វេទិកា

ចិន-អាស៊ីអាគ្នេយ៍លើកទី៤

ស្តីពី កិច្ចសហប្រតិបត្តិការសមុទ្រ

Fourth China-Southeast Asian Countries Marine Cooperation Forum

December 15-16, 2016

Siem Reap, Cambodia

Minutes of the Fourth China-Southeast Asian Countries
on
Marine Cooperation Forum

The Fourth China-Southeast Asian Countries Marine Cooperation Forum was successfully convened in Siem Reap, Cambodia during December 15-16, 2016. The Forum was co-hosted by the Ministry of Environment of Cambodia (MoE) and the State Oceanic Administration of China (SOA), and sponsored by the IOC Sub-Commission for the Western Pacific (WESTPAC). The Department of Marine and Coastal Conservation (DMCC) of MoE worked together with the First Institute of Oceanography (FIO) of SOA as local organizers. Dr. Khim Nung from MoE and Dr. QIAO Fangli from FIO co-chaired the Forum. Totally about 160 scientists and government officials from Brunei, Cambodia, China, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam, as well as representatives from WESTPAC, PEMSEA, Private Sector Youth, some International NGOs, and Partners attended the Forum. Participants list is attached in Annex I.

Following the objectives of the past three China-Southeast Asian Forums, the Fourth Forum also aims to promote the scientific communication among China and the Southeast Asian countries, and to strengthen the existing platforms for future cooperation. Under the theme of "Strengthen the China–Southeast Asia Marine Science and Technology Cooperation, Promote the Sustainable Development of Southeast Asia", the Forum was conducted in two sessions with five sub-themes. 35 oral presentations were given during the Forum and were followed by active communications between the presenters and participants. Forum agenda is attached in Annex II. Abstracts of oral presentations are attached in Annex III.

During the Opening Session on December 15, four speeches were delivered by **H.E. Dr. Khim ChhayHeang,** Deputy Governor of Siem Reap province, **H.E. Dr. FANG Jianmeng**, Deputy Administrator of SOA, **H.E. Yin KimSean**, Secretary of State of Ministry of Environment (MOE), and **Dr. Somkiat Khokiattiwong**, Vice Chair of UNESCO/IOC and Chair of UNESCO/IOC/WESTPAC. All speakers highlighted the key roles played by marine science and ocean management in the sustainable development, as well as the importance of promoting regional cooperation for scientific research, ocean observation and forecasting, ecosystem protection, disaster prevention and policy making. Several initiatives were raised by the speakers and echoed by all participants, including establishing and strengthening the regional partnership for marine cooperation, developing more practical cooperative projects, improving marine science innovation, promoting the development of marine biological civilization, establishing demonstration sites for blue economy, etc.

Followed the opening session, Session 1 of "Outcomes and Achievements of Ongoing Cooperation" was organized in three sub-themes, which are 1) Ocean Forecasting and Marine Disasters Early Warning System for Southeast Asia, 2) Research for Conservation of Marine Endangered Species and Ecosystems in the Southeast Asia, and 3) Building Ecological

Management Network for China-ASEAN Marine Protected Areas. Dr. Hem Socheth from MoE and Dr. Qiao Fangli, FIO served as co-chairs of Session 1.

In sub-theme 1) of Session 1, the outcomes and future implementation plans of the ongoing project namely the Ocean Forecasting and Marine Disasters Early Warning System for Southeast Asia, which was supported by China-ASEAN Maritime Cooperation Fund, was discussed. As the project PI, Dr. Fangli Qiao reported the project progress and future plan of Ocean Forecasting System for the Southeast Asia, followed by five presentations on downscaling, data assimilation, dynamical processes off Viet Nam, Typhoon forecast and the present and future plan of Myanmar's Marine Meteorological Services from Malaysia, Viet Nam, Myanmar and China. Myanmar showed high demand on the ocean forecasting and marine disaster early warning system, because Myanmar has been often attacked by different marine hazards while the forecasting capacity on marine hazards urgently to be improved. Malaysia reviewed great success of the Ocean Forecasting System jointly developed by China, Malaysia and Thailand, and then proposed the high demand of the Asian Monsoon onset prediction and projection in the Southeast Asia region, in which Prof. Fredolin Tangang is PI of CLIVAR CORDEX project. Prof. Tangang then proposed to set up a task force under the project of the Ocean Forecasting and Marine Disasters Early Warning System for Southeast Asia, and a concept proposal will be prepared. Viet Nam reviewed the main oceanographic processes in South Vietnam waters, and highlighted the importance of upwelling in national economy sustainability, and proposed cooperation on the investigation and prediction of upwelling system in the South China Sea.

In sub-theme 2) of Session 1, the outcomes and future implementation plans of the ongoing project namely Research for Conservation of Marine Endangered Species and Ecosystems in the Southeast Asia. Experts from Cambodia, China, Thailand, Malaysia and Brunei gave seven presentations, covering the topics including experience and gaps of marine protected area establishment, development of international cooperation platform, and progress and future projections of the ongoing projects on marine endangered species (MESR) that are funded with the China-ASEAN Maritime Cooperation Fund and endorsed under IOC/WESTAPC as well as local plans. The floor paid attention to the outputs and future projections, and suggested further development of the projects. Under the theme "Management and Restoration of Marine Environment and Ecosystem", the floor received the presentation from PEMSEA on applying integrated coastal management to trans-boundary conservation of dolphins and their habitats. Noting the common interest on integration, MESR Project invited its involving partners and potential new partners, from Cambodia, China, Brunei, Malaysia, Thailand, and PEMSEA, and discussed the development of new proposal on integration of research and management for endangered species (dolphins). A consensus was reached on the intention to draft the conceptual proposal in the immediate following period. Potential sites of application were also identified during the discussion.

In sub-theme 3) of Session 1, the outcomes and future implementation plans of the ongoing project namely Ecosystem Management Network for Marine Protected Areas in China and ASEAN Countries was discussed. This project has just been approved by the China-ASEAN

Marine Cooperation Fund. Six presentations were delivered by the project partners from Thailand, Cambodia, Indonesia, Malaysia and China. Although this project is now in its very beginning stage, the partners from the participating countries have already reached a full discussion on the project proposal. 7 demonstration sites have been selected as the study areas in China and ASEAN Countries. Based on the concept of the marine and coastal biodiversity conservation and Blue Economy development, an international workshop has been conducted on November 3, 2017 in Xiamen China to share the experiences from the global perspectives, as well as the discussion on the current status of the demonstration sites and implementation plans. Thailand partners showed the progress in Thailand, Chinese and Cambodia experiences on the MPAs establishing and management have been shared in this forum, Indonesia colleague illustrated the Mangrove heath condition in Indonesia, and Malaysia colleague emphasized the importance of marine habitat conservation for the bio-resources preservation and discovery. This project welcomes the participation of the ASEAN countries, more and more ongoing activities and outcomes will benefit the capacity building and best practices sharing for the MPAs management in this region.

On December 16, Session 2 of “Future Cooperation Proposals” was organized in two sub-themes, which are 1) Management and Restoration of Marine Environment and Ecosystem, and 2) The Role of New Marine Technology in the Development of Blue Economy. Dr. Khim Nung from MoE and Mr. WANG Antao from SOA served as co-chairs of Session 2. Experts and representatives from China, Malaysia, Myanmar, Vietnam as well as PEMSEA delivered 16 presentations for future cooperation proposals. The proposals covered the comprehensive areas related to ocean acidification, coastal sediment, HAB, ecosystem evaluation, coastal hazard, marine animals, oil spill, ICM, remote sensing, Tsunami, desalination of sea water, tidal current forecasting, and so on. The Forum agreed that it was important to further develop marine cooperation initiatives in this region and strengthen the partnership mechanism among marine research institutes and universities of the Southeast Asian Countries and China.

After Session 2, **H.E Khim Nung** and **Dr. QIAO Fangli**, the two Forum co-chairs, organized the closing session. **Mr. WANG Antao** from SOA announced that Malaysia has kindly offered to host the Fifth China-Southeast Asian Countries Marine Cooperation Forum in 2017. The time, venue and detailed arrangements of the Fifth Forum will be announced later. The two co-chairs summarized the discussion during the Forum sessions and thanked all the participants for their valuable contributions to the Forum as well as the regional marine cooperation. All the participants welcomed the continuation of the Forum among the Southeast Asian countries and China to promote marine scientific cooperation.

Annex I- Participants List

List of Participants
Fourth China-Southeast Asian Countries Marine Cooperation Forum
December 15-16, 2016, Siem Reap, Cambodia

I- Participants from the Southeast Asian Countries/Organizations

No	Country	Name	Title	Organization
1.	Brunei	Mohammad Vol HJ MOMIN		Sakam Enterprise of Brunei
2.	Cambodia	SreySunleang, Ph.D	Dean and Professor	Faculty of Mathematics, Science and Engineering, Pannasastra University of Cambodia
3.	Indonesia	I Wayan Eka Dharmawan		Research Center for Oceanography, Indonesian Institute of Sciences (RCO-LIPI)
4.	Malaysia	Azizan Abu Samah	Professor	University of Malaya
5.	Malaysia	Dr. Lim Phaik Eem	Associate Professor	Head of Marine Biotechnology Unit, Institute of Ocean and Earth Sciences (IOES), University of Malaya
6.	Malaysia	Lim Po Teen	Associate Professor	University of Malaya
7.	Malaysia	CheAbd Rahim Bin Mohamed	Professor	National University of Malaysia
8.	Malaysia	FredolinTangang	Professor	Universiti Kebangsaan Malaysia
9.	Malaysia	Prof. SAIFULLAH ARIFIN B. JAAMAN	Professor	Institute of Oceanography & Environment (INOS), Universiti Malaysia Terengganu (UMT)
10.	Malaysia	James Anak BALI		Sarawak Forestry Corporation
11.	Myanmar	Dr. HlaTun	DDG	Department of Marine of hydrology, Myanmar
12.	Myanmar	Dr. Myat Lwin	Rector	Myanmar Maritime University
13.	Philippines	Dr. Mundita Lim	Director	Biodiversity Management Bureau, Department of Environment and Natural Resources
14.	Thailand	Somkiat Khokiattiwong	Director	Phuket Marine Biological Center

15.	Thailand	Wannakiat Thubthimsang	Expert	Phuket Marine Biological Center
16.	Thailand	Kongkiat Kittiwattanawong	Expert	Phuket Marine Biological Center
17.	Thailand	Chakkrit Reamruk	Head	Hydrographic Department, Royal Thai Navy
18.	Vietnam	Le Dinh Mau	Director General	Vietnam National Institute of Oceanography
19.	Vietnam	Dr. BU HONG LONG	Professor	Vietnam National Institute of Oceanography
20.	Vietnam	Phan Minh Thu	Principal Researcher	Dept. Marine Ecology, Institute of Oceanography
21.	PEMSEA	Adrian Ross	Executive Director	PEMSEA

II- Participants from China

No	Name	Title	Organization
1.	Mr. Fang Jianmeng	Deputy Administrator	State Oceanic Administration of China (SOA)
2.	Dr. Zhang Haiwen	Director General	Department of International Cooperation, SOA
3.	Mr. Wang Antao	Division Director	Department of International Cooperation, SOA
4.	Ms. Ning Jia	Program Officer	Department of International Cooperation, SOA
5.	Dr. Qiao Fangli	Secretary-General	First Institute of Oceanography (FIO), SOA
6.	Dr. Yin Xunqiang	Researcher	First Institute of Oceanography (FIO), SOA
7.	Dr. Wang Guansuo	Researcher	First Institute of Oceanography (FIO), SOA
8.	Dr. Zhao Biao	Researcher	First Institute of Oceanography (FIO), SOA
9.	Dr. Wang Shouqiang	Researcher	First Institute of Oceanography (FIO), SOA
10.	Dr. Zhang Xuelei	Researcher	First Institute of Oceanography (FIO), SOA
11.	Dr. Shi Xuefa	Researcher	First Institute of Oceanography (FIO), SOA
12.	Dr. Qiao Shuqing	Researcher	First Institute of Oceanography (FIO), SOA
13.	Dr. Liu Baochao	Researcher	First Institute of Oceanography (FIO), SOA
14.	Mr. Yang Yafeng	Division Director	First Institute of Oceanography (FIO), SOA
15.	Ms. Lv Wenjun	Program Officer	First Institute of Oceanography (FIO), SOA
16.	Ms. Zhang Lingyu	Program Officer	First Institute of Oceanography (FIO), SOA
17.	Dr. Zeng Jiangning	Researcher	Second Institute of Oceanography (SIO), SOA
18.	Dr. Lu Douding	Researcher	Second Institute of Oceanography (SIO), SOA
19.	Dr. Zhou Feng	Researcher	Second Institute of Oceanography (SIO),

			SOA
20.	Dr. Liu Zhenghua	Researcher	Third Institute of Oceanography (TIO), SOA
21.	Dr. Xu Changan	Researcher	Third Institute of Oceanography (TIO), SOA
22.	Dr. Gu Haifeng	Researcher	Third Institute of Oceanography (TIO), SOA
23.	Dr. Chen Keliang	Associate Researcher	Third Institute of Oceanography (TIO), SOA
24.	ZHOU QING	Researcher	North China Sea Environmental Monitoring Center, SOA
25.	Dr. Xu Jiangling	Senior Engineer	North China Sea Marine Forecasting Center, SOA
26.	Liu Shouhua	Associate Researcher	National Marine Information and Data Service, SOA
27.	Cai Dahao	Associate Researcher	National Marine Information and Data Service, SOA
28.	Mr. XU Ying	Associate Researcher	National Satellite Ocean Application Service, SOA
29.	Dr. Chen Han	Assistant Research Fellow	Island Research Center, SOA
30.	Dr.Yu Weidong	Researcher	National Marine Environmental Forecasting Center, SOA
31.	Dr.Yuan Ye	Research Associate Professor	National Marine Environmental Forecasting Center, SOA
32.	Mr. Liu Qiuxing	Research Assistant	National Marine Environmental Forecasting Center, SOA
33.	Mr. Peng Wei	Professor	National Ocean Technology Center, SOA
34.	Dr. Teng Xin	Dr.	National Ocean Technology Center, SOA
35.	Ruan Guoling	Chief Engineer	Institute of Sea Water Desalination and Multi-purpose Utilization, SOA
36.	Dr. Gao Tianxiang	Professor	Zhejiang Ocean University

III- Participants from Cambodia

No	**Name**	**Sex**	**Institute**	**Tel/Email**
1.	Ros Sophornna	M	MPWT	012 628 356
2.	Nhal Thoun	M	MoE	011 272 005
3.	Hong Daravuth	M	MoE	012 781 727
4.	SoK Seiny	F	Youth	098 738 715
5.	Tean Sopheaktra	M	Youth	098 915 958
6.	Sin Nisai	F	Youth	010 669 445
7.	Khum Kroem	M	Youth	085 559 224
8.	Vibol Sinun	M	Youth	093 628 347
9.	Pirun Sareaksa	M	Youth	096 55 30 774
10.	Ouk Chandyna	M	DoE, Kampot	097 991 77 10

11.	Yan Kimsea	F	Youth	010 844 272
12.	Houn Kim hun	M	Youth	078 815 848
13.	Kim Soben	M	RUA	kimsoben@gmail.com
14.	Meng Sokhon	M	PNCA	mengsokhon@gmail.com
15.	Mak Seseth	M	MPWT	maksideth@gmail.com
16.	Sek Thea	M	MoE	thea_sek@yahoo.com
17.	Ly Sophorn	F	MoE	sophornly@gmail.com
18.	Seng Soth	M	MoE	
19.	Lor Poleth	M	Youth	012 788 871
20.	Tan Sambo	M	Youth	017 389 999
21.	Chou Sophark	M	Youth	012 363 689
22.	Mour Chhay	M	DoE, Phreah Sihanouk	016 425 2
23.	Ek Menrith	M	MoE	099 889 506
24.	Ngoun Kong	M	MoE	011 832 667
25.	Neang Thy	M	MoE	016 67 17 71
26.	Sim chhiuv Chhean Pisith	M	DoE, Siem Reap	012 629 767
27.	Khourn Sokun visesh	M	DoE, Siem Reap	012 934 948
28.	Eav Sam An	M	FACT	012 653 351
29.	Kruoch Kimthon	M	MoD	031 722 22 26
30.	Hour Thanit	M	MoE	012 202 649
31.	Chea Sam Ang	M	MoE	012 862 730
32.	Chhub Paris	M	NCSD	017 31 33 66
33.	Teng Channath	M	Youth	078 77 00 27
34.	Pon Sowanna	M	Siem Reap Admin	086 66 72 47
35.	Koch Savath	M	MoE	012 787 088
36.	Kim Chhaiheing	M	Siem Reap Admin	061 59 59 63
37.	Phai Kimyon	F	Youth	087 357 284
38.	Kim Nong	M	MoE	092 77 22 56
39.	Kak Danet	F	PUC	012 867 507
40.	Yin KimSean	F	MoE	
41.	Phourn Lina	M	MoE	012 77 53 65
42.	Tek Vanna	M	MoE	012 62 85 26
43.	Hem socheth	M	MoE	077 29 99 98
44.	Kim Sokha	M	FiA/MAFF	012 78 46 87
45.	Sum Thy	M	Dcc/GSSD	016 90 77 64
46.	Wayre Mclalk	M	Song Sa FDK	077 777 498
47.	Sous Socheat	F	youth	096 60 46 117
48.	Chhay Siyen	F	Youth	086 69 05 91
49.	Gilles Viommon	M	Thnai Bang Chalt	036 4564 771
50.	Ung Chhay	M	Siem Reap Admin	012 277 71
51.	Sum Dara	M	MoE	012510677
52.	Chea Phala	M	MoE	

53.	Ek Phanith	M	MoE	
54.	Chhith Sam Ath	M	WWF	
55.	Than Rithy	M	Youth	070 528 256
56.	Cheoung Chanseyha	M	Youth	087 28 24 17
57.	Klouk Socheat	M	Youth	081 57 51 40
58.	Im Panharith	M	DoM, Kep	012 255 255
59.	Hun marady	M	DoM, Koh Kong	
60.	Ou Phichong	F	World Fish	089 46 79 01
61.	SeK Sopheak	M	MoE	092 92 42 69
62.	Lien Tevy	M	MoE	012 88 26 48
63.	Sok Sothea	M	MoE	012 82 06 04
64.	Hong Lork	M	MoE	012 65 68 02
65.	Sreng Sophal	M	MoE	089 696 910
66.	Khan Sopheap	M	Siem Reap Provincial Hall	086 66 72 47
67.	Tithout Vathana	F	MoE	078 88 72 18
68.	Meas Rithy	M	MoE	012 4444 97
69.	Hy Sophal	M	MoE	077 777 088
70.	Sem Tolasreypov	F	MoE	012 868 001
71.	Yim Sopheakneat	F	MoE	010 372 919
72.	Mey Parinha	M	MoE	016 813 483
73.	Ross Ban Sok	M	MoE	012 71 11 01
74.	Chin Sothon	M	MoE	077 43 40 32
75.	Nary Sobutra	M	MoE	010 10 20 22
76.	Khoy Bona	M	CTN	012 22 92 32
77.	Than Monomayith	M	MoE	089 888 576

Annex II Forum Agenda

Day1, December 15, 2016, Thursday

Time	**Activities**	
08:30 – 09:00	Registration	
	Opening Ceremony **Chair: H.E Khim Nung** **Dr. QIAO Fangli (FIO, China)** **Master of Ceremony:** **Ms. Tith Huothvathana**	
09:00 – 09:10	Welcome remarks by Siem Reap Governor	
09:10 – 09:20	Remarks by H.E Mr. FANG Jianmeng, Deputy Administrator of SOA	
09:20 – 09:30	Remarks by Dr. Somkiat Khokiattiwong, Vice chair of UNESCO/IOC and chair of UNESCO/IOC/WESTPAC	
09:30 – 09:45	Open speech by **H.E. Yin KimSean**, Secretary of State, MOE	
09:45 – 10:10	Photo Group & Coffee Break	
	Session 1: Outcomes and Achievements of Ongoing Cooperation **Co-chairs: H.E Hem Socheth,** **Dr. Qiao Fangli, FIO, China**	
10:10-12:30	**I. Ocean Forecasting and Marine Disasters Early Warning System for Southeast Asia**	
	The project progress and future plan of Ocean Forecasting System for the Southeast Asia	Dr. QIAO Fangli, FIO, China
	The demand on high-resolution downscaled ocean forecasts / climate prediction and projection in the Southeast Asia region	FredolinTangang, UKM, Malaysia
	Development of EAKF assimilation system in FIO-ESM and reconstruction of climate reanalysis data	Dr. YIN Xunqiang, FIO, China
	Main oceanographic processes in South Vietnam waters	Le Dinh Mau, NIS, Vietnam
	Research on the Mechanism of ocean response to swell generated by Typhoon	Dr. WANG Guansuo, FIO, China
	Myanmar's Marine Meteorological Services: Present and Future Plan	Hla Tun, Department of Marine of hydrology, Myanmar
	Discussion	
12:30– 14:00	Lunch Break	
14:00 – 15:50	II. **Research for Conservation of Marine Endangered Species and Ecosystems in the Southeast Asia**	
	Presentation on marine conservation by FiA/MAFF	Mr. Uk Vibol, Director of Department
	The development of China-Thailand Joint	Dr. YU Weidong,

	Laboratory in support of bilateral and regional cooperation.	NMEFC, China
	Research for Conservation of Marine Endangered Species and Ecosystems	Mr. Seak Sophath, RUPP/University
	Integrated Study of Marine Endangered Species: An Update of the Regional Project	Dr. ZHANG Xuelei, FIO, China
	Marine endangered species conservation in Thailand	Dr. Kongkiat Kittiwatanawong, PMBC, Thailand
	Preliminary results on the boat survey of Irrawaddy dolphins (Orcaella brevirostris) in the Bay of Brunei, Brunei Darussalam	Dr. JAAMAN Saifullah Arifin, UMT, Malaysia
	Developing Bird Watching in Brunei Darussalam	Mr. Mohammad Vol HJ MOMIN, Sakam Enterprise of Brunei
	Dolphin conservation in Sarawak	Mr. James Anak BALI, Sarawak Forestry Corporation, Malaysia
	Discussion	
15:50-16:10	Coffee Break	
16:10-18:00	III. **Building Ecological Management Network for China-ASEAN Marine Protected Areas**	
	Outcomes of the International Workshop on Ecosystem Management of Marine Protected Areas in China and ASEAN Countries	LIU Zhenghua, TIO, China
	Progress of Ecological Management Networks for MPAs in Thailand	Wannakiat Thubthimsang, PMBC, Thailand
	Building Ecological Management Network Marine Protected Areas	Mr. Neang Thy, MOE, Cambodia
	Environmental Management and Experiences of Marine Protected Areas in Beibu Gulf of China	Dr. CHEN Keliang, TIO, China
	Community Structure and Carbon Dynamics of Mangrove in Kema, North Sulawesi - Indonesia	IWayan Eka Dharmawan, LIPI, Indonesia
	Importance of Marine Habitat Conservation for Preservation and Discovery of New Bio-resources of Seaweeds	Phaik Eem Lim University of Malaya, Malaysia
	Discussion	
18:00 – 21:00	Dinner	

Day 2, December 16, 2016, Friday

Time	Activities	
	Session 2: Future Cooperation Proposals **Co-chairs: H.E Khim Nung** **Mr. WANG Antao, SOA**	
8:30-10:00	**I. Management and Restoration of Marine Environment and Ecosystem**	
	The development of WESTPAC-SEAGOOS on ocean acidification monitoring and Its Impacts on the coral reef biodiversity	SomkiatKhokiattiwong, PMBC, Thailand
	Sedimentary characteristic and provenance identification in the western Gulf of Thailand	Dr. SHI Xuefa, FIO, China
	Preliminary study on radiochemical and chemical in sediment cores at the Northeast Peninsular of Malaysia	Dr. Che Abd Rahim Mohamed, UKM, Malaysia
	Addressing socio-economical impact of harmful algal blooms incidences in Asian waters through collaborative research and capacity building enhancement	Dr. Lim Po Teen, University of Malaya, Malaysia
	Evaluation of coastal ecosystem in the South China Sea and application in the demonstration sites	Dr. GU Haifeng, TIO, China
	Trend, uncertainties of harmful algal blooms and possible links in China coastal waters	Dr. LU Douding, SIO, China
	Coastal (Island) hazard risk and adaptive management in China-ASEAN Countries	Dr. CHEN Han, IRC, China
	Integrated observation and conservation of the Irrawaddy and humpback dolphins	Dr. Stephen Adrian Ross, PEMSEA
10:00-10:20	Coffee Break	
10:20-12:00	**II. The Role of New Marine Technology in the Development of Blue Economy**	
	Marine oil spill fingerprinting identification	Dr. ZHOU Qing, NCSB, China
	Blue Economic and ICM in Vietnam: Conceptual Framework of Oceanography	Dr. Bui Hong Long, Institute of Oceanography, Vietnam
	Sea level variability trend and future estimates in the China/ASEAN sea based on satellite remote sensing observation	Dr. XU Ying, NSOAS, China
	Marine Observation Capacity and Marine Renewable Energy Resource Investigation	Dr. PENG Wei, NOTC, China
	Establishment of a UNESCO-IOC South China Sea Tsunami Advisory Center: Operational and	Dr. YUAN Ye, NMEFC, China

	Scientific Aspects	
	Desalination and the blue economy	Dr. RUAN Guoling, ISDMU, China
	Project Proposals relating Tidal Current, Port Location, Sea Water Intrusion in Myanmar	Dr. Myat Lwin Myanmar Maritime University, Myanmar
	Tide and tidal current forecast and climate change mechanism over Southeast Asia	Dr. LIU Shouhua, NMDIS, China
	Discussion	
12:00 – 12:30	**Closing Ceremony**	
12:30 – 14:00	Lunch Break	

Annex III Abstracts of Presentations

The project progress and future plan of Ocean Forecasting System for the Southeast Asia

Dr. Fangli Qiao
First Institute of Oceanography, State Oceanic Administration, Qingdao, P R China

Due to the importance of Ocean Forecasting System (OFS) in the mitigation of marine hazards and lacking of operational OFS in the southeast Asian area, the OFS project was proposed and approved by IOC/WESTPAC in May 2010 in Bali Island, Indonesia. Based on the non-breaking surface wave-induced vertical mixing theory, an operational wave-circulation coupled Ocean Forecasting Demonstration System for the Gulf of Thailand was successfully developed and launched in May, 2012 in Busan, South Korea, operationally run in both Malaysia and China. Two years later, the surface wave-circulation coupled OFS for the west Pacific, the South China Sea and north Indian Ocean was developed, and the system was installed in both Thailand and China. In 2015, IPOVAI project focusing on regional air-sea coupled system for the prediction of Typhoon and monsoon was approved by IOC/WESTAPC in May of 2015 in Phuket, Thailand. Both OFS and IPOVAI are crucial important for improving forecasting ability of ocean environments, Typhoon and monsoon and open for further partners.

The demand on high-resolution down scaled ocean forecasts / climate prediction and projection in the Southeast Asia region

Professor Fredolin Tangang
School of Environmental and Natural Resource Sciences,
Faculty of Science and Technology
The National University of Malaysia
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Abstract

Southeast Asia is a complex region with complex coastlines, landmasses, regional seas and topography. With pronounced monsoon seasonality and variability from intra-seasonal to inter-annual times, complex regional air-sea interaction, the region is often viewed as a difficult domain for a general circulation model to adequately capture. Existing ocean forecasts, climate prediction and projection based on GCMs may not able to sufficiently resolve the complex dynamics over this region. Yet, with a population of more than half a billion people, this region is highly exposed and highly vulnerable to marine and climate related disasters. Ocean forecasts, climate prediction / projection are required for disaster mitigation and long-term adaptation. Hence, there is a need to develop the high-resolution downscaled ocean forecasts, climate prediction and projection for the region from global-scale forecasts /prediction/projection. Due to the highly technical and resource expensive requirement for research and development of these products, progresses over this region are rather slow and lagging from that of the developed world. Nevertheless, some positive developments have been made. This paper describes briefly the progress and advancements made in the development of regional ocean forecasting system, seasonal forecast and climate projection in the Southeast Asia region during the last decade or so. In particular, the development of the IOC-WESTPAC SEAGOOS Ocean Forecasting System will be described. This paper will also describe the on-going Southeast Asia Regional Climate Downscaling (SEACLID)/CORDEX Southeast Asia Project, an international collaborative under the auspices of the World Climate Research Programme (WCRP) that involves 20 institutions from 14 countries. Through this project, the collaborators have successfully downscaled simulations of more than 15 GCMs using multi-RCMs and multi-emission scenarios. This paper will also discuss the development of regional seasonal forecast over the Southeast Asia, which is still considered minimal. Finally, this paper will discuss the way forward on how to accelerate the progress on research and development on ocean forecasts and climate prediction/projection over this region.

The development of EAKF-ODA system and its application in ocean and climate models

Xunqiang Yin, FangliQiao, Changshui Xia, Qi Shu, Ying Bao, Hui Chen, Zhenya Song, Bin Xiao, Guansuo Wang

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Since there is always exist some bias during the simulation of ocean and climate system, data assimilation is urgently needed to properly absorb the observed information into the numerical model in order to increase the precision of numerical simulation or forecast. Among all the methods of data assimilation used in the study of ocean and climate, ensemble adjustment Kalman filter (EAKF) is more suitable for application due to its significant advantage. In this method, perturbing of observation is avoided, the prior information from numerical model can be well preserved, and the cost of computation and requirement of storage are also relatively smaller. An EAKF assimilation system is developed for oceanic data assimilation (EAKF-ODA) for ocean models and Earth System Model. To make this system more flexible, some common program has been developed in this system. All the possible grids in horizontal (C and B) and vertical (z-,Sigma-, S-coordinates) popularly used in state of art ocean numerical models is supported in this system. On the other hand, this system is also including the functions of quality control of observations. An offline way to connected with numerical models is used and it makes the application of this system becomes easier. This EAKF-ODA system has been applied to POM, ROMS, MOM and FIO-ESM models. Most oceanic observations, such as the satellite observation along track, Argo profiles and objective analysis field results can be assimilated efficiently. After data assimilation, the model errors have been significantly reduced and this system is potentially helpful to improve skills of hind-cast and forecast of the ocean and climate system.

Main oceanographic features and present state of ocean observation/forecasting in Vietnam

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Abstract:
The data of this paper were collected from different projects in recent years especially from International cooperation projects. Study results show that the main oceanographic features in Vietnam waters were driven by monsoonal regime in East Asia region and extremely events such as typhoon, coastal flood etc. Remarkable features are the region of strongest upwelling phenomenon occurred in South Central Vietnam coast and the spreading of Mekong River water to the upwelling area during SW monsoon. During NE monsoon, the cold current flows from north to south along South Central Vietnam Coast was intensified. Regions of strongest wave action were along South Central Vietnam Coast. In recent years, ocean observations of Vietnam are equipped of a series modern measured and analyzed instruments for the Vietnam Academy of Science and Technology (VAST) and Ministry of Natural Resources and Environment (MONRE). Especially, from 2013 VAST is carrying out the UAV (Unmanned Aerial Vehicle) program to observe oceanographic conditions in nearshore region. Earlier, from 2009 the MONRE is carrying out the program to establish a network of stations to observe waves and current characteristics in nearshore region by Radar high frequency technology. To date, have not any buoy stations to longtime observation of oceanographic parameters. Forcasting work have not equipped strong computer and the input data sources were also not good quality. In general, the current status of ocean observations and forcasting in Vietnam are still shortcomings in both manpower and equipment and focused in the nearshore region. For sustainable developing of ocean observations and forcasting, it is necessary to promote international cooperation projects on oceanography.

Keywords: Upwelling, Monsoon, Ocean observations, Current, Wave, UAV, Radar, forecasting

Rapid intensification of Super Typhoon Haiyan:
The important role of a warm-core ocean eddy

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Super Typhoon Haiyan devastated portions of Southeast Asia, particularly the Philippines, on November 8th, 2013. In 2014, I.-I Lin suggested that the subsurface warming ocean pre-condition for Hanyan caused by the La Nina-like phenomenon and its fast traveling speed supported for intensification. In this study, observational data is used to analyze the intensification process of Super Typhoon Haiyan. Observational data showed that its encounter with a double warm-core ocean eddy, Typhoon Haiyan intensified with maximum sustained winds increasingto 59 ms^{-1}, while the typhoon'scentral pressure dropped from 970 hPa to 920 hPa. Numerical simulation and observational data show that the presence of the warm-core eddy combined with SST increases due to climate change led to a rapid intensification of Supertypoon Haiyan. Comparing these two factors, the warm-core ocean eddy, which brings significantly more heat into the upper ocean layer, plays the leading role in the intensification, with climate warming providing a lesser contribution. Moreover, due to the increased thickness of mixed layer associated with the warm-core ocean eddy, Super Typhoon Haiyan, did not cause a significantly lower sea surface temperature to the east of Philippines, as is typical of typhoons, with the largest decline being only about less than 1.

“Myanmar’s Marine Meteorological Services: Present and Future Plan”

Abstract

Myanmar has a total coastline of nearly 3,000 km, extending about 1,900 km from 10° to 21° north of the equator and 93° to 97° east of Greenwich. It enjoys the Southwest Monsoon and most of the areas receive 90% of annual rainfall. As Myanmar also a country of Agricultural based Least Developing Country, changing Weather and Climate systems severely affected on rice and other food production, energy, irrigation and water resource, transportation and other weather and climate sensitive sectors.

Department of Meteorology and Hydrology (DMH) is a Government Organization under the supervision of Ministry of Transport and Communications, as a member of WMO since (1947) with specific objectives and missions. Main responsibility is to provide the timely, effective early warning of weather and Climate and other information. DMH are providing Public Weather Services, Aeronautical Meteorological services, Marine Meteorological services, Seasonal Climate, Agro Meteorology, Hydrology, Earthquake and Tsunami.

Present status of Marine Meteorological forecast products (weather, wind, gale, height of wave, etc.,) is announced among the sea area. Forecast products rely on satellite, NOAA wave forecast, NWP products, information and warning from SWFDP- BoB (RSMC, New Delhi). These services are not enough to coastal community such as fishery, coastal navigation, development of deep sea port and special coastal economic zones, etc. DMH had absence of the observations and instruments for SST, Wave, Ocean current and Buoy weather. Abnormal behavior of southwest monsoon and severe cyclone in the Bay of Bengal are main challenges and high venerability to coastal community. Better understanding on interaction of ocean and atmosphere over Bay of Bengal and its monsoon character, role of SST, character of meso-scale deep convection near coastal, ocean currents, marine meteorological modeling, capacity development and human resources development are required and priorities of our future plan. Modernized Ocean Forecast Systems, observation instruments, Marine Disasters Early Warning System and research for climate change are required for the Coastal areas.

An agreement between State Oceanic Administration (SOA) China and Myanmar DMH will be new window for improvement of Myanmar’s Marine Meteorological Services. Comprehensive Cooperation among Intergovernmental Oceanography Commission Sub-Commission for the Western Pacific (IOC-WESTPAC), State Oceanic Administration (SOA) China and Meteorological Services of ASEAN Members will benefit multi-lateral collaboration, better scientific communication, sharing information and technology transfer and observation and climate change. And Myanmar DMH will participate actively in future cooperation between China and ASEAN Countries for the improvement of Marine Science, Marine Meteorological Services and Climate Change.

Establishing Cambodia's First Marine Protected Area

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Abstract

The development of Cambodia's first Marine Fisheries Management Area (MFMA) – a type of multiple-use Marine Protected Area (MPA) - required a comprehensive exercise in stakeholder engagement. The first step of the process was the creation of a provincial government management team, which coordinated the consultation process and developed the provincial legislation (DEIKA) needed to establish management structures. A technical working group was formed, reporting to the provincial government team, and incorporating government authorities, NGO's, island concessionaires, Community Fisheries (CFi) and tourism agencies (dive companies). In total 26 individuals were included. The technical working group was responsible for balancing stakeholder needs with conservation initiatives and for initiating the development of the legislation (PRAKAS)for the creation of the proposed MFMA, now approved by the Ministry of Agriculture, Forestry and Fisheries (MAFF). This integrated approach was designed to ensure effective collaboration and coordination, and enabled stakeholder input to zoning plans. Research and recommendations have been compiled and submitted to MAFF to support the proclamation of the Cambodia's first MFMA, and 10 MFMA goals (socio-economic, biophysical, governance) agreed. Monitoring and evaluation will be undertaken through socio-economic surveys, habitat monitoring as well as the MPA Management Effectiveness Tracking Tool. Although time consuming, the importance of collaborative approaches in engaging stakeholders in the development of multiple-use MPAs cannot be underestimated. It is hoped that this participatory approach will yield results in terms of improved marine and coastal conditions and enhanced socio-economic benefits for local villagers.

The Development of China-Thailand Joint Laboratory in Support of Bilateral and Regional Cooperation

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In response to the increasing common interests in better addressing the ocean's role in supporting the sustainable development at the national, regional and global level, by exchanging and sharing the knowledge, technology and best practice, and towards jointly promoting the cutting research in safeguarding the ocean health and prosperity, Chinese State Oceanic Administration (SOA) and Thai Ministry of Natural Resources and Environment (MNRE) joined the hands together signing the Memorandum of Understanding (MoU) onDec. 22, 2011 in Bangkok, which opens the new era of China-Thailand marine cooperation and raises the awareness of ocean to the top level. Subsequently on Apr. 17, 2012, in Beijing, both SOA and MNRE agreed to establish China-Thailand Joint Laboratory for Climate and Marine Ecosystem (hereinafter as Joint Lab) as the coral platform to implement the MoU. The Joint Lab was officially kicked off Jun. 6, 2013, in Phuket, Thailand. The successful operation of the Joint Lab since then is witnessed by the release of the Five-Year Plan for China-Thailand Marine Cooperation (2014-2018), the effective implementation of the 6 on-going bilateral projects covering the 5 priorities outlined in the Five-Year Plan, the continuous efforts on the capacity building. In addition to promote the bilateral cooperation, the Joint Lab also contributes to the regional ocean related cooperation. For example, the Joint Lab supports IOC/WESTPAC's regional endeavor on promoting ocean science and application, particularly in improving the ocean observing capacity under Southeast Asian Global Observing System (SEAGOOS). The success story of the Joint Lab provides a good model in promoting the marine cooperation in the region. The unique role of the Joint Lab as the bilateral collaborative platform and the potential hub for region cooperation opens much space to explore.

Research for Conservation of Marine Endangered Species and Ecosystems

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Abstract

Cambodia has a 440 kilometer-long coastline extended in the Gulf of Thailand and consists of four provinces namely Koh Kong, Preah Sihanouk, Kampot, and Kep. The marine and coastal areas of Cambodia are considered to be rich in natural resources, especially fisheries, as marine environments are still in good condition if compared with neighboring countries due to pollution and coastal habitat destruction. Recent study estimates there are 10 species of sea grasses, 70 species of hard corals, 30 species of mangroves and 435 fish species present in the Cambodia waters. Furthermore, the study highlights the remarkable animal and plant species, such as dugong and seahorses. Also, the survey in 2001 of marine mammals of Cambodian sea estimated about ten species (dolphins and whales) that need immediate conservation effort. Conservation and protection of marine resources and ecosystems have little action on the ground because Cambodia historically prefers freshwater resources. The marine and coastal resources have been under threats mainly due to overfishing, pollution from urban development, conversion of coastal forests to agricultural farmland and transportation roads, and marine pollution, and sedimentation. Moreover, the mangrove forests face the same threats as marine and coastal areas in general, with clearance to various kinds of salt pan/aquaculture. However, there has been little research project to explore and document the marine endangered species and ecosystems within Cambodia's marine and coastal waters. There is an immediate need to establish the research strategy and action plan to conduct the research on this sector. Findings from such research projects will support the concerned government agencies to prepare appropriate management plan for strict protection and conservation of marine endangered species and ecosystems of Cambodia for sustainable development.

Integrated Study of Marine Endangered Species: An Update of the Regional Project

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Marine endangered species such as marine mammals and sea turtles are mega lives and migrate between their habitats. Traditionally, the region relies on labor intensive methods to observe/study/protect the endangered marine species. These methods cannot meet increasing demand for higher efficiency, objectivity and repeatability, which can be empowered with modern science and technologies such as telemetries using bioacoustic sensors, satellites, unmanned aero vehicles and boats, molecular bioassays and advanced lab analysis. The mega marine endangered species are components of the marine ecosystem. Thus, for sound science and toward effective conservation measures, we also need to conduct concert research into the system's productivity, oceanography and coastal anthropogenic activities therein. Some methods and preliminary results will be presented, from the regional research efforts jointly funded with the China-ASEAN Maritime Cooperation Fund and partners' co-financing.

Marine endangered species conservation in Thailand

Dr. Kongkiat Kittiwatanawong, PMBC, Thailand

Preliminary results on the boat survey of Irrawaddy dolphins (*Orcaellabrevirostris*) in the Bay of Brunei, Brunei Darussalam

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The Bay of Brunei is located at 4°45'-5°02'N, 114°58'-115°10'E; east of Bandar Seri Begawan, Brunei Darussalam. A cooperative project between Brunei, Malaysia and China to survey marine mammal distribution and abundance and investigate interactions with humans in the Brunei waters of the bay was initiated on January 2016. To date, four boat sighting surveys were conducted in January, April, July and October 2016, respectively. In total, 12 days (58.7 hours) were spent on searches and covered a total distance of 786.4 km, with a total daily survey effort of 4001.98 km.hrs. A total of 13 Irrawaddy dolphin sightings were recorded with a rate of 0.32 sighting per 100 km.hrs. The mean group size was 5.2 ± 3.88 SD (min = 1, max = 15) and six (46%) dolphin sightings were groups consist of adults, juveniles and calf. Several dolphins observed were the same individuals that we encountered in the Malaysian side of the bay. Irrawaddy dolphins were found to be distributed in all over the area and as far as Temburong-Pandaruan Estuaries. The species may preferred the Bruneian side of the bay for their daily activities because it is relatively sheltered and contains a number of islands and large estuary, mangrove forest and mudflat areas, as compared to the Malaysian side. Since the occurrence of marine mammals can be considered as indicator species for a healthy marine environment and potential sustainable resources for marine ecotourism, a long-term monitoring and research program is needed to aid the management and conservation of these marine endangered species in Brunei waters.

Keywords: Bay of Brunei, conservation, distribution, ecotourism, *Orcaellabrevirostris*.

DEVELOPING BIRD WATCHING IN BRUNEI DARUSSALAM

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Abstract:
Sakam Conservation Program (Sakam CP) has been involved with the Marine Endangered Species(MES) Researchin the Brunei Bay since 2013, with the team from University Terengganu Malaysia led by Dr. Saifullah ArifinJaaman, and Prof Zhang Xuelei from FIO.

Sakam CP is the research administrator for the MES research in the Brunei Darussalam side of the Brunei Bay, aiming at getting Brunei Darussalam to accept and lead the Conservation of the Brunei Bay.
Sakam CP is currently in the midst of starting another research project on the Shore Birds of the Brunei Bay (Brunei Darussalam side).

Mohammad Vol is the Executive Officer for Sakam CP and is an avid Bird Watcher in Brunei Darussalam. Bird Watching activity is very new amongst the locals in the country and only been active for the last 4 years, which makes this matter a very interesting pursuit for Mohammad Vol.

Mohammad Vol is the contact person when it comes to Bird Watching in Brunei Darussalam and has managed to produce a pocket field guide booklet on Birds in Brunei Darussalam.
Mohammad Vol took this as an opportunity to educate the younger generation on the conservation of wild birds, and actively doing roadshow to schools in the country.

A total of 688 species of birds in Borneo. Borneocomprises of the states of Sabah and Sarawak that belongs to Malaysia; Kalimantan State of Indonesia and Brunei Darussalam. Very little study is done on birds in Brunei Darussalam. Mohammad Vol welcomes any organization that does wild bird studies and conservation to take the initiatives.

The presentation is about how Bird Watching developed through the last 4 years. The content will further touch on the interesting birds, resident birds and migrating birds, which made Brunei Darussalam beautiful.

CONSERVATION OF MARINE MAMMALS IN SARAWAK, MALAYSIA

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Abstract
In Sarawak, Malaysia all marine mammals (whales, dolphins, porpoises and Dugong) are listed as Totally Protected Animals under the Wild Life Protection Ordinance, 1998. Extensive research and conservation efforts on marine mammals in Sarawakonly began with the establishment of collaborative studies between Universiti Malaysia Sabah and Forest Department Sarawak in 2000. The involvement of Sarawak Forestry Corporation in conservation of marine mammals only started in 2003 when it was tasked to manageand conserve the wildlife species in Sarawak. This paper provides information on past and present efforts on marine mammal researches and conservation programs in Sarawak.
Key words: Conservation, marine mammals, Sarawak, Malaysia

Outcomes of the International Workshop on Ecosystem Management of Ocean Parks in China and ASEAN Countries

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Abstract

In order to study the current status of marine protected areas management in China-ASEAN countries and share the best practices for ecosystem management and blue economy development, the International Workshop on Ecosystem Management of Ocean Parks in China and ASEAN Countries was conducted on Nov 3, 2016 in Xiamen, China, which is organized by Third Institute of Oceanography (TIO,SOA) and China-ASEAN Ocean Cooperation Centre (Preparatory).

Representatives and experts from China and 4 ASEAN countries including Cambodia, Indonesia, Malaysia, and Thailand and the delegates of IUCN and CI shared their experiences in building and managing Marine Protected Areas (some delegates focus more on Ocean Parks). The best practices sharing from the selected demonstration sites of relevant projects were introduced, including the progress of MPA management and cooperation requirements on the current status of MPA management, ecosystem conservation and ecological restoration, as well as the ecotourism and socioeconomic benefits of MPAs.

It's recognized that building Marine Protected Areas is not only an important approach for marine and coastal conservation, but also beneficial for the local community and the Blue Economy development in the related regions. This workshop is a good start for the implementation plan discussion for the project Building Ecological Management Network for China-ASEAN Marine Protected Areas which was funded by China-ASEAN Countries' Maritime Cooperation Fund. In this presentation, next step for the project will also be discussed.

Keywords: MPAs, Ocean Parks, Ecosystem Management, Progress
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Progress of Ecological Management Networks for MPAs in Thailand

Wannakiat Thubthimsang,
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Presentation Title

" *Building Ecological Management Network Marine Protected Areas*"

Mr. Neang Thay, Ministry of Environment

At present, Cambodia's 45 Terrestrial Protected Areas (PAs) are under management and responsibility of the Ministry of Environment. Cambodia is divided into five important biogeographical parts: Marin region, Cardamom Mountains, low lying central part, eastern plain, northern plain. This paper discusses the Cardamom Mountains that links to the marine region. The Cardamom Mountains contains 17 Protected Areas, most of which receive moon influence from the Gulf of Thailand. The variety of habitats of the PAs in the Cardamoms support high diversity of fauna and flora, including globally threatened species. The recent increase of accessibility and growing capacity in research, many species of plants and animals are being discovered and proved to be endemic to Cambodia. These are important biological resources for conservation. However, these values are being threatened by unsustainable activities from agricultural expansion, enlargement of settlement, development, hunting, logging for local consumption and trade. In response to these threats, MoE has restructured PAs management strategies in according to the existing laws and regulation, developed management plans, zonation and demarcation.

Environmental Management and Experiences of Marine Protected AreasinBeibu Gulf of China

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Abstract: With the China-ASEAN Maritime Cooperation Fundproject--marine and island environment al management cooperative research in BeibuGulf, the current situation of China's marine environmental managementwas analyzed. In the process of implementation of the project, the environment management status and experiences of several marine protected areas(MPAs) inBeibuGulfhad been investigated this year. Based on the current situation and conservation of MPAs, the effective ways were discussed to resolve the conflicts existed among pollutions, coastal line changes, industry and tourism, overfishing, over-exploitation, and invasion of alien species, marine ecosystems health, erosion and siltation. It summarized management experiences from the planning, policy, public participation, ecological compensation as well as the regularmanagement, analyzed the existing challenges and put forward some suggestions for the management improvementof MPAs.

Key words: environmental management; marine protected areas

Community Structure and Carbon Dynamics of Mangrove in Kema, North Sulawesi - Indonesia

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ABSTRACT

Indonesia has the most mangrove extensive area and significant role for climate change mitigation in the world. Nevertheless, the most degradation rate of mangrove area has been found in this country. Moreover, some policy could not be initiated or headed to the right management due to lack of valid data in some areas. The cooperation between Indonesia (RCO) and China (TIO) had focus study to provide various data in order to support initiation of marine conservation area in Lembeh strait, North Sulawesi. This study was aimed to describe mangrove community structure in Kema area (south part of Lembeh Strait) and to analyze carbon dynamics on mangrove ecosystem. The exploration area was divided into three perpendicular zones based on its position from the sea i.e. landward (LW), middle zone (MZ) and seaward (SW). The result found that mangrove species composition in those zones was differed due to its soil characteristics. Mangrove community health in Kema mangrove has been in fair condition and has small average trunk diameter (<10 cm) compared with 22 sites of Indonesian mangrove. Carbon storage was lower than other studies especially in soil content. Middle zone mangrove has absorbed the highest carbon consentration (12.99±4.10MgC/ha/y.) followed by SW and LW: 10.04±2.64 MgC/ha/y and 9.70±3.39 MgC/ha/y, respectively. Litter production was in medium value at 7.50±2.51 Mg dry wight.$ha^{-1}.y^{-1}$, averagely. Decomposition rate of leaf litter was varied from 0.43±0.24 Mg C/ha/y at SW to 0.96±0.74 Mg C/ha/y at MZ. Mangrove soil carbon emission was ranged 2.63±1.42 C/ha/y to 3.32±1.78 Mg C/ha/y. Mangrove in Kema is the main mangrove area nearby Lembeh Strait, conservation action should be initiated to protect coastal ecosystem.

Keywords: *mangrove, conservation community structure, carbon dynamics, climate change mitigation*

Importance of Marine Habitat Conservation for Preservation and Discovery of New Bio-resources of Seaweeds

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ABSTRACT

Malaysia harbours an extensive coastline of 4,675 km with 418 000 km^2 of continental shelf area which provides natural habitats for the marine seaweeds. In addition to that, there are around 52 marine parks are established to protect and conserve various habitats and marine organisms in Malaysia. The Algae Research Group, University of Malaya has been conducting the survey, collection, documentation and cataloguing the biodiversity of Malaysian Marine Seaweeds since the 1980s. The seaweeds are deposited at the University of Malaya Seaweeds and Seagrasses Herbarium. There are more than 10,000 specimens in the collection. Traditionally, the identification of seaweeds is based on morphological features. However it is known that seaweeds possess high plasticity, therefore the incorporation of molecular techniques for identification is essential. We have used the combination of both morphological features and molecular markers in the identification of species of commercially and ecological importance species such as, *Kappaphycus, Eucheuma, Halymenia, Gracilaria, Caulerpa*, Ralfsiales and many others. A total of 401 taxa comprising Chlorophyta (13 families, 110 taxa), Rhodophyta (27 families, 188 taxa), Phaeophyta (8 families, 86 taxa) and Cyanophyta (8 families, 17 taxa) are recorded With the concerted efforts in understanding the biodiversity at different ecological areas, new species as well as new records of seaweeds were discovered. In this talk, we will discuss the importance of marine habitat conservation for preservation and discovery of new bio-resources.

The development of WESTPAC-SEAGOOS on ocean acidification monitoring and Its Impacts on the coral reef biodiversity

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Abstract

The impact of climate change to the marine ecosystem has been concerning in many aspects. Ocean acidification is an impact from the increase of CO_2 in the atmosphere from anthropogenic activities and its consequence is to higher dissolved of CO_2 in the seawater which cause to change of its carbonate chemistry. Especially, it could reduce of pH and increase acidity of seawater. The change of carbonate chemistry is making the less available of carbonate to be utilized by the marine organisms to built their calcium carbonate structure. Only some few organisms could get benefit of high CO_2 in the seawater such as seagrass and some species of phytoplankton etc. The ocean acidification is therefore high concern in the new UN global implementation, which is the Sustainable Development Goal (SDG-2015-30) especially in the SDG-14. The nation in the Asian has been giving a high priority to the response to the SDG-14. However, the ocean acidification in the Southeast Asian is still lack of information and its status. The WESTPAC-SEAGOOS (Southeast Asian Global Ocean Observing System is the programme under the IOC Sub-mission for the Western Pacific and its adjacent region) has been initiating the ocean acidification and coral reef biodiversity monitoring project, since 2015, to develop the capability of the researcher in the region to be able to develop the ocean acidification monitoring in their countries. The WESTPAC-SEAGOOS has been developing the Standard Operation Guideline (SOP) for the biodiversity on the coral reef ecosystem and for carbonate chemistry analysis of seawater. It will assist the country in the region to generate the data and information to be shared among themselves and to build up the network at regional and join the Global Ocean Acidification Monitoring Network. It will help us to understand the impacts of ocean acidification to marine ecosystem in the region

Preliminary study on radiochemical and chemical in sediment cores at the Northeast Peninsular of Malaysia

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Abstract

Peninsular Malaysia consist two different marine environments, where in the east coast and west coast Peninsular is Sunda Shelf and Malacca Straits, respectively. The Sunda Shelf especially northeast Peninsular Malaysia received large terrestrial input through a river discharge such as Mekong River, Chao Phraya River, Pahang River and Kelantan River. The level concentrations of Rare Earth Elements, natural radionuclides and trace elements in surface sediments are also different before and after northeast monsoon events. Recently the study was conducted at two large rivers basin in the east coast Peninsular Malaysia i.e., Kelantan River and Pahang River for investigate the suspended particles loading into the Sunda Shelf, which both rivers were activity with sand mining. However, through the natural radiochemical proxy such as the value ratio of 231Pa/230Th is less than 1.0 indicating this marginal sea is low with biological productivity but slightly high with organic contents (LOI > 3%) on surface sediments. The further investigation will continue with a detail study on Kelantan Delta, Pahang Delta, and scientific cruise before and after monsoon events. The further discussion on collaboration research will highlight during the oral presentation.

Keyword: *Sediments, rivers, chemical, radiochemical, collaboration*

Addressing socio-economic impact of harmful algal blooms in Asian waters through collaborative research and capacity building enhancement

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Abstract

HAB and its socio-economic impacts have been well recognized internationally due to its deleterious effects on coastal ecosystem, safety and security of food and drinking water, as well threats to human health. While most occurrences of HABs confined to coastal embayment, blooms are spread to larger areas, and transboundary occurrences are increasingly common. HABs become more challenging and require collaborative efforts internationally to overcome the issue. Build on the foundation of GLOBALHAB Science Plan, and the existing regional research networking, a HAB program is proposed to address HAB issue in Asian waters. The program which involved regional partner institutions will emphasize on four major elements: a) biology and ecology b) detection and mitigation technologies c) bioprospecting from blooms d) capacity building. Comparative approaches should be adopted in understanding the biology, ecology and oceanography of existing and emerging HAB species and its related incidents. Development of various advanced tools using molecular and chemical based platform is crucial for precise and rapid detection of these species in research and monitoring program. Betterment of unmanned vehicles and remote sensing technology is important in tracking large scale HAB events in the region. Bioprospecting of biomass from these bloom events for discovery and development of useful materials should be considered and explored. Through the establishment of Regional Training Center, and tasked with capacity building program, is essential to provide trained manpower to strengthen our capacity in dealing with increasingly challenging HAB issues

Evaluation of coastal ecosystem in the South China Sea and application in the demonstration sites

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The South China Sea is a tropical and subtropical area, which boasts its rich marine biodiversity. The South China Sea is currently facing a major threat from habitat loss and degradation, ecosystem structure alienation, agriculture, industry and domestic sewage and heavy metals pollution emissions due to human activities and global change. Strengthening the long-term research and monitoring of marine and coastal ecosystems is not only helpful to understand the ecological environment quality status, buffer tolerance, and development trend during the global change, but also provides strong theoretical basis for the protection and restoration of the marine ecological environment. Here we propose to use the existing marine ecological station, and a number of new marine ecosystem experiment station around the South China Sea to establish a coastal ecosystem research network, and carry out marine ecosystem observation and investigation, ecosystem health evaluation, typical ecosystem (coral reefs, mangroves and sea grass beds) conservation and restoration together with academic research institutions from South East Asian Nations (ASEAN) countries. This proposal will also aim to construct marine biodiversity information system proposed for regional marine ecosystem conservation measures and management measures, and the demonstration results will be extended to other waters in the South China Sea. The immediate objective of the project is to build nine marine ecology stations in the ASEAN countries, and put forward a series of technology system of typical ecosystem restoration and rare animal protection measures, and construct biodiversity information library, specimen database and biological resources library, and put forward the regional conservation strategies and management measures. The implementation of this project will promote the cooperation between China and ASEAN countries in the field of marine science and technology, help to foster mutual trust, cooperation and win-win spirit of "21st century Silk Road on the sea", for the joint development of the South China Sea economic, and provide a good atmosphere and environment for protecting the ecological environment of the South China Sea.

Biodiversity of marine harmful benthic microalgae and coral ecosystem safety--cooperation prospects between China and ASEAN countries

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Abstract: Harmful events related to benthic microalgae (BHABs), have been reported more frequently over the last decade including in areas where BHAB genera were hardly known. Of particular concern are the outbreaks toxic dinoflagellate associated with the ciguatera fish poisoning (CFP). The ciguatoxins produced by *Gambierdiscus* are bio-accumulated in reef fishes and are responsible for the most common algal toxin-related illnesses, globally affecting the greatest number of victims and often with significant long-term health effects. Benthic and epiphytic toxic algae (BETA), which can be found on hard substrata such as coral rubble, macroalgae or sand in coral ecosystems, include species in genera of *Gambierdiscus*, *Fukuyoa*,*Ostreopsis*, *Prorocentrum*, *Coolia* and *Amphidinium*. BETA have been observed in subtropical Asia-Pacific regions including in Thailand, Malaysia as well as in the South China Sea. Their worldwide distribution appears to be expanding and increasing numbers of new BETA species have been reported worldwide, including from Southeast Asia, but their real biodiversity and potential impacts on marine food webs and human health in the region are unknown. This presentation provides an overview of BHAB problems and prospects for future cooperation between us.

Key words: Biodiversity, benthic and epiphytic toxic algae (BETA); ciguatera fish poisoning (CFP), coral ecosystem safety

Coastal (Island) Hazard Risk and Adaptive Management in China-ASEAN Countries

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Coastal (Island) hazard risk and adaptive management in China-ASEAN Countries, leading by the Island Research Center of SOA (IRC), and the partners come from both of Chinese and ASEAN's scientific research institutions and universities, including the Third Institute of Oceanography of SOA(TIO), the First Institute of Oceanography of SOA(FIO), the South China Sea Branch of SOA from China; University of Malaya, Malaysia(UM), Department of Mineral Resources, Thailand(DMR), Institute of Oceanography, Vietnam(VNIO), National Committee on Coastal Area Management and Development, Cambodia (NCCMD) belonged to ASEAN.

The project pays attention to the cooperation of the coastal (Island) hazard risk assessment and adaptive management along China-ASEAN Seas. The main objectives of the project as follows:

1) Coast (Island) survey, including physical feature, development and utilization, management and existing problems etc.to develop a basic data;

2) Coastal (Island) hazard survey, containing hazard types and characteristics, mechanisms, situation, to establish coastal hazard database;

3) Coastal (Island) vulnerability assessment to Sea-Level Rise;

4) to build Coastal (Island) hazard risk assessment modeling and to implement risk zoning;

5) to setup demonstration area for coastal (Island) hazard risk reduction and mitigation, or for adaptive management;

6) to establish cooperation platform between China and ASEAN, such as Coastal (Island) hazard Joint Lab, Marine Science Joint Research Center and etc., to develop scientific studies and talents.

PEMSEA Project Concept Note

Applying Integrated Coastal Management to Strengthen Trans-boundary Conservation of Irrawaddy and Humpback Dolphins and Management of Their Critical Habitat

Stephen Adrian Ross, PEMSEA

I Introduction

About 30 cetacean species are found in East Asia, and 9 species are endemic to the region, such as the Irrawaddy Dolphin (*Orcaella bresirostris*) and Humpback Dolphin (*Sousa chinensis*). The Irrawaddy Dolphin is listed as vulnerable in IUCN Redlist, in Appendix I of the Convention on the Conservation of Migratory Species of Wild Animals. The range states of Irrawaddy Dolphins include Australia, Bangladesh, Brunei Darussalam, Cambodia, India, Indonesia, Lao PDR, Malaysia, Myanmar, Papua New Guinea, Philippines, Singapore, Sri Lanka, Thailand and Vietnam. (Figure 1) The overall population of the Humpback Dolphin is estimated to be less than 10,000 individuals, which qualifies for classification as "Near Threatened" according to IUCN 2010 criteria. It is listed in Appendix II of the Convention on the Conservation of Migratory Species of Wild Animals due to its unfavorable conservation status that would benefit significantly from international co-operation. The species is also listed in Appendix I of Convention on International Trade in Endangered Species where international trade is banned. The Humpback Dolphin has a much wider distribution, covering China, Brunei Darussalam, Cambodia, China, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Singapore, Thailand and Vietnam in the Seas of East Asia and CTI and ASEAN. (Figure 1)

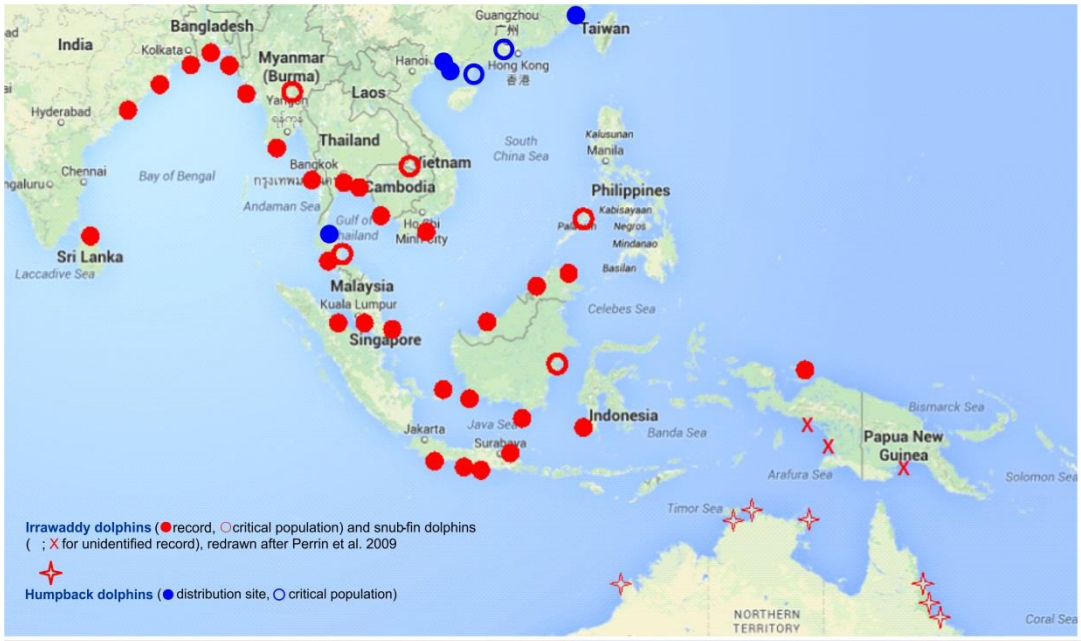

Figure 1: distribution of Irrawaddy Dolphin and Humpback Dolphin

The threats to the survival of cetacean species are complex. Both species live in particularly close contact with humans due to their habitat preferences for estuarine waters. This makes

them particularly vulnerable to entanglements in fishing gear and habitat degradation due to declining freshwater supplies. Fishing gear entanglement, or incidental catches in fishing gear most commonly pair trawls but also occasionally gillnets, is considered as the most significant threats to Humpback Dolphin, followed by a significant threat from vessel collisions in some industrialized areas, especially in Chinese waters. Although the species is much less studied in other portions of the species' range outside of China, most of the same types of impacts are occurring to varying degrees (T. A. Jefferson & B. D. Smith, 2016)

There are reported threats from tourism activities. In addition, habitat change, decreasing fishery resources, land-based pollutants such as marine debris, underwater noise disturbance from underwater industrial activity all result in decline in populations. The reproductive success Humpback Dolphins including neonatal survival is reportedly being affected by organochlorines from high volumes of sewage discharge. Mercury concentrations and daily intake of sewage bacteria are also considered as problems to the species.

Trans-boundary movement of the cetacean species (Irrawaddy and Humpback Dolphins and Finless Porpoises) across administrative boundaries within one country and between countries (Brunei and Malaysia; Indonesia and Malaysia) necessitates collaborative conservation efforts of concerned cities, provinces and countries. Protecting Dolphin species through MPA networking is an effective approach and can be replicated in other ranges.

The CMS has passed a number of resolutions for conservation of cetaceans in relation to sustainable boat-based marine wildlife watching, management of marine debris, by catch of CMS-listed species in gillnet fisheries, underwater noise, climate change in relation to migratory species. In the actions of the Program of Work of CMS in the Central and North West Pacific Ocean (East and Southeast Asia), collaborative initiatives to address entanglement, by catch and marine bush meat, pollution, habitat and feeding ground degradation are weighted as high priorities. Ship strikes and marine noise as medium priorities, and climate change is weighted as lower in risk. The Aquatic Working Group of the CMS is requested to provide support to the region, especially with assessing and developing mitigation measures for the region's by catch, identification of and where appropriate work on the protection of habitat and developing appropriate standards for noise pollution. For the time being, only Philippines is a member country of the CMS in the East Asia region.

II Project goal and objectives

The goal of the proposed project is to conserve Irrawaddy and Humpback dolphins and effectively manage their critical habitats to contribute to implementation of cetacean-related resolutions of the Convention on Migratory Wildlife Species (CMS) and Aichi Target 11[1]and

[1] Aichi Target 11"By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes."

12 [2] of Convention on Biological Diversity (CBD) by applying Integrated Coastal Management in East Asian countries. Specific objectives of the project are to reduce the killing of both species in entangling gears and vessel collisions and conserve their priority habitat in a network of MPAs that include their protection needs.The project also supports the implementation of the National Biodiversity Strategy and Action Plans (NBSAPs) of participating countries.

III Project plan

A strong alliance is needed to achieve a common objective of protecting the dolphins through implementation of the resolutions of the CMS under the framework of the SDS-SEA. Crucial factors in achieving this are education to create awareness of dolphin species and the threats facing them, informing decision makers and involving local communities. ICM, MPA and marine spatial planning will be used as the key approach to address the challenges in lack of scientific knowledge and threats from by catch, interference from tourism activities, pollution and other anthropogenic activities.

[2]Aichi Target 12: "By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained."

Marine Oil Spill fingerprinting identification

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The North China Sea Environmental Monitoring Center of SOA

Oil spill fingerprinting identification based on GC-FID and GC-MS low resolution analyses, is a forensic methodology for characterizing and identifying the source of waterborne oils resulting from accidental spills or intentional discharges. The methodology may be used in support of the legal process as evidence for prosecuting offenders.

Oil spill source identification is a complex methodology due to the large variation in samples and oil spill situations that can be encountered. The underlying basis for this method is the widely variable nature of oils with respect to their specific chemical compositions, which allows oils from different sources to be readily distinguished using appropriate analytical methods. The method relies upon detailed chemical characterization and numerical comparison between samples.

These methodology have been made by researchers around the world and documented in a wide range of peer-reviewed literature. In addition, numerous Round Robin tests have been conducted to evaluate and improve upon the methodology. Since 2004, in the frame work of Bonn-OSINET (Bonn-agreement Oil Spill Identification network), annual Round Robin tests are organized jointly by RWS-WD (Rijkswaterstaat - Center for Water Management in the Netherlands) and BSH (BundesamtfürSeeschiffahrt und Hydrographie in Germany) in which laboratories from around the world participate. The Round Robin tests have covered cases dealing with light fuel oil distillates (diesel oils), bilge water samples (a mixture of gas oils and lube oil), crude oils and heavy fuel oils. Findings from these RR-tests have been discussed at annual meetings by the participating scientists and have been taken into account for refining the suggested methodology.

Blue Economic and ICM in Vietnam: Conceptual Framework of Oceanography

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Blue economy (BE) and integrated coastal zone management (ICZM) are important objectives and expectations of coastal countries towards sustainable development and adaptation to climate change. However, most of publication on the blue economy refers only to the issue of how to quantify or determine the implement of blue economy in the economic management, orientation and development. This study would discuss the assimilation of hydrology, oceanography and circulation into quantitative the applying level BE and ICZM. In the case study of the Bien Dong, the modelling results present anomalous circulation phenomena in the study areas. As analyzing the impact of hydrodynamic systems on elements of the BE and ICZM, the paper noted several indicators of BE and ICZM that were contributed by the hydrodynamic and oceanographic system. This paper also presented the status of application oceanographic forecasting systems (OFS) and their needs for the sustainable development of Vietnam's marine economy. Therefore, the systems of oceanographic forecasts as well as marine hydrodynamic and circulation were required as a necessary condition for implementation of BE and ICZM effectively.

Sea level variability and its long-term trending the South China Sea based on satellite remote sensing observation

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Abstract

Based on the satellite Maps of Sea Level Anomaly (MSLA) data and *in-situ* tidal gauge sea level data, correlation analysis and Empirical Mode Decomposition (EMD) are employed to investigate the applicability of MSLA data, correlation of sea level variability, long-term sea level variability (SLV) trend, sea level rise (SLR) rate and its geographic distribution in the South China Sea (SCS).The finding shows that for the four tidal stations, the minimum correlation coefficient between the closest MSLA grid point and tidal station is 0.61. This suggests that the satellite altimeter MSLA data is effective to observe coastal sea level variability in the SCS on monthly scale. Overall, the average SLR in the SCS is 90.8 mm with a rising rate of (5.0 ± 0.4) $mm \cdot a^{-1}$ during 1993 ~ 2010. The SLR rate from Southern Luzon Strait through Huangyan Seamount area to the Xisha Islands area is higher than that of other areas of the SCS. The correlations of SLV in the SCS are also discussed on different time scales.

According to the above results, the future research work of the modynamic and dynamic influence mechanisms of the SLV in the SCS based on multi-source satellite data and ocean reanalysis data will be introduced. Brief introduction of National Satellite Ocean Application Service(NSOAS),applications of ocean remote sensing in NSOAS and overview of the present and future ocean satellite program in China (HY-1 series, HY-2 series, HY-3 series, CFOSAT) will also be presented.

Ocean Observing Capacity Building and Marine Renewable Energy Resources Survey

PENG Wei

National Ocean Technology Center

Ocean Observing is an important means of acquiring information on the marine environment, providing support for understanding the oceans, forecasting and reducing marine disasters. With over 50 years of development, National Ocean Technology Center has accumulated hundreds of high-tech achievements which have been successfully applied in the Pacific Ocean, the Indian Ocean, the Atlantic Ocean and the Arctic and Antarctic, as a major R&D unit of China's ocean observation technology.

In this paper, through the introduction of the marine observation technology and equipment in NOTC, the author puts forward the cooperation proposal on bilateral and multilateral joint R&D, site layout and data sharing.

We are willing to share the achievements of ocean observation technology with the scientific research and management departments of ASEAN countries, and jointly strengthen the ocean observation capability and capacity building, effectively prevent and reduce marine disasters, and serve the people of China and the ASEAN countries.

At the same time, this paper also introduces the NOTC as the technical management department of China Ocean renewable energy, has organized and undertaken the marine energy resources investigation and evaluation, and the development of marine energy generating devices such as wave energy and tidal currents energy as well carrying out the construction of multi-functional synergy independent power demonstration system for ocean islands.

Establishment of a UNESCO-IOC South China Sea Tsunami Advisory Center: Operational and Scientific Aspects

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Abstract: The past decade has witnessed a terrible loss of life and economic disruption caused by giant earthquakes and tsunamis, including 2004 Indian Ocean Tsunami and 2011 Tohoku Great Tsunami. South China Sea region is recognized as one of the most vulnerable areas to tsunami hazard due to its unique tectonic setting and high level of seismicity. To fully address tsunami risks in the South China Sea (SCS) and its adjoining basins, the Intergovernmental Oceanographic Commission (IOC), through its 41th Executive Committee meeting and ICG/PTWS Intercessional meetings, encourages the SCS neighboring nations to coordinate and collaborate closely for the establishment and sustained operation of the South China Sea Tsunami Warning and Mitigation System (SCSTWS) within the framework of ICG/PTWS. ICG/PTWS at its 25th session (Vladivostok, September 2013) decided to establish a Task Team on the Establishment of a South China Sea Tsunami Advisory Centre (SCSTAC).

Tsunamis are triggered by earthquakes and can strike the coast in less than a couple of hours. It leaves little time for us to respond. The operation of the SCSTAC, as well as its further enhancement, is a complex on-going process involving the development of reliable earth observing networks and robust standard operation procedures, as well as the active participation and commitments of the Member States through their respective agencies and institution. As a sub-regional operational center within the framework of ICG/PTWS, the primary task of the SCSTAC is to locate and characterize tsunami sources and forecast coastal impacts in the SCS region after the occurrence of a major earthquake. To accomplish this mission, the SCSTAC is equipped to continuously receive and process seismic and sea level monitoring data from within and surrounding the region, and evaluate tsunami threats to the SCS neighboring countries. In this report, the operational and scientific considerations for the SCSTAC are introduced and summarized.

Desalination and the blue economy

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Project Proposals relating Tidal Current , Port Location, Sea Water Intrusion in Myanmar

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Abstract

Myanmar has a very long coastal line about 2832 km. Energy extraction from the tidal current is one of the attractive renewable sources for Myanmar.

This project is to use the new unconventional turbines, which can efficiently extract the kinetic energy from a free unconstrained tidal current without any dams or barrage.

That is why this project is the first step to the low cost and simple way to extract electricity for the nation.

- To develop the effective Tidal Power Turbine.
- To examine the efficiency of the turbines in water circulation tank.
- To search the possible location in the HmawWun Creek for the pilot project.

In addition, Myanmar has plan for development of deep sea ports projects namely Dawei in Tanantharyi Region and Kyaukphyu in Rakhine Statein Myanmar.

Myanmar Maritime University tries to do the project to support this project and the aims are

- To develop the port sector and to investigate shore line changes in study areas
- To analyze wind and wave conditions
- To do the beach soil particle investigation
- To consider proper terminals and possible layouts in the study areas and choose sustainable one.

At present, sea water intrusion in Ayeyarwady River is now a major issue in Myanmar. We have to quantify the amount of salinity intruding into the nine mouths of Ayeyarwady River. To fill the data gaps, we need to collect data and information regarding water resources management and to understand the effect of coastal squeeze on the seawater intrusion length in Delta area.

Apart from this topic, Marine and Coastal Spatial Planning, Inland development and protection plan , the development of ocean energy, marine observation station and capacity building needed for these projects would be shortly included in this presentation.

Tide and tidal current forecast and sea level rise over Western Pacific

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Abstract: The tide and tidal current forecast in Western Pacific and the coastal areas around Southeast Asia will be introduced. There are about 260 tide stations and 60 tidal current forecast stations in our operational network. The tidal characteristics of some important ports in Asia countries along “Belt and Road Initiative” will be discussed. Based on the sea surface height (SSH) observations of tide gauge stations and satellite altimeter, the variation and the long term trend of sea level are investigated. The method of quality control of tidal data is studied. Some analysis of the temporal and spatial characteristics of sea level change along the China coast will be shown. With a simple mathematic method, how to assess the impact of sea level rise to coastal area will be given. The potential impact assessment of sea level rise in the coastal areas of Hainan Island is investigated. Based on the GIS and foundational geographic information, the range of influenced land area is calculated, and the way to assess the impacts on the population, economy, and traffic is discussed.

Key words: tide forecast, tidal current, sea level rise, assessment