PBI: All Cypriniformes Species : Phase II of an Inventory of the Otophysi
- Personal research funding from National Science Council, Taiwan (2010-2012) (NSC 99-2611-M-002-001-MY2) (4,855,000 NTD). Project title: Marine phylogenomics: a case study for ray-finned fishes
- Starting grant from College of Science, National Taiwan University (2009) (1,200,000 NTD)
- Ph.D. student fellowship of French government (1997-2000).

Professional service:

- Associate editor for *Frontiers in Marine Science* (2014 – present).
- Grant referee for National Science Council, Taiwan (2009 – present); African Coelacanth Ecosystem Programme (ACEP), South Africa (2012); and National Fund for Scientific and Technological Development (FONDECYT), Chile (2010).
- Manuscript referee for 14 international journals including *Frontiers in Marine Science* (2014), *Journal of Ichthyology* (2014), *Molecular Phylogenetics and Evolution* (2013, 2014), *Ichthyology Research* (2012, 2006), *Journal of*



Participants

Systematics and Evolution (2012), *Marine Ecology & Progress Series* (2011), *Zoological Scripta* (2011, 2013), *Zootaxa* (2010), *Systematics and Biodiversity* (2010), *Biology Letters* (2009), *Hydrobiologia* (2009), *Journal of Biogeography* (2006), *Journal of Fish Biology* (2004), *Molecular Biology and Evolution* (2003).

- Student supervision: 4 (Ph.D. in progress); 2 (Master in progress) +3 (Master degree obtained).
- Dissertation/thesis committee member for 7 Ph.D. and 14 master students from the following institutions: Department of Biology (Saint Louis University, MO, USA); Institute of Oceanography (National Taiwan University); Institute of Zoology (National Taiwan University); Institute of Ecology and Evolutionary Biology (National Taiwan University); Institute of Fisheries Science (National Taiwan University); School of Forestry and Resource Conservation (National Taiwan University); School of Veterinary Medicine (National Taiwan University); Institute of Marine Biology (National Sun Yat-Sen university).

Participants



Prof. Dr. Hasjim Djalal

Prof. Dr. Hasjim Djalal was born on February 25, 1934, in West Sumatra, obtained a BA degree from Indonesian Academy for Foreign Service in Jakarta (1956), M.A (1959) and Ph.D (1961), both from the University of Virginia. He graduated from the Indonesian National Defense Institute (LEMHANNAS) in 1971.

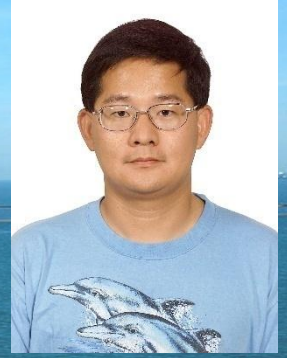
He was Director of Treaty and Legal Affairs of the Indonesian Department of Foreign Affairs (1976-1979) and Director General for Policy Planning (1985-1990). He has served at the Indonesian Embassies including as Ambassador to the United Nations in New York, Canada, Germany and Ambassador at large for law of the Sea and Maritime issues.

He participated fully in the Third UN Law of the Sea Conference (1973-1982) and in its implementation thereafter, as well as in other maritime activities, nationally, regionally and internationally until now.

He was President of the International Seabed Authority (ISBA) in Jamaica (1995, 1996), and currently serves as Chairman of the Finance Committee of the ISBA. Since 1989 he has been the initiator and convener of the Workshop Process on Managing Potential Conflicts in the South China Sea, and has been involved in development of maritime cooperation in the Indian and Pacific Oceans.

Currently, he is a member of Indonesian Maritime Council, Senior Advisor to the Indonesian Minister for Maritime Affairs and Fisheries, and to Indonesian Naval Chief of Staff, and lectures at universities and other high learning institutions in Indonesia.

Participants



Tung-Yung Fan

Dr. Tung-Yung Fan is the research fellow of Department of Planning and Research in National Museum of Marine Biology and Aquarium, Taiwan. He got the PhD in Institute of Oceanography, National Taiwan University. His research interests include reproduction, physiology and larval ecology of corals as well as community ecology and restoration of coral reefs. He prefers international collaboration on research, education, and conservation of coral reefs. The international collaborators come from America, Australia, Canada, China, France, Hong Kong, Indonesia, Israel, Japan, Korea, Philippine, Singapore and Thailand.

Participants



Edgardo D. Gomez

Edgardo D. Gomez, a University Professor Emeritus, started in University of the Philippines in 1974 as the founding Director of the U.P Marine Science Institute which has become the leading marine science department in the Philippines and Southeast Asia. After earning a Ph.D. in Marine Biology from the Scripps Institution of Oceanography University of California-San Diego in 1973, he started studying corals and coral reefs as well as the reproduction of important invertebrates, which eventually led to his work on the reestablishment of the true giant clam, *Tridacna gigas*. He graduated summa cum laude in 1962 with two degrees, B.Sc.Ed. and B.A., from De La Salle University in Manila. As a Fulbright travel grantee, he obtained a Master's degree in biology from St. Mary's University in Minnesota in 1967.

Ed has been a member of a number of organizations such as the International Society for Reef Studies and the Executive Committee of the International Union of Biological Sciences. He served as Chairman of the Scientific and Technical Advisory Committee of the Global Coral Reef Monitoring Network, the Scientific Committee on Coral Reefs of the Pacific Science Association, and the Inter-agency U.N. Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP), among others. He was honored with the Presidential Lingkod Bayan Award in 2000. He became an Academician in the National Academy of Science and Technology in 1993, His notable international award was being a laureate in UNEP's Global 500 Roll of Honour for his efforts in the protection of the oceans as early as 1989. In 2001, he became a Fellow in the Pew Marine Conservation Program and an Honorary Member of the Asian Fisheries Society.

Participants



Nguyen Chu Hoi

Associate Professor

Senior Lecturer Faculty of Environment, Hanoi University of Science under Vietnam National University

Assoc. Prof. Dr. NGUYEN CHU HOI is High-level Researcher and Senior Lecturer in Faculty of Environment, Hanoi University of Science (HUS) under Vietnam National University (since 2012), Former Deputy Administrator of Vietnam Administration of Seas and Islands - VASI (2008-2011), Former Director of Vietnam Institute of Fisheries Economics and Planning - VIFEP (2004-2007) and Haiphong Institute of Oceanology - HIO (1993-2001).

He has participated in lecturing for BSc, MSc & PhD degree in Hanoi University of Science, MSc & PhD training programs of Vietnam National University, Nhatrang University of Fisheries, Haiphong Private University, Dannang University and University of Agriculture No I, University of Geology and Mining, National Academy of Politic and Administrative and Political Sciences named Ho Chi Minh President, as well as National Academy of Social Sciences.

He has been and being the task-leader of 50 national projects related to coastal/marine sciences and management (during 1974 - 2014). He has 30 published books and about 180 published papers in oversea and domestic journals and proceedings.

Participants



Cheryl Rita Kaur

Cheryl Rita received her MSc in Marine Science, Policy and Law at the National Oceanography Centre Southampton, University of Southampton, United Kingdom and completed her BSc (Hons.) in Marine Biology at University Malaysia Terengganu. She joined the Maritime Institute of Malaysia (MIMA) in 2006. MIMA is a policy research institute set up by the Malaysian Government to look into matters relating to Malaysia's interest at sea and to serve as a national focal point for research in the maritime sector. Cheryl's research interest is in the areas of natural resources, marine protected areas management, pollution, and marine tourism. Her research findings and views on coastal and marine environmental issues have appeared in various publications. Cheryl has also participated and presented papers at national and international events. In addition, she was awarded an Asian Conservation Training Fellowship (2006-2009) by the Earthwatch Institute of Australia. More recently, she undertook a placement with the government Centre for Environment, Fisheries and Aquaculture Science (CEFAS) in Lowestoft, UK in 2011 where she worked on the European Union's framework on Monitoring and Evaluation of Spatially Managed Areas; and as a Visiting Scientist at Academia Sinica in Taipei, Taiwan in 2012.

Cheryl is currently a member of several national working groups under the Coral Triangle Initiative (CTI), and active in regional environmental initiatives including the Bay of Bengal Large Marine Ecosystem (BOBLME) and the Sulu-Sulawesi Marine Ecoregion (SSME) programmes. She was earlier involved in the UNEP/GEF project on Reversing Environmental Degradation Trends in the South China Sea and the Gulf of Thailand (Coral and Coral Reefs Component).

Participants



Jianwei Li

Li Jianwei is Director of Research Centre for Maritime Economy, National Institute for the South China Sea Studies (NISCSS), China. Her research interests are dispute resolution in the South China Sea (SCS): legal aspects, alternatives and state practices; IUU fishing activities; the US policies and the SCS. Her recent publications include: “Freedom of navigation and peaceful use of the seas: UNCLOS, Chinese perspectives and personal thoughts” (co-authored), in *Securing the Safety of Navigation in East Asia: Legal and political dimensions*, edited by Shicun Wu and Keyuan Zou, Chandos Asian Studies Series (Oxford: Chandos Publishing, 2013); “Managing Tensions in the South China Sea: Comparing the China-Philippines and the China-Vietnam Approaches” (RSIS Working Paper series no. 273, 2014) and “China, the U.S. and Maritime Security in East Asia: A Chinese Perspective”, in *China, the U.S. and Maritime Security in East Asia*, edited by Mingjiang Li and Kalyan M. Kemburi (London: Routelodge, 2014).

Participants



Li-Lian Liu

Education

- Department of Biology, National Taiwan Normal University, Taiwan. B.S. 1981
- Institute of Marine Biology, National Sun Yat-Sen University, Taiwan. M.S. 1983
- Department of Zoology and Physiology, Louisiana State University, USA. Ph.D. 1990

Professional Employment

- Research assistant, 1979 – 1981 Institute of Zoology, Academic Sinica, Taiwan.
- Instructor, 1983-1986 Institute of Marine Biology, National Sun Yat-Sen University.
- Teaching Assistant, 1988-1990 Department of Zoology and Physiology, Louisiana State University.
- Associate Professor, 1990-1998 Institute of Marine Biology, National Sun Yat-Sen University.
- Professor, 1999-2013 Institute of Marine Biology, National Sun Yat-Sen University.
- Director, 2002/8-2005/7 Institute of Marine Biology, National Sun Yat-Sen University.
- Group leader, 2012/8-2014/1 Division of Natural and Applied Sciences Education, Center for General Education, National Sun Yat-Sen University.
- Professor, 2013- Department of Oceanography, National Sun Yat-Sen University.



Participants

Chi-Kwong Lui

Chi-Kwan Lui, the deputy director of Marine National Park Headquarters. Graduated from National Donghwa University with a master's degree of natural resource management. Work for national park agencies since 1985.

Participants



Kwang-Tsao Shao

Kwang-Tsao Shao, Ph.D. is Senior Research Fellow & the Executive Officer of Systematics and Biodiversity Information Division, Biodiversity Research Center, Academia Sinica (BRCAS) since 2008 and adjunct Professor at Institute of Marine Biology, National Taiwan Ocean University (IMB-NTOU) since 2003. He received his Ph.D. from Department of Ecology and Evolution, SUNY at Stony Brook in 1983. He used to be the 1st Director of IMB-NTOU in 1991, and the Director of Institute of Zoology, Academia Sinica in 1996-2003. He established the BRCAS and served as the Acting Director from 2004 to 2008. He devoted himself to fish taxonomy, ecology and evolution studies and has published hundreds of papers, technical reports, books and encyclopedia on fishes and marine ecology. He organized several important international conferences in Taipei including the 7th Indo-Pacific Fish Conference in 2005 and the 2nd International Barcode of Life Conference in 2007. He coordinated many team projects such as the 1st LOICZ project at Chi-Ku lagoon, and the 1st marine LTER in Kenting coral reefs, ten years National Digital Archive Program (Biodiversity Themem), and MPA studies at Taiping Isl. In 2009 and 2013.

Besides his research effort, Dr. Shao is dedicated to the work of many academic services and public awareness for marine conservation and sustainable fisheries in this country. He was elected the Presidents of Biological Society of China, Taiwan Ichthyological Society, Taiwan Cetacean Society etc. He won awards Ten Outstanding Youth, Outstanding Agriculture Experts Award, Outstanding research awars, and Forestry & Natural Conservation National Award etc. In the area of international collaboration, Dr. Shao has for many years been the Executive Secretary of National Committee for IUBS, CODATA, DIVERSITAS and GBIF. He is now in charge of the integration of biodiversity information in Taiwan which includes establishing the national portals of Catalog of Life in Taiwan (TaiCOL), Cryobanking and Barcode of Life in Taiwan (TaiBOL), Encyclopedia of Life in Taiwan (TaiEOL), Taiwan Biodiversity Information Facility (TaiBIF), and Taiwan Fish Database. Currently, he is the member of National Sustainability Committee, Executive Yuan.

Participants



Fuh-Kwo Shiah

Education

School	Nation	Department/Institute	Degree	Date (start ~ end)
University of Maryland	USA	Marine, Estuary and Environ. Science Program	Ph.D	1988/09 ~ 1993/09
Natl. Sun-Yat-Sen Univ.	ROC	Institute of Marine Biology	Master	1984/08 ~ 1986/07
Natl. Taiwan Normal Univ.	ROC	Dept. Biology	Bachelor	1976/08 ~ 1981/07

Working experience

Company/School	Department/Institute	Title	Date (start ~ end)
Academia Sinica	Research Center for Environ Changes	Research Fellow and deputy director (2013~)	2004/08 ~present
Natl. Taiwan U	Inst. Oceanography	Joint-appointed professor	2007/08 ~present
Natl. Taiwan Ocean U	Inst. of Mar Chem and Ecol	Joint-appointed professor	2005/02 ~present
Natl. Taiwan Ocean U	Inst. of Mar Chem and Ecol	Director, professor	2004/02 ~2005/02
Natl. Taiwan U	Natl. Ctr. for Ocean Res.	Deputy director	2003/08 ~2004/07
Natl. Taiwan U	Inst. Oceanography	Associate professor	2000/08 ~2004/07
Natl. Taiwan U	Natl. Ctr. for Ocean Res.	Adjunct scientist	2002/08 ~2004/07
Natl. Taiwan U	Inst. Oceanography	Assistant professor	1999/08 ~ 2000/07
Natl. Taiwan U	Natl. Ctr. for Ocean Res.	Associate researcher	1997/11 ~ 1999/07

Participants

Natl. Taiwan U	Inst. Oceanography	Post Doctor	1993/10 1997/09	~
Academia Sinica	Inst. Zoology	Research assistant	1986/08 1988/07	~
Natl. Taiwan Norm. U	Dept. Biology	Teaching assistant	1983/08 1984/07	~
Natl. Taiwan Norm. U	Dept. Biology	Teaching assistant	1980/08 1981/07	~

Specialty

Biological oceanography	Microbial Ecology	Estuarine ecology	
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Honors

2001-2002. NSC the distinguish research award

2001. National Taiwan Univ. Young scholar award

1999-2000. NSC research award and candidate of the distinguish research award

1992. Univ. Maryland HPL MEERC research scholarship. 1992.09-1993.08.

1987. Ministry of Education-ROC government scholarship. 1988.09 - 1991.08.

Participants



Keryea Soong

Degrees

- Bachelor of Science, 1977, Zoology, National Taiwan University
- Master of Science, 1979, Marine Biology, National Taiwan University
- Ph D., 1990, Biology, University of Texas at Austin (USA)
- Position: Professor, Dept. of Oceanography, National Sun Yat-sen University
(Address: 70 Lienhai Road, Kaohsiung 804, Taiwan)

Experience

- Nov. 1979-Aug. 1981, Antifouling organism research in Navy (Taiwan)
- Aug. 1981-June 1983, Research Assistant, Institute of Zoology, Academia Sinica (Taipei, Taiwan), working in the field of Marine Ecology.
- Jul. 1983-Jul. 1984, Lecturer, Department of Marine Resources, National Sun Yat-sen University (Kaohsiung, Taiwan)
- Aug. 1984-Feb. 1990 Ph D student at Division of Biological Sciences, University of Texas at Austin (USA)
- Jun. 1985-Jul. 1985 Field work at Galeta Marine Lab. Smithsonian Tropical Research Institute (in Panama)
- Jun. 1986-Aug. 1986 Field work at Virgin Island Marine Laboratory (Virgin Island, USA)
- Aug. 1986 Field work at Discovery Bay Marine Lab. (Jamaica)
- Jan. 1986-Jun 1987, Sep. 1988-Feb. 1990 Teaching Assistant at Division of Biological Sciences, University of Texas at Austin (USA)
- Jun. 1987-Aug. 1988. Field work at Galeta Marine Lab., Smithsonian Tropical Research Institute (in Panama)
- Feb. 1990-Aug. 1994. Associate Professor at Institute of Marine Biology, National Sun Yat-sen University (Kaohsiung, Taiwan)
- Aug. 1994-July 1997. Professor, Chairman, Institute of Marine Biology, National Sun Yat-sen University (Kaohsiung, Taiwan)
- Nov. 1998-2000. President of Taiwanese Coral Reef Society (Taiwan)
- Aug. 1999-July, 2002, Aug. 2010-July 2013 Director, Institute of Marine Biology,



Participants

National Sun Yat-sen University (Kaohsiung, Taiwan)

- March 2002 Outside reviewer at Research Institute of Subtropics (Okinawa, Japan)
- Aug 2003-Jul 2004 Visiting professor at Biology of Florida State University (USA).
- Jan. 2007- 2011, Member, National Park Planning Committee, Ministry of Interior. Republic of China
- Aug 2013-present, professor, Dept. of Oceanography, National Sun Yat-sen University (Kaohsiung, Taiwan)
- Nov, 2012-present, Dongsha Atoll Research Station, PI

Courses taught:

Evolution, Marine Ecology, Coral Reefs, Quantitative Genetics, Evolutionary Ecology, Coastal ecology, Marine Biodiversity,

Journal peer review referee: Zoological Studies, Coral Reefs, Marine Ecology Progress Series, Deep-Sea Research, Marine Biology, Aquaculture, Bulletin of Marine Science, Estuarine Coastal and Shelf Science, The Open Ecology, AMBI, Journal of Experimental Marine Biology and Ecology, Journal of Marine Biology (Israel), Ambio, Restoration Ecology.

Participants



Yann-huei Song

Professor Yann-huei Song is currently a research fellow in the Institute of European and American Studies, Academia Sinica, Taipei, Taiwan, the Republic of China. He is also a joint professor in the Institute of Marine Affairs, College of Marine Sciences, National Sun Yat-sen University, Kaohsiung, Taiwan.

Professor Song received his M.S. in Political Science from Indiana State University, Indiana; Ph.D. in International Relations from Kent State University, Ohio; L.L.M. and J.S.D. from the School of Law (Boalt Hall), University of California, Berkeley, the United States.

He has broad academic interests covering ocean law and policy studies, international fisheries law, international environmental law, maritime security, and maritime disputes in the East and South China Seas.

Professor Song is a member of the editorial boards of *Ocean Development and International Law* and *Chinese (Taiwan) Yearbook of International Law and Affairs*.

六、論文摘要

Keynote Speech: Professor Dr. Hasjim Djalal

THE PROCESS ON THE STUDY OF BIODIVERSITY IN THE SOUTH CHINA SEA INFORMAL WORKSHOP PROCESS ON MANAGING POTENTIAL CONFLICT IN THE SCS

I would think that the potential project of the next Biodiversity cooperation would be around Prataash and/or Hainan, particularly since there was no specific territorial dispute in or around Hainan and Prataash Islands. It has always been understood that, in any case, the conduct of the biodiversity project would be without prejudice to territorial and jurisdictional issues.

In fact, due to the views of some participants that the conduct of MSR may prejudice the territorial and jurisdictional issues that Indonesia suggested to conduct the 1st biodiversity expedition around the Indonesian Anambas Island, which was not disputed by any country. It was also agreed to conduct the biodiversity expedition in the informal process around Palawan Island, because it was not disputed by any one either, primarily because the conduct of the expedition was informal in nature until the Philippines changed it later into a formal endeavour.

On the basis of these experience, I would suggest that the next biodiversity expedition would best be around Hainan Island or Prataash Island, which were not disputed by anyone, especially the Southeast Asian countries. I feel that the informal scientific expedition around it would be very helpful and useful for the conduct of promotion of scientific knowledge and cooperation in the SCS area. I hope that the NISCSS and or the Chinese Taipei/Taiwan could take initiative on this matter and suggested a joint biodiversity expedition around the Hainan Island and or Prataash Island to the next 25th workshop.

Lunch Speech: Deputy Director Chi-Kwan Lui

Dongsha Atoll National Park is the first marine protected area in Taiwan that in accordance with National Park Law, which cover an area as big as 353,668 ha. Waters around Dongsha Atoll appears a biodiversity hotspot while had subjected overfishing

and destructive fishing. Besides, the temperature of seawater increased in 1998 had led mass coral bleaching. In order to conserve the aquatic resources and surroundings, Dongsha Atoll National Park was set up in 2007, and Marine National Park Headquarters be established and commissioned to the park's management. The priorities were to proceed with resources restoration, ecological researches and environmental monitoring. In the long term, Dongsha island is expected to become the South China sea research center site to promote transnational cooperation. After approaching the resources restoration, ecotourism and environmental education will consider offering for public within some limitation. The business of long-term monitoring and researches will continue in the meanwhile, a new milestone will be marked there simultaneously.

SESSION I: Professor Nguyen Chu Hoi

Philippines-Vietnam Joint Oceanographic and Marine Scientific Research Expedition in the South China Sea (JOMSRE-SCS) was an initiative in the framework of Presidential level meeting of Vietnam and Philippines (in Ha Noi, December 1995).

The MOU on JOMSRE-SCS'96 has been signed in 5nd April 1996 in Ha Noi by H.E. Minister of Ministry of Science, Technology and Environment (MOSTE) on behalf of Vietnam Government and H.E. Ambassador of The Philippine Embassy in Ha Noi on behalf of the Philippine Government.

The goals of the JOMSRE-SCS'96 were: (i) To increase the political willingness between the leaders of both countries through the cooperative activity in marine scientific research in the SCS; and (ii) To improve understanding about marine natural processes and its resources in the SCS, especially in the Spratly archipelago. Based on the above mentioned goals, the objectives have been also identified for each cruise.

Four cruises, as JOMSRE-SCS I (24 April – 09 May, 1996), JOMSRE-SCS II (27 May – 02 June, 2000), JOMSRE-SCS III (14 - 26 April, 2005) and JOMSRE-SCS IV (17 – 29 April, 2007), have been implemented since 1996 to 2007 jointly by marine scientists of both countries with focal point agencies from Vietnam (Vietnamese Academy of Science and Technology – VAST) and from Philippines (National University of Philippines, Institute of Marine Sciences).

All 4 cruises focused on measuring and studying in marine physical (including meteorological), chemical, geological, biological conditions, reef ecology and

biodiversity of corals and reef fish, seagrass, seaweeds. The cruises have been conducted by transects cut across the SCS in the Spratly archipelago (from Manila, Philippines to Vung Tau city or Nha Trang city, Vietnam) with some islands and shoals in detail surveys. The marine research vessels of Philippines (RPS Explorer vessel) and Vietnam (East Sea vessel) have been used for each cruise in rotation. The rotation seminars on the survey's results have been held in each country just after each cruise's completion.

The final conference on assessment of the JOMSRE-SCS's achievements has been held in Ha Long city, Vietnam in March 2008 in which 4 cruises' results had been highly appreciated. The Vietnam-Philippines joint cruises has opened a new page in collaboration, organization and professional capacity of the marine scientists of both countries in marine scientific research, in environmental and biodiversity protection in the SCS.

Press release of Philippines Ministry of Foreign Affairs No. 359-03 dated 17 July 2003 showed that the joint research was an important landmark in bilateral relationship and a key aspect to increase confidence between Vietnam and The Philippines (<http://www.mofa.gov.vn/quocte/27,06/vncn27,06.htm>). In visiting The Philippines of the Prime Minister of Vietnam in 10th August 2007, the JOMSRE-SCS has been discussed and supported by the Leaders of both countries.

In term of scientific results, the JOMSRE-SCS cruises provided data and information of marine physical environment, status of marine resources and biodiversity in studied marine waters. They also provide the scientific baselines for reasonable use, marine living resources and environmental protection, marine biodiversity conservation in the region and contribute to marine security and peace.

The JOMSRE-SCS has been discussed with China about negotiation mechanism to expand the cruises in China's participation. Through 3 negotiation meetings, 3 countries have agreed about purposes, scientific activities and surveyed staff composition, surveyed data/information and specimen sharing, but withdrawn the cruise transect and area and vessel kind. After 2009, the negotiation meeting has not been implemented until today.

Apart from the above mentioned situation, the paper will also presents about some primary results in marine biodiversity surveys in the JOMSRE-SCS's cruises.

SESSION I: Professor I-Shiung Chen

Marine fish biodiversity survey from the Anambas Marine Biodiversity Expedition 2002 to current coral reef fish biodiversity research of the Dongshar Islands and Taipin islands

The important Anambas Marine Biodiversity Expedition 2002 is a rather successful scientific cooperation team work dealing with first time joined with participants from 10 countries. The all cruise handle by the RV Bsrana Jaya VIII, the famous Indonesian Research vessel. All overseas participants arrived in Singapore and attended an expedition briefing by the cruise organizer & Chief Scientist, Dr. Peter K. L. Ng. The cruise for field marine biodiversity survey had been achieved during Mar. 11 to 20 around southern part of South China Sea.

Both Taiwanese participants (Prof. I-S. Chen & Dr. S.C. Chuang) mainly worked on the visual accounts and fish collections for marine fish biodiversity via SCUBA diving as well as netting of freshwater fish inventory at the forest streams while arriving large islands. The learning for the team up for marine biodiversity survey from Anambas Expedition would be as follows: (1) scientific team must with experienced taxonomists and ecologists which good with SCUBA diving experience from varied zoological groups of marine invertebrates to fishes; (2) some work for marine plankton survey would be also necessary for employing the both night time & cruise time to make more fruitful marine biological collections; (3) some extension valuable work should be considered for extra days to re-survey some biodiversity hotspots just found in the cruise; (4) extending workshop or symposium would be rather useful and beneficial to gather all scientific papers done for good contribution of marine biodiversity knowledge of the region.

Extending research for marine fish biodiversity survey have been still continued by author's team and also made good progress for contributing and revealing the several new discoveries of fish taxa for accounting of marine fish biodiversity in the World including mostly benthic coral reef fishes: gobies, sandperches and triplefins would be presented and discussed in this talk.

SESSION II: Ms. Cheryl Rita Kaur

Bordered by nine coastal states in the region, the South China Sea (SCS) forms a

major large marine ecosystem. Located within the global centre of marine biodiversity, the SCS supports immensely rich species diversity. More than half of Southeast Asia's hard coral species diversity is recorded to be found in the SCS. The coastal areas and the deeper parts of the SCS record coral species diversity ranging from 12 to 351 at different sites. In addition to the island groups in the SCS, fringing reefs and atolls occur throughout the SCS basin, playing a crucial role in larval connectivity and migratory species. The rich biodiversity makes reefs here extremely valuable for their ecosystem services as well as for ecotourism activities. Although environmental and economic benefits of coral reefs found in the SCS are well known, numerous reports on the subject point to their wide-spread degradation and destruction. Amidst the mounting human activities and coastal development, there is a greater urgency for better protection of the ecosystems in the SCS so that its full environmental and economic value can be realised for the benefits of the local community and people in the region. This paper focuses on presenting a case study of the tourism activities and management efforts in the Layang-Layang Island, a coral-deep sea atoll off Sabah in Malaysia towards ensuring that ecosystems benefits are reaped in a more sustainable manner over the long-term.

SESSION II: Deputy Director Jianwei Li

Due to the exotic nature and the beauty of natural scenery, as well as the courage involved in travelling experience, tourism to remote islands has become more and more attractive to tourists. Promotion of such tourism is also attractive to local government in enhancing local economic growth. However the tangible marine environment and the unique ecosystem involving man, islands and the sea require precautionary approach during every stage of the development of marine tourism--planning, designing and developing. This presentation intends to explore factors involved in such human activities for the aim of shedding lights on Hainan's experience from its promotion of cruise tourism to remote islands groups.

SESSION II: Professor Porfirio M. Aliño

Marine Tourism and Biodiversity Conservation: Finding Synergies to Achieve Multiple Sustainable Development Objectives Porfirio M. Aliño, The Marine Science Institute, University of the Philippines, Diliman, Quezon City.

The Philippines pursuit of an archipelagic development path identifies marine

tourism as an option for alternative livelihood and mainstream as part of its overall sustainable development strategy. Most MPA in the Philippines considers sustaining fisheries utilization as a priority objective of their management initiatives. We look at the various marine tourism activities i.e. Pangasinan, Batangas and Palawan, and their link to the likelihood of shifting from fishing to marine tourism related livelihood. Some of our investigations have shown that the development of coastal and marine tourism is one of the areas that fishers are able to pursue as an option for sustainable development. Promising results are seen in marine tourism's potential to diversify their livelihoods and move towards shifting to other livelihood opportunities. Emerging challenges to sustainability are also seen to be relevant in mainstreaming environmental governance, ecological and social benefits to assure minimal negative impacts on its road to sustainable development. Capacity building through socio-ecological networking in the tourism and environment sector facilitates convergence, cooperation and coordination offers an opportunity for charting a promising development path.

SESSION III: Professor Li-Lian Liu

Giant clams are harvested and farmed in the tropical western Pacific for their shell and highly prized adductor muscle. Due to widespread overfishing and deterioration of coral environments, giant clams have been listed as vulnerable in the IUCN (International Union for Conservation of Nature) list and all species are categorized in Appendix II of CITES (United Nations Convention on International Trade in Endangered Species of Wild Fauna and Flora). Here, the giant clam subfamily Tridacninae of Taiwan is reviewed. In addition, the reproductive biology and culture of *T. maxima* and *T. noae* were conducted for conservation purpose. A total of seven species have been reported, i.e. *H. hippopus*, *T. crocea*, *T. gigas*, *T. squamosa*, *T. maxima*, *T. noae* and *T. derasa*. Underwater surveys only revealed the occurrence of 5 giant clam species around Taiwan and adjacent islands. Based on the changes of egg diameter, the spawning peak of *T. maxima* and *T. noae* differed between sites of Kenting and Dongsha. Artificial fertilization was successfully conducted in *T. maxima*, *T. noae* and the hybrid. However, the death of hybrids occurred two days after fertilization. As a whole, there was no significant difference in shell length between the larvae of *T. maxima* and *T. noae*.

SESSION III: Professor Wei-Jen Chen

The origin of the Indo-West Pacific (especially, the Coral Triangle's) extreme concentration of marine biodiversity, in relation to geological, climate and evolutionary events, has been under discussion for many years. Advanced exploration for the biodiversity and the comprehensive biogeographical surveys of species from various living groups are still needed to reach conclusions on the major evolutionary patterns and processes at play. With more than 24,000 extant species, the Actinopterygii (ray-finned fish) is the most diverse group of vertebrates. Taiwan is part of the Coral Triangle, the core of the tropical Indo-West Pacific. Although it only represents 0.025% of the world's land, there are around 3,000 fish species, representing about one tenth of the world's species richness. This astonishing diversity represents not only an underexploited resource for research from this topic in our area but also a source of valuable information for comparative biology and medical science. In this presentation, I outline some of my past international surveys on marine diversity exploration, and the results. In addition, I illustrate some example studies conducted in my lab by using phylogenomic (or multiple gene) approach. These fish models inhabit different marine habitats (estuaries, reefs, deep-sea, etc.). The comparative results from different fish groups will eventually allow us to understand the historical factors that have determined the biodiversity gradients in marine fish species locally and more broadly, in the whole Indo-West Pacific, and to provide a guideline for the implementation of marine protected areas and any other conservation matter.

SESSION III: Professor Keryea Soong

The investigation of Dongsha Atoll started in the 1930's when T.Y. Ma studied the growth banding of stony corals there. Then, R.C. Yang et al. studied the corals, fishes and mollusks in 1975. More recent studies commenced in 1990 when L.S. Fang et al. as well as others surveyed the ecology, both marine and terrestrial, of the Dongsha Island and the atoll. Major efforts of scientific investigations began since 2005 when the atoll was designated a part of the Marine National Park. More than 70 reports have been published on the general ecology, seawater, biodiversities, sunken vessels, management, seagrass beds, long-term monitoring, conservation, restoring, migrating birds, history, etc, between 2005 and 2014. All these are accessible in the website of the national park (http://marine.cpami.gov.tw/chinese/index.php?option=com_dlarea&view=type1&Itemid=40).

In brief summary, the atoll is characterized by:

- A. Situating in the typhoon path of western Pacific.
- B. Exposed to internal waves in the north part of South China Sea.
- C. The lagoon was severely affected by the 1997-98 massive bleaching event when branching acroporids were killed. Corals in the forereefs were unaffected.
- D. Signs of overfishing are clear.
- E. Being a typical atoll, with a ring of reef-crest about 25 km in diameter, the central lagoon is dotted by hundreds of patch reefs which vary in diameter from ~100 -2000 m.

The Dongsha Island is inhabited by a few hundred servicemen (coast guards), park rangers and others. An air strip, a weather station and a park station are maintained.

To promote scientific investigations and cooperaton in the SCS region, a marine station, Dongsha Atoll Research Station, is established by the National Sun Yat-sen University, under the subsidy of Ministry of Science and Technology. Dongsha Marine National Park also constructed a research building to accommodate scientists and lab space. Basic oceanographic instruments, vessels, dry and wet laboratories as well as accommodation are accessible to international scientific communities. Cooperation in research of all relevant disciplines is solicited.

SESSION IV: Professor Kwang-Tsao Shao

The Spratly Islands archipelago is the largest group islands in the South China Sea. Amid these islands are a myriad of coral reefs which support abundant biodiversity and fishery resources. The area may also contain rich oil and natural gas reserves. Many of the world's busiest shipping lanes pass through or near the archipelago, linking together countries in Asian, Europe and Africa. The area is the subject of overlapping territorial claims by six surrounding countries, five of which maintain military outposts among the islands and reefs. Taiping Island is the largest island in the Spratly group and is controlled by Taiwan. As a result of numerous biodiversity studies, it is ecologically the best known among the islands. The Government of Taiwan intends to establish a marine protected area there as a positive step towards the development of a larger "International Spratly Islands Marine Peace Park". It has the support of the academic community of China to "set disputes aside and develop the area collaboratively, but it must keep conservation as a first priority". Because Taiwan has no official diplomatic relationships with other countries, the Government of Taiwan cannot employ official channels to initiate the peace park. As

an alternative, it has been suggested that each disputed country should establish local marine protected areas at the sites currently under their control, and to encourage international academic collaboration among the sites. Ultimately, an international “Spratly Island Treaty”, modelled on the recently renewed Antarctic Treaty, could be developed so as to ensure the conservation and sustainable use of all resources within Spratly Islands.

SESSION IV: Professor Fuh-Kwo Shiah

The oceans and coasts are playing increasingly important role in sustainable economic and social development in the South China Sea region. However, it is well noted that the oceans and coasts in this region have not been effectively and properly managed. They are not only threatened by poverty, resource degradation and pollution, but also affected by frequent and extreme weather events, acidification of the oceans and seas, flooding, water shortage, salt water intrusion and sea level rise caused by climate change. It is our mission to conduct adequate management over the oceans and coasts and to achieve the goal of sustainable development in our region. Capacity-building is essential to fulfill such a mission. The major purpose of the *South-East Asia Network for Education and Training (SEA-NET)* is to serve as a platform providing proper training and expertise-sharing for the people engaged in ocean and coast management in the South China Sea region. This joint proposal was discussed and became an adopted project of the 19th Workshop on Managing Potential Conflicts of the South China Sea in the year of 2000, and conducted by Chinese Taipei in 2010, 2012 and 2014 as well as China in 2011 and 2013. There have been 44 visiting scientists and 41 Trainee benefited from this project since 2010.

SESSION IV: Professor Yann-huei Song

Beginning in 1991, the participants of the Informal Workshop on Managing Potential Conflicts in the South China Sea (“the SCS Workshop”) agreed to recommend to the relevant governments to explore areas of cooperation in the SCS, which include the preservation and protection of marine environment and conducting marine scientific research. As a result of the discussion, in March 2002, a joint biodiversity project was carried out around the undisputed Indonesian Islands of Anambas in the SCS, with 29 participating experts and researchers from Malaysia, the Philippines, China, Taiwan, Thailand, Vietnam, Singapore and Indonesia. In 2003,

another joint project was proposed to study the state of marine biodiversity in the waters near Palawan of the Philippines. After the implementation of the biodiversity projects in Anambas and Palawan, the countries that border the northern portion of the SCS, namely, China, Taiwan, Vietnam, and the Philippines, have been asked to consider the possibility of conducting biodiversity expedition that will include Northeast and Northwest area of the SCS in order to complete the picture of biodiversity in the SCS as a whole.

At the 14th Informal Workshop on Managing Potential Conflicts in the South China Sea (“the SCS Workshop”), that was held in Batam on November 24-26, 2004, the participants from mainland China, the Philippines, Taiwan, and Vietnam were encouraged to consider the possibility of conducting biodiversity study in the northeastern and northwestern parts of the SCS. At the 16th SCS Workshop in Bali in November 2006, the participants from mainland China and Vietnam indicated that they were not ready to conduct the biodiversity expedition in the suggested area. This was followed by a decision made at the 17th SCS Workshop in Jogjakarta on November 23-24, 2007 that the continuation of the biodiversity cooperative programs under the workshop process would be kept under review.

At the 22nd SCS Workshop in Bandung on November 23-24, 2012, Prof. Dr. Hasjim Djalal, the founding father of the SCS Workshop process, suggested again to continue the biodiversity expedition project. The workshop expected the project proposal to be submitted to the 23rd workshop for consideration, particularly in the northeastern part (around the Pratas Island), the northwestern part (around the Paracel Island), or the central part (around the Spratly Islands and Taiping Island/Itu Aba) of the SCS. At the 23rd SCS Workshop in Jogjakarta on November 1-2, 2013, however, no specific proposal was made on the continuation of the joint marine biodiversity study.

In August 2014, the idea of promoting a joint marine biodiversity study in the northeastern or northwestern parts of the SCS was raised again at the Workshop on Implementing the DOC and Cooperation Mechanism in the South China Sea that was organized by the National Institute for South China Sea Studies and held in Haikou, Mainland China. The idea was also discussed at the 24th SCS Workshop held in Bali, Indonesia on October 14-15, 2014.

The purpose of my presentation is to review the SCS workshop process that discussed the need for joint marine biodiversity studies in the South China Sea.