Horiba International Conference

"New Direction of Ocean Research in the Western Pacific"

- Past, Present and Future of UNESCO/IOC/WESTPAC Activity for 50 years and the JSPS Project "Coastal Marine Science" -

Intergovernmental Oceanographic Commission

Commission océanographique intergouvernementale

50

1960-2010

26 - 29 October 2010

Atmosphere and Ocean Research Institute (AORI)

The University of Tokyo

Horiba International Conference

New Direction of Ocean Research in the Western Pacific

Past, Present and Future of
UNESCO/IOC/WESTPAC Activity for 50 years
and
JSPS Project: Coastal Marine Science

Program and Abstracts

26-29 October 2010
Atmosphere and Ocean Research Institute
The University of Tokyo

Contents

Preface

In the past 50 years, the Intergovernmental Oceanographic Commission (IOC) has promoted various programs in oceanography research, protection of marine environment, and capacity building; and has contributed to developing a sustainable society through these activities. On this occasion of IOC's 50th anniversary, we would like to summarize these activities, particularly those in the WESTPAC region.

The support of the Japan Society for the Promotion of Science (JSPS) has enabled Japan to carry out a cooperative research program focusing on marine sciences in the coastal seas of the WESTEPAC region with Southeast Asian countries since 1988. For the last 20 some years, we have seen remarkable progress in the fields of material transport, harmful algal blooms, marine biodiversity (fish, benthos, plankton, and sea grass/seaweeds), and marine pollution in the coastal regions of Southeast Asia.

Over 350 scientists from Japan, Indonesia, Thailand, Malaysia, The Philippines, and Vietnam are learning techniques, sharing knowledge, and deepening science with one another under the "Coastal Marine Science" multilateral core university cooperative program. This 10-year program terminates at the end of March 2011.

This conference aims at opening up a new vista of marine sciences of the Western Pacific region for a glorious future.

26 October, 2010

Mitsuo UEMATSU
Chairman
The Organizing Committee for the Horiba
International Conference

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Program

Tuesday, 26 October 2010

1500-1800：Registration at Asakusa View Hotel
1800-1930: Welcome Reception at Asakusa View Hotel

Wednesday, 27 October, 2010

0915-1030: Registration at AORI
0930-1030: Prepare and Open the Poster Session

1030-1200: Opening Ceremony (Chaired by Prof. Shuhei NISHIDA)

Welcome Address
Prof. Mutsumi NISHIDA Director, AORI, University of Tokyo

Addresses from Representatives of Sponsors
Dr. Sang-Kyung BYUN Vice-Chairperson, IOC
Prof. Dr. Nor Aieni Haji MOKHTAR Vice-Chairperson, IOC/WESTPAC
Representative of Ministry of Education, Culture, Sports, Science and Technology, Japan
Representative of Japan Society for the Promotion of Science

Goals for the Conference
Prof. Mitsuo UEMATSU Director, Center for International Collaboration, AORI, University of Tokyo

Group Photo

1200-1330: Lunch Break

1330-1430: Keynote Speech (Chaired by Prof. Yutaka MICHIDA)
"Contributions of Japan to the activity of IOC/WESTPAC for 50 years"
Prof. Toshio YAMAGATA Chairperson, IOC National Committee

1430-1500: Coffee Break

1500-1700: Panel Discussion (Coordinated by Prof. Mitsuo UEMATSU)
"Future of Ocean Research in the Western Pacific"
Panelists:
Prof. Yasuwo FUKUYO Vice Chairperson, IOC/WESTPAC, Japan
Dr., Academician Victor A. AKULICHEV Director, V. I. Il'ichev Pacific Oceanological Institute, Russia

Prof. Shuhei NISHIDA Leader, JSPS Coastal Marine Science
Prof. Tetsuo YANAGI Project Leader, JSPS Coastal Marine Science
Dr. Suchana CHAVANICH Project Leader, WESTPAC

1830-1900: Registration at Asakusa View Hotel
1900-2100: Reception at Asakusa View Hotel sponsored by JSPS

Thursday, 28 October, 2010

0930-1230: Review of Scientific Accomplishments for the Last 10 years of JSPS-CMS Project (Chaired by Dr. Shuhei NISHIDA)
- 0930-1000: Recent progress of physical coastal oceanography in the Southeast Asia — Dr. Tetsuo YANAGI
- 1000-1030: Science on harmful algal blooms in Southeast Asia — Dr. Yasuwo FUKUYO

1030-1050: Coffee Break

1050-1220: Marine Biodiversity
- 1050-1100 An overview — Dr. Keiichi MATSUURA
- 1100-1120 An overview of the JSPS fish team activities over the past 10 years: What we have done and where we can go? — Dr. Keiichi MATSUURA
- 1120-1140 Characteristics of benthos biodiversity in the Western Pacific - an overview — Dr. Yoshihisa SHIRAYAMA
- 1140-1200 Biodiversity of zooplankton in Southeast Asia — Dr. Shuhei NISHIDA
- 1200-1220 A report on the activities of the seaweed/sea grass group in the "Coastal Marine Science" during 2001-2010 — Dr. Shigeo KAWAGUCHI

1220-1250: Summary of the project 4, "Pollution of Marine Environment (POME)" — Drs Koji INOUE and Nobuyuki MIYAZAKI

1250-1500: Lunch and Poster Session (1st floor of AORI)

1500-1640: National Report from CMS Member Countries (Chaired by Dr. Yasuwo FUKUYO)
- 1500-1520: Indonesia Dr. SUHARSONO
- 1520-1540: Malaysia Dr. Mohd Ibrahim SEENI MOHD
- 1540-1600: Philippines Dr. Miguel D. FORTES
- 1600-1620: Thailand Dr. Charoen NITITHAMYONG
- 1620-1640: Viet Nam Dr. TRAN Duc Thanh

1640-1725: Future of IOC/WESTPAC (Chaired by Mr. Wenxi ZHU)
- 1640-1655: Dr. Yasuwo FUKUYO (Vice-Chairperson, IOC/WESTPAC, Japan)
- 1655-1710: Dr. Nor Aieni Haji MOKHTAR (Vice-Chairperson, IOC/WESTPAC, Malaysia)

1710-1725: Mr. Yoshiharu NAGAYA (Director, Japan Oceanographic Data Center, Japan)

1900-2200: Banquet sponsored by Horiba Foundation

Friday, 29 October, 2010

0930-1200: Report of Science Proposals and Future Programs
(Chaired by Dr. Shuhei NISHIDA)
(Presenters to be assigned)

1200-1400: Lunch Break
Join the Open Campus events and exhibition on the Kashiwa Campus!

1200-1300: JSPS Coordinators' Luncheon Meeting (Conference Room 219)

1400-1530: Report Session (Continued)

1530-1620: Plenary Discussion: Future Activities and Making up of Memorandum
(Chaired by Dr. Miguel FORTES)

1620-1630: Closing Remarks Dr. Mitsuo UEMATSU

Meeting Adjourned

Abstracts of plenary presentations

Review of Scientific Accomplishments for the Last 10 years of JSPS-CMS Project

National Report from CMS Member Countries

Recent Progress of Physical Coastal Oceanography in the Southeast Asia

Tetsuo Yanagi
Research Institute for Applied Mechanics, Kyushu University

There were many biological and chemical coastal oceanographers but a few physical coastal oceanographers in the Southeast Asian countries at the time of the 1990s, about twenty years ago. The knowledge on the physical conditions in the coastal sea is indispensable for the correct biological and chemical understanding of oceanographic phenomena, because the biological and chemical oceanographers cannot distinguish the temporal change of biota density or chemical concentration at some point in the coastal sea and the effect of advection or diffusion there without the correct knowledge of the advection and diffusion around the observation point.

During the past ten years, the knowledge on the coastal physical oceanography in the Southeast Asian region has remarkably increased mainly by the JSPS (Japan Society for the Promotion of Sciences) multi-lateral cooperative study, and the coastal oceanographers became to understand that the knowledge of physical conditions is the base of chemical and biological coastal oceanography.

I introduce here some new findings on the physical coastal oceanography in the Southeast Asia during the past ten years.

Keywords: Coastal Physical Oceanography, Satellite Image, Numerical Model, Ecosystem model

Science on harmful Algal Blooms in Southeast Asia

Yasuwo Fukuyo
Asian Natural Environmental Science Center, the University of Tokyo, Japan

Harmful Algal Bloom (HAB) has been thought not much serious so far except paralytic shellfish poisoning in Southesast Asia. But in JSPS Multilateral Cooperative Research Program during 2001 and 2010, about 40 active members of the group 2 noticed that Southeast Asia waters have big potential threat of various HAB causative microalgae. There are about 30 HAB species, of which 1/3 are red tides and 2/3 toxic species.

Red tide species are *Chattonella marina, Noctiluca scintillans, Prorocentrum minimum, Cochlodinium polykrikoides, Karenia mikimotoi, Ceratium furca, C. fusus,* and *Heterocapsa circularisquama.* Their red tides sometimes associated with fish mass mortality. Biology and ecology of *N. scintillans, C. polykrikoides,* and *H. circularisquama* were studies in deep.

Biology, ecology and toxin chemistry of organisms responsible for paralytic and amnesic shellfish poisonings (PSP and ASP) were given high priority for cooperative researches. For PSP, *Pyrodinium bahamense*, *Alexandrum mimutm, A. tamiyavanichii,* and *Gymnodinium catenatum,* and for ASP, *Pseudo-nitzschia multiseries, P. caciantha,* and *Nitzschia navis-varingica* were widely endemic in the region

In addition to cooperative researches, training workshops on identification of dinoflagellate cysts led by Ms. Furio of the Philippines, gene sequence characterization led by Dr. Usup of Malaysia, and PSP toxin detection using ELISA led by Dr. Dao of Vietnam were held jointly with the WESTPAC-HAB project of IOC/UNESCO. Trained participants become core scientists of the JSPS Program. Members of the JSPS HAB project conducted various workshops and local training activities too, and organized local and regional HAB projects. For example, as the regional scale, Dr. Furuya and Dr. Matsuoka led EASTHAB project, and Dr. Furuya and Dr. Usup are trying to organize GEOHAB Asia project. Dr. Azanza organized PhilHAB program in the Philippines, as a country scale. Regional and local HAB science activities will be more and more active in near future.

Key words: Harmful Algal Blooms, EASTHAB, GEOHAB Asia, red tide, PSP, ASP

An overview of the JSPS fish team activities over the past 10 years: What we have done and where we can go?

Keiichi Matsuura
Collection Center, National Museum of Nature and Science, Japan

The JSPS Core University Project on Coastal Marine Science (CMS) started in April 2001 under the leadership of the Ocean Research Institute of the University of Tokyo. The participants of this project are composed of marine scientists from the six countries: Indonesia, Japan, Malaysia, Philippines, Thailand and Vietnam. The marine biodiversity research (Project 3) is one of the important components of the project, being divided into 4 groups: fishes, benthos, plankton, and sea algae and sea grasses. The fish team includes 12 ichthyologists, 2 from Indonesia, 5 from Japan, 2 from Malaysia, 1 from Thailand and 2 from Vietnam. Discussions by the fish team in the early stage of the CMS led us to focus on 3 topics: taxonomic study on fishes in SE Asia, publication of field guides, and capacity building for young fish researchers. Our work on these topics resulted in great successes including many research papers on fish taxonomy with descriptions of new fishes; field guides for fishes of Bitung, Sulawesi, fishes of Libon Island on the west coast of Thailand, and fishes of the Andaman Sea; and workshops in the participant countries where activity reports have been organized by experts from the participant countries and young researchers have been given opportunities to get training on fish taxonomy. This project has made great contribution to develop fish diversity studies in this region. Although research products such as scientific papers and field guides are great in terms of science, it should also be pointed out that this project was the first and great opportunity for marine biologists in this region to develop and establish the human network helping studies on fish diversity of the region. The CMS will soon be finished and every participant of this project should make efforts to continue this wonderful cooperative research framework.

Key words: fish diversity, taxonomy, field guide, workshops

Characteristics of Benthos Biodiversity in the Western Pacific - an overview

Yoshihisa Shirayama
Seto Marine Biological Laboratory, Kyoto University, Japan

The characteristics of benthic biodiversity have been compared in a global scale using a standardized protocol in NaGISA (Natural Geography in Shore Area) project. Several NaGISA sites have been established in the JSPS project and the results were used in the analyses of NaGISA project.

Several characteristics of benthic biodiversity were recognized in the South Asian Western Pacific region. For example, the biodiversity of macro algae seems low compared to high latitude area. It however does not necessarily mean the number of algal species living in the region is fewer than in the high latitude region such as Alaska. The comparison carried out in NaGISA is number of species in a unit area. In the tropical region, the variety of habitat is very large, and the total biodiversity of the region probably could not be characterized by the protocol used in the project.

Several other patterns of benthic biodiversity in the global scale were extracted through the project, and drivers that promoted such patterns were extracted. Among major drivers, it was noteworthy that ocean acidification played considerable role to creat the pattern of biodiversity. The fact emphasize more detailed study is necessary regarding influence of future ocean acidification on the benthic ecosystem.

Key words: Biodiversity, Benthos, Western Pacific, Global Comparison

Biodiversity of zooplankton in Southeast Asia

Shuhei Nishida
Atmosphere and Ocean Research Institute, University of Tokyo

Southeast Asia is in a unique setting in terms of pelagic biodiversity: it encompasses the Indo-Malayan Region, an evolutionary center of marine fauna, many taxa having the highest numbers of species recorded in this region of the world; it comprises a complex system of island chains and isolated basins such as Sulu and South China Seas, which is related to the origin of faunal complexity of the region exemplified by, e.g., geographically isolated sibling species, endemism, and relict species; it is also among the biodiversity-crisis hotspots where the load of human activities is most serious but research is wanting.

Under this circumstance, we have conducted researches into the biodiversity of zooplankton in Southeast Asia, as one of the field research project of the Japan Society for the Promotion of Science (JSPS) on Coastal Marine Science during the years 2001-2010. We are also co-operating with the Census of Marine Zooplankton (CMarZ), a field project of the Census of Marine Life (CoML). This is being done with the multilateral co-operation of Japan and five countries in this region: Thailand, Malaysia, Indonesia, Philippines, and Vietnam.

Particular efforts have been paid to the areas where there have been few studies due to historical consequences and/or technical difficulties. This resulted in discoveries of more than 120 species so far unknown, of which ca. 80 species have been described as new to science, from the estuaries, coral reefs and marginal seas of Southeast Asia.

We also held training courses on the methods of zooplankton research, in particular those on classification and practical identification in five member countries, with a total of ca. 150 scientists/students/technicians so far participated.

We have established a zooplankton database (CMarZ-Asia Database: www.cmarz-asia.org), which contains taxonomic, morphological, ecological, and genetic information on zooplankton in the Asian Region.

Key words: zooplankton, new species, training cources, database

A report on the activities of the seaweed/sea grass group in the "Coastal Marine Science" during 2001-2010.

Shigeo Kawaguchi
Faculty of Agriculture, Kyushu University, Japan.

In coastal ecosystems, seaweeds and sea grasses are very important as primary producers. If these organisms decrease, the marine production will be much reduced. These days, in most of the member countries, the coastal environment is strongly damaged due to the rapid economic development and the marine production is threatened to greatly decrease. To stop this threat and to preserve the coastal environment supporting biodiversity in SE Asian region, some actions would be apparently needed. As the Biodiversity Project in the "Coastal Marine Science", we (seaweed/sea grass group) have promoted several actions against the above mentioned threat during 2001-2010. Such actions are briefly summarized as follows:

A. Ecological part

1. Instruction of native young researchers and/or students on the basic methodology of ecological studies in each member country. This includes lectures in the laboratory and practices in the seaweed/sea grass beds.
2. Establishment of advanced methodology applying recent technology.

B. Taxonomical part

1. Lectures on the identification of several important groups of seaweeds and sea grasses. This also includes practices in the laboratory.
2. Improvement of our knowledge on seaweed and sea grass taxonomy. This includes observations and discussions on the dried herbarium sheets brought from the member countries.
3. Clarification of local floras by collection of specimens in the field.

For performing these actions, we have had totally eight workshops in the member countries. A part of the results have already been presented in the Joint Seminars.

Here in this presentation, I would like to make a report on some results of our activities and also make a brief comment on our future collaborations.

Keywords: biodiversity, coastal ecosystem, ecology, seaweed, sea grass, taxonomy

Summary of the project 4, "Pollution of Marine Environment (POME)"

Koji Inoue and Nobuyuki Miyazaki
Atmosphere and Ocean Research Institute, The University of Tokyo, Japan

Southeast Asia, containing geographically and ecologically diverse regions, is known as a center of biodiversity in the world. Especially, coastal areas of Southeast Asia contain many ecologically important regions including tidal flats, mangrove forests, and coral reefs. Southeast Asia is also a rapidly developing area characterized by the rapid growth of population, urbanization, and industrialization. To avoid the damages on the natural ecosystems and severe deterioration of environmental conditions resulting from economic development, it is important to monitor the status of environmental conditions accurately, effectively, and continuously, and utilize the data for future actions.

In the first phase of the project 4, "Pollution of Marine Pollution (POME)", efforts have been devoted to training of the scientists from the five Southeast Asian countries, to increase accuracy of analyses, and also to standardize the protocol. Through this process, the core members of the POME team have been organized. The core members have actively analyzed the status of pollutants including Polycyclic Aromatic Hydrocarbons, Organochlorine and Organotin Compounds, Heavy Metals, and Radionuclides, occasionally hosting international cooperative sampling at several important locations such as Manila Bay, Gulf of Thailand, Strait of Malacca, Jakarta Bay, and Halong Bay. The samples are also stored in "Environmental Specimen Bank" of Ehime University because each sample is the record the environmental status at the time of collection. The data have been published as enormous number of scientific papers.

Biological approaches have been also attempted recently. For example, some members are trying to use transgenic fish to detect pollutants, and some other members are studying accumulation process of the pollutants through the food web. The former enables to monitor the status of pollution continuously and economically, and the latter helps to understand the pollution of the whole ecosystem and also brings us important information to consider the food safety.

Keywords: Environmental Pollution, Persistent Organic Pollutants (POPs), Southeast Asia, Coastal Ecosystem

Country report of Malaysia

Mohd Ibrahim Seeni Mohd
Faculty of Geoinformation Science and Engineering
Universiti Teknologi Malaysia, Malaysia

The JSPS Multilateral Core University Program on Coastal Marine Science (JSPS-MCUP-CMS) began in 2001. For the past 10 years, many activities have been undertaken by the Malaysian scientists participating in the program. In this report, focal persons involved in the program, funding mechanisms, accomplishments, some emerging issues and future collaborations are summarized. Some of the accomplishments include publications of over 330 papers in journals, over 170 papers in seminar and conference proceedings, over 230 papers presented in seminars/conferences/workshops and some chapters in books, bulletins, monographs and posters. Many research projects have been undertaken as highlighted in the report. Several workshops and training programs have been conducted by the respective project teams. Some emerging issues include hazardous chemical pollution in coastal marine environment due to the increase of human activities in the coastal areas, the occurrence of new HAB species, effects of pollution and climate change, effects of global warming and sea level rise, effects of aquaculture activities on biodiversity, and high occurrence of invasive species in stressed marine ecosystems. The JSPS-MCUP-CMS program has certainly benefited both Japan and other participating countries in terms of knowledge enhancement through research and training activities.

The Philippine JSPS CMS Project: Status, Problems and Perspectives

Miguel D. Fortes
Marine Science Institute CS, University of the Philippines

Highlighted by 276 publications, the products and services emanating from the JSPS Coastal Marine Science Component in the Philippines are presently contributing significantly to national marine science. While problems existed, these were obviated by the cooperation and determination of a core group, guided by the national science agency. However, their continuance is uncertain in the years beyond 2010. This calls for a renewed and more functional coordination among the members, with DOST, vigorous campaign to raise external support, and shift activity focus to those which show more promise in addressing priority national issues.

The project identified the essential elements in coastal biodiversity conservation and environmental sustainability. These elements include: collective visioning, deliberate planning and design of the undertaking, coordinated science generation, capacity building, promotion of policy and institutional reforms, creation of an informed public, and mobilization of the stakeholders or affected communities. The key steps lie the ability of those in management to understand and optimize the dynamics of Integrated Coastal Management for timely mobilization of political opportunities, financial resources, intellectual capitals and stakeholders' support to improve coastal governance. All these are predicated largely on sound marine science and technology. This is where the JSPS CMS contributed substantially.

The key solution for resolving the problems JSPS CMS encountered in its operation and at the same time sustain the benefits it provided, is the formulation of a comprehensive national coastal management policy to harmonize coastal resource use laws, enhance coordination of capacity-building programs, and enforcement activities. It must also provide for the establishment of consultative mechanisms to enhance local government participation in policy and decision-making, as well as the institutionalization of monitoring, evaluation, information-sharing mechanisms, and reporting on the status of coastal resources and implementation of CRM programs at the different levels of governance.

Key words: coastal, Philippines, biodiversity, sustainability, JSPS

Marine science activities in Thailand

Charoen Nitithamyong
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The interest in marine science in Thailand was initiated during the reign of King Rama IV in 1870's but it is the NAGA Expedition in 1959-1961 which had brought about the intense interest. The National Marine Science Committee was formed in 1962 in order to set the direction of and promote marine science research and survey in the country resulting in several marine cooperative programs and establishing of the first two Departments of Marine Science in 1968. The bilateral cooperative research program between Thailand and Japan in the field of marine science started in 1978 before being changed to multilateral cooperation in 2001. Since then the scope of cooperative research has been divided into 4 main project areas. Each project leader is responsible for deliberating research plans, workshops or academic seminars. The National Research Council of Thailand (NRCT) has been the sole funding agency of the proposed researches from the program, as well as national conferences and workshops carried out in Thailand. Four research projects have been funded to Thai researchers during the multilateral period. Seven conferences and 8 workshops were carried out while at least 20 peer reviewed articles, 2 books, 2 proceedings and 1 manual were published. Scientist exchanges were mostly from member countries to Thailand compared to from Thailand to those countries. The key benefits from the cooperative program include capacity building, exchange of knowledge, idea and experience despite some management problem. Knowledge in marine science has been useful in educating the public and raising their awareness to involve public participation in the conservation of valuable coastal ecosystems.

Key words: Thailand, history, capacity building, consortium

Strengthening collaboration in JSPS-CMS program for a better improvement in the field of marine science – a lesson and experience learned from Vietnam

Tran Duc Thanh
Institute of Marine Environment and Resources, Viet Nam

Fostering international cooperation projects among research institutions and foreign counterparts has been considered as the priority tasks in globalization of marine research activities by Vietnamese government. Based on the frame work of signing agreement between the Vietnam Academy of Science and Technology (VAST) and Japan Society for Promotion of Science (JSPS) in 1999, three major organizations/ministries in Vietnam to take part in the VAST/JSPS program namely: Vietnam Academy of Science and Technology (5 research institutions), Ministry of Education and Training (2 universities), Ministry of Agriculture and Rural Development (2 research institutions). The total number of the project member accounted for 54 experts joined in 4 main projects.

The VAST/JSPS team in Vietnam has actively contributed for all the research activities such as to be the host of 6 technical training courses in Vietnam and provided 150 time experts as the resource persons at the regional training programs. In addition, most experts in Vietnam joined the program also found the counterparts in Japan or South East Asia country members to get the human power and solve the same interested problems related to the 4 designated main projects in program. By strengthening collaboration in VAST/JSPS project, the Vietnam side also got the fruitful products such as more than 100 papers to be published (25 papers published at the international proceedings and journals), 16 post graduate students (9 MSc, 7 PhD) to be trained full time in Japan, Vietnam or partial time in the country members. Moreover, the invaluable results come out from this program was establishment of a networking group for the marine scientists in region. Vietnam side also stimulate this task by successfully organized the 4th VAST/JSPS joint seminar in Hai Phong and the 6th National Coordinator's meeting in Ha Long Bay.

Though, the 10 years joint program would be ended but not be last due to the solid collaboration platform was built. We scientists hope that all the people in the region can keep going on with our duty in the new paradigms. The sea needs scientists to explore and the people ask the scientists to answer.

Abstracts of Posters by Projects and Groups

Project-1: Water circulation and the material transport process in the coastal areas and marginal seas of the East and Southeast Asia

Project 2: Ecology and Oceanography of Harmful Marine Microalgae

1-1

Roles of Turbulence on Chlorophyll-a distribution in the upper gulf of Thailand

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[2]Research Institute for Applied mechanics, Kyushu University, Japan

Field observation in the upper Gulf of Thailand (UGoT) in March and August 2009 were conducted to investigate the relationship between vertical diffusivity (water turbulence) and chlorophyll-a (Chl-*a*). Other water properties, including salinity, temperature, density, dissolved oxygen (DO), dissolved inorganic nitrogen (DIN) and phosphorous (DIP), dissolved silicate (DSi) and turbulence, were also investigated. Temporal variation analysis indicated that salinity, density, nitrite, silicate and Chl-a in March were larger than those in August, while temperature, pH, SS, DO, ammonia, nitrate and phosphate had the opposite trend ($p < 0.05$). High Chl-a water did not exactly correspond to the area of freshwater influences and high nutrients, except DSi during the cruise in March 2009. Insignificant relationships between Chl-*a* and environmental parameters were found in the correlation analysis. Proportional relationships seem to happen for Chl-*a* and DIP, and Chl-*a* and Dsi in March 2009, while reverse relationships for Chl-*a* and K_z resulted for both periods. Further investigations are required to clarify the occurrence mechanism of red tide in UGoT.

Keywords: vertical diffusivity, chlorophyll, dissolved nutrient, water quality, Gulf of Thailand

1-2

Study on variability Indonesian throughflow in the Makassar Strait

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[2]Mathematics Dept., Faculty of Science Hasanuddin University, Indonesia
[3] Research Institute for Applied Mechanics, Japan

The transport volume of the Indonesian Throughflow (ITF) in the Makassar Strait has been simulated by using 3-D hydrodynamic-baroclinic circulation model during years 1972 to 1974, 1981 to 1983 and 1996 to 1998. The simulation is to analysis variability of volume transport related to ENSO and Monsoon. Sea surface temperature anomaly at Niño3.4 and meridional wind velocity are used as indicator for ENSO and Monsoon and cross correlated with transport volume in the strait.

Mean value of the ITF in the Makassar Strait from April 1973 to May 1974 (La Niña phase) is 9.54 Sv and in June until December 1998 14.75 Sv. In the El Niño phase from April 1972 to March 1973 is 3.98 Sv, from May 1982 to June 1983 is 6,12 Sv and from April 1997 to May 1998 is 11.21 Sv. In the normal phase 1974 is 5.31 Sv, in 1981 is 5.31 Sv and in 1996 is 12.95 Sv. Maximum and minimum transport volume in phase La Niña 1973 to 1974 occurs in November 1973 is 12.47 Sv and in May 1973 is 7.22 Sv respectively, and in 1998 in October is 17.63 Sv and in June is 11.10 Sv.

In the El Niño phase 1972 to 1973 exists in May 1972 is 6.53 Sv and in December 1972 is 1.72 Sv respectively, in 1982 to 1983 occurs in May 1983 is 8.65 Sv (maximum) and October 1982 is 3.84 Sv (minimum) and in 1997 to 1998 maximum and minimum transport occurs in May 1997 is 14.61 Sv and in January 1997 is 8.14 Sv. Meanwhile in the normal phase 1974 maximum and minimum transport exists in March is 9.71 Sv and in October is 0.47 Sv s respectively, in 1981: February is 7.79 Sv and November is 3.19 Sv and in 1996 occurs in June is 15.79 Sv and in November is 5.61 Sv. Cross-correlation results shows that ENSO dominantly affect transport volume in the Makassar strait, while effect of monsoon is weakly. The model verification generally shows that good, although in January and May 1997 seen is not satisfy.

The Indonesian Throughflow in the Makassar Strait at ENSO phase emit a stream of northerly to good south which vary between its it and also between occurence year like elaborated at second paragraph above.

Key words: Indonesian Throughflow, volume transport, ENSO, monsoon

1-3

Current natural and anthropogenic carbon flux in Jakarta Bay, Indonesia

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[2]Research Institute for Applied Mechanics, Kyushu University, Japan

Jakarta Bay with an area of about 496 km^2 and coastal length of around 85 km with a mean water depth of 8,4 m is located in the northern coast of Jakarta City, the most populated city in Indonesia. Thirteen rivers flowing in the Jakarta region with 3 big rivers with significant discharge to the Bay namely Citarum, Ciliwung and Cisadane Rivers. Water and sediment samples were taken and analysed from 17 stations during 2 monsoonal seasons, the west monsoon or rainy season and east monsoon or dry season.

Water temperature of the bay ranged between 27^oC to 33^oC which do not correspond to the seasonal variation. Penetration of fresh water from the river to the coastal areas especially in the eastern and western parts were shown by the salinity pattern. Total Suspended Solid were significantly increased during the rainy season from about 100 mg/l to over 400 mg/l and highest concentration was found in the eastern coast. Dissolved Oxygen (DO) concentration were lower in the coastal area and higher in the bay ranged between 4.5 mg/l and 7.1 mg/l. Secchi depth ranged from 0.2 in the coast and up to 6.4 m in the bay. Sediments in the coastal area consist mostly of black clay and changing to greyish green sandy clay and greyish green clayey sand with some shell fragments in the bay.

Good correlations were found between TSS and Chlorophyll-a and Total N with chlorophyll-a. DOC concentrations in February and May ranged between 100-950 µg-C/l and between 0-850 µg-C/l respectively whereas POC concentrations ranged between 50-650 µg-C/l and 50-900 µg-C/l. The concentrations between both periods are nearly similar, but the load of organic carbon flux from the land to the Jakarta Bay show a large contrast due to the different freshwater input. Total organic Carbon fluxes from the river to the bay in February and May 2007 were 107.6 T /day C and 42.7 T /day C, respectively.

Keywords: water, TSS, DOC, POC, seasonal variations, Jakarta Bay

1-4

Sea bottom mapping from ALOS AVNIR-2 and Quickbird satellite data

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Satellite remote sensing techniques have been found to be useful in many area of applications. The frequent and wide coverage provided by remote sensing satellites has made it possible to obtain up-to-date information of features and phenomena over large areas of the earth's surface. In this paper, a study that was carried out using the ALOS AVNIR-2 and Quickbird satellite data acquired on 29 July 2008 and 7 August 2008 respectively to extract sea bottom features, i.e. seagrass, seaweed and coral areas in the coastal waters of Sibu Island, Malaysia is reported. The technique that was used combines the information in band 1 and band 3 of the satellite data to produce a depth invariant index map of the sea bottom types. Sea truth data were used to validate the results. It was found that coral dominates most of the coastal areas of the island. There were also more seaweed areas than seagrass areas from both satellite data.

Keywords: Remote sensing, coral, seaweed, seagrass, ALOS AVNIR-2 and Quickbird data

1-5

Status of Physical Oceanography study in Viet Nam and works in future

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Physical Oceanography was studied from the year 1950s in Vietnam, during last sixty years, this field had being developed incessantly with studied directions, for example set up the monthly maps on temperature, salinity; studied on regime of wave and current, storm surge modeling, objective analyzing for marine physical fields, calculate the tidal harmonic constant; studied on sea sound channel in Tonkin Gulf, studied on structure of mass water of Vietnam East sea in three dimensions; studied on mechanism of erosion-accretion in coastal zone, coastal engineering, salt intrusion; simulation of transportation of pollutants and oil spill by mathematical model, ecological model, upwelling, simulation and forecast of tsunami by numerical model… These studies had been applied widely in life and they are scientific basic for division of sea border with neighbor countries. In the future, with the interest of Viet Nam Government and the international cooperation through programs, organizations such as IUCN, NOAA, WESPAC, JSPS, SIDA/SAREC…, physical oceanography in Viet Nam will focus on new studies: submarine groundwater, marine energy, stratification of sea sound, interaction of atmosphere-ocean, numerical model for offshore, climate change effect to resource and marine environment.

Keyword: physical oceanography, submarine groundwater

1-6

Water mass characteristics in the strait of Malacca using ocean data view

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The pattern of water masses in the Strait of Malacca are studied in this project. The variations in the physical properties of temperature, salinity and dissolved oxygen over the Monsoon season were investigated. Data for 1900 to 2005 were taken from World Ocean Database. Ocean Data View software was used to process the data and to create contour visualizations. The results show the significant low salinity input from the west coast of Peninsular Malaysia during the Northeast Monsoon season. During the Southwest Monsoon period, there was an intrusion of high saline water from the Andaman Sea to the Strait. The Southwesterly Monsoon winds may push seawater from the Indian Ocean and Andaman Sea into the Strait from the northern sector. The Strait waters also were found to be more stratified in the warmer condition. However, the southern sections are more homogeneous in every season, indicating better mixing. Further study can improve the understanding of seasonal water mass variations in the Strait of Malacca.

Keywords: Northeast Monsoon, Southwest Monsoon, Strait of Malacca, Water mass, Water movement

1-7

Overview about the researches of material cycling in Manila Bay

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Recently, water quality of Manila Bay has been deteriorated and red tides frequently occur. We researched the characteristics of material cycling in Manila Bay in JSPS program. We will summarize our researches in this presentation,

1. The results of nitrogen cycling in the surface layer of Manila Bay in March (dry) and Nov. (rainy) in 1999.
2. The results of nitrogen cycling in the surface layer of the Pasig River estuary during March 1996 to Dec. 1998.
3. The results of dissolved inorganic nitrogen budgets in the Pasig River estuary in dry and rainy seasons.

Conclusions of the research are as follows, A red tide occurrence can be prevented, if DIN in the upper layer is decrease especially rainy season, and main source of DIN in Manila Bay is decomposition in the water column. Therefore the start of reduction of organic matters in Manila Bay is to control the intrusion of Nitrogen from the land area. But the recovery of the marine environment will take long time. In case of Osaka Bay is 30 years.

Keywords: Manila Bay, Material Cycling, Red tide

1-8

Surface current off Vietnam in Summer

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It is suggested that a strong southward current with the speed of more than 80 cm/s exists along Vietnamese coast in winter from the result of numerical models, buoy trajectory, and satellite data analysis. On the other hand, it is well known that a cyclonic eddy appears off southern part of the Vietnamese coast in winter. These currents might play an important role to the material transport and local climate around Vietnam. However, observed data to investigate the currents are limited. In the present study, we analyze satellite altimetry data to reveal current pattern off Vietnam and to investigate variability in these currents. In addition, we carried out hydrographic and buoy trajectory observations off Da Nang and Qui Nhon in July 2010.

Satellite altimetry analysis suggests that a strong southward current exists from 12° N to 16° N along Vietnamese coast in summer and a cyclonic eddy appears round 13° N. Previous studies have reported the cyclonic eddy, but the current direction off Vietnam was opposite to the results of previous studies. 3 buoys deployed off Qui Nhon flowed to the north with the speeds of more than 150 cm/s and then turned around. Trajectories of the buoys were quite different from results of satellite altimetry. Since we cannot obtain mean current pattern from the altimetry data, the mean current was evaluated from altimetry and buoy trajectory data. Almost the buoy trajectory data to evaluate the mean current were data in winter. Therefore, southward current might be overestimated. We will recalculate the mean current which can reproduce the buoy trajectories of our buoys and investigate the current pattern off Vietnamese coast in summer.

Key words: strong current, Vietnam, altimeter, buoy trajectory

1-9

Seasonal variation of sea surface current in the Gulf of Thailand

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In this study, the seasonal variations in the surface water currents within the Gulf of Thailand were revealed through the use of (i) temperature and salinity data derived from the world ocean database, (ii) the monthly dynamic heights anomaly (DHA) from TOPEX/Poseidon and (iii) the ERS-2 altimetry data, during 1995-2001. The mean dynamic height (MDH) and mean geostrophic current were derived from the climatological temperature and salinity data, while the DHA data was derived from the MDH and their geostrophic currents. The mean geostrophic current showed a strong southwestward flow of the South China Sea water along the gulf entrance. Counterclockwise eddies in the inner gulf and the western side of the gulf entrance were associated with upwelling in the area. Seasonal geostrophic currents showed a basin-wide counterclockwise circulation during the southwest monsoon season and a clockwise circulation during the northeast monsoon season. Upwelling was enhanced during the southwest monsoon season. The circulation patterns varied seasonally probably due to the variation in wind regimes. Finally, the congregation, spawning, and migration routes of the short-bodied mackerel were fund to conform to the upwelling and surface circulation in the gulf.

Key words: *sea surface dynamic height, geostrophic current, upwelling/downwelling, Gulf of Thailand*

1-10

Variability of Sea Surface Temperature Change within the Indonesian Regions Revealed by Satellite Data

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The region of the Indonesian seas from view point of the Indonesian Fisheries Management (IFM) was divided into 11 regions (Fig.1); they are the Indian Ocean of (1) West Sumatera, (2) South Java-Nusa Tenggara, (3) Malacca Strait, (4) South China Sea, (5) Java Sea, (6) Macassar Strait and South Sulawesi Sea, (7) Banda Sea, (8) Molucca Sea, (9) Arafura Sea, (10) Pacific Sea of North Papua and (11) North Sulawesi. To understand the variability of sea surface temperature (SST) change within these regions, a series of the SST satellite data derived from Path Finder, MODIS and AVHRR-NOAA data in period of 1985-2007 were collected. The observation result shows that in general the SST change within the Indonesian regions trend to decrease particularly in period of 2001-2007. The SST change within the region geographically shows variability as response to the global, regional and local environment change i.e. in Indian Ocean of the Indonesian regions, the SST change was strongly affected by the upwelling occurrences stimulated by the dynamic of the NINO and Indian Ocean Dipole (IOD), while in Macassar Strait that is influenced by the Indonesian Through Flow (ITF) and South China Sea, Malacca Strait, Pacific Sea of the North Papua and Sulawesi Seas that is influenced by the dynamics of the Pacific Ocean in which the NINO dynamics also influences.

Keywords: Variability of sea surface temperature (SST) change, Indonesian region, satellite data

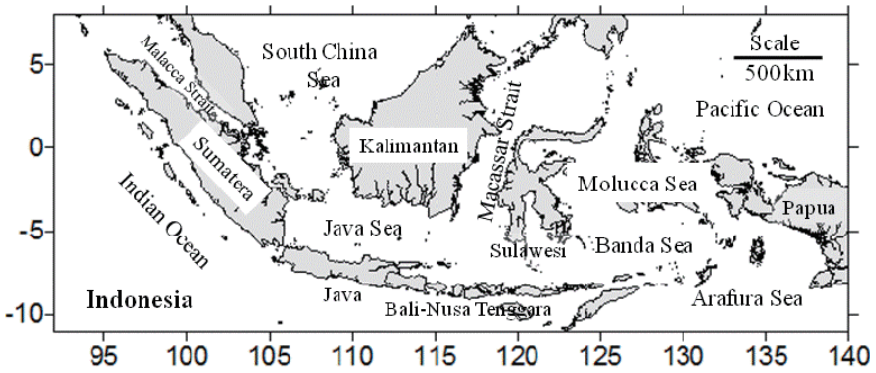

Fig.1. The 11 regions of the Indonesian seas from view point of the Indonesian Fisheries Management (IFM)

2-1

A Research and Development (R and D) Program on the Ecology and Oceanography of Harmful Algal Blooms in the Philippines (PhilHABs)[1]

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Harmful Algal Blooms (HABs) commonly and collectively known as "Red Tides" has been a significant national concern in the Philippines for their negative public health and/or economic effects. Blooms of *Pyrodinium bahamense* var. *compressum*, a Paralytic Shellfish Poisoning (PSP) causative organism, have been reported in several areas including new ones in the Philippines. Sorsogon was declared in a state of calamity after more than a hundred casualties of PSP in January 2007 and recently in 2010. *Cochlodinium* red tide blooms in 2005-2006 caused fish kills and public alarm along the western coast of Palawan. Fish kills associated with various harmful algae have been experienced in some areas in Pangasinan in 2002 and some years thereafter. The PhilHABs program aims to understand critical factors and mechanisms underlying the population dynamics of major HAB species in the Philippines which can be used as basis for monitoring and managing their occurrence, movement, toxicity and environmental effects. There are 8 projects in this Research and Development (R and D) Program supported by the Philippines' Department of Science and Technology (DOST) and the University of the Philippines Marine Science Institute (UP MSI). The program being implemented from 2009-2011 involves 14 researchers and 28 research associates/graduate students. It has involved the participation of local government and other academic institutions especially in Sorsogon and Pangasinan provinces.

Keywords: HAB, Philippines, Pyrodinium bahamense, *Paralytic Shellfish Poisoning,* Cochlodinium, *PhilHABs*

2-2

A review on the progress of HAB study in Viet Nam from 2001 to 2010 through JSPS cooperation

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As same as many other Asian countries, Vietnam has been facing occurrence of HABs since 90s. Almost all blooms are reported as harmful due to serious economic loss in aquaculture and environmental ecological damages. National monitoring system on coastal water quality and toxins in shellfish products for export was established to reduce negative impacts from HABs. Also, scientific researches on HABs have been carried out intensively, only national but also international frameworks. In the scope of these projects, presence and distribution of harmful and potentially toxic microalgae in Vietnamese waters was mainly focused.

The first cooperative research under the JSPS Multilateral Program between Japanese and Vietnamese scientists was conducted at the Haiphong Branch of Institute of Oceanography (currently named as Institute of Marine Environment and Resources) on microagal composition and toxin level in shellfish in northern Vietnam. After then various study topics such as classification of potentially HAB species, toxin accumulation in marine organisms, and toxin productivity in the HAB species found in Vietnamese waters have been carried out. Especially a study on accumulation mechanism of domoic acid, causative toxin for amnesic shellfish poisoning, in bivalve and its origin was intensively conducted at Nha Phu Bay, central Vietnam.

Although the research started with various difficulties in available facilities, budgets and human resources, Vietnamese scientists could develop capacity for HAB study both at country and regional levels through the cooperative activities. Results of the study were presented at international meetings, whorkshops and published in international and national journals. Ten international and 23 national papers were published based on JSPS-VAST collaborative researches during 10 years (2001-2010).

Keywords: Harmful algal blooms, Vietnam, toxins, shellfish poisoning

2-3

Pseudo-nitzschia caciantha, a possible causative organism of domoic acid in *Spondylus vesicolor* from Nha Phu Bay, Vietnam

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Recently, it was reported that a significant level of domoic acid (DA), a causative toxin of Amnesic Shellfish Poisoning, was detected in bivalves belonging to a genus *Spondylus* collected from various tropical areas, including Vietnam whereas no significant DA was detected in other bivalve species. These facts suggest that the causative plankton species for DA occur widely in tropical waters and that *Spondylus* spp. accumulate DA more effectively than other bivalve species. In the monitoring on seasonal change of DA levels in *S. vesicolor* and plankton net samples in Nha Phu Bay, Khanh Hoa Province, Vietnam, DA level of *S. vesicolor* was found to increase when DA was detected in the plankton net samples, showing the occurrence of causative plankton species for DA. Under light microscopic observation of the plankton samples, cells of *Pseudo-nitzschia* spp., the size of which was smaller than toxic *Pseudo-nitzschia* such as *P. multiseries*, were observed. In the plankton net samples fractionated by successive filtration through the sieves and membrane with different pore sizes, most of DA was recovered in the smallest size particle fraction (0.6-10 mm). Most of the cells of *Pseudo-nitzschia* spp. were also concentrated in the fraction. Some strains of unicellular cultures established from the cells in this fraction showed the production of DA, though the productivity was low. All the DA-producing strains were identified as *Pseudo-nitzschia caciantha*. These results indicate that *P. caciantha* is a causative species of DA accumulated in *S. vesicolor* .

Key words: domoic acid, Amnesic Shellfish Poisoning, Pseudo-nitzschia, Pseudo-nitzschia caciantha, Spondylus

2-4

Distribution of dinoflagellate cysts in the surface sediment of the coastal areas at Chonburi Province, Thailand

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Distribution of dinoflagellate cysts were investigated in the surface sediment of the coastal areas at Ang-sila, Si-racha and Laem-chabang, Chonburi Province, Thailand at two climate seasons. The first and second cruises were conducted in February and September that represented the dry and rainy season samples, respectively. Thirty types of cysts, of which 28 belonged to order Gonyaulacales, Gymnodiniales and Peridiniales and two unknown, were found. The dominant species were *Pheopolykrikos hartmannii* and *Pyrophacus steinii,* and the most common species were *Pheopolykrikos hartmannii*, *Gonyaulax spinifera* (*Spiniferites mirabilis*), *Lingulodinium polyedrum*, *Pyrophacus steinii*, *Protoperidinium pentagonum*, and *P. leonis*. The illustrations and description in these areas have also been analyzed.

Dinoflagellate cysts were widely found in most stations of the study area. Total numbers of the cysts in dry season was higher than those in rainy season. Their abundance in both seasons was high at the stations with deeper than 10 meter around Ang-sila and Bang-pra areas and low at the station near Laem-chabang areas. These findings suggested that cyst abundance and distribution might be affected by seasonal changes of marine environmental condition.

Key words: distribution of cysts, dinoflagellate cysts, surface sediment, Gulf of Thailand

2-5

Potential Importance of Dinoflagellate Cyst Mapping for Harmful Algal Bloom Expansion in the Southeast Asian Coastal Waters

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Dinoflagellate cysts play an important role in the initiation, recurrence and geographical expansion of harmful algal blooms (HABs). The geographical distribution and abundance of dinoflagellate cysts in marine sediment has become very essential information in giving early warnings of the presence of toxic species and the continuing recurrence of HABs in a given area. This paper presents the combination of results of the TTR-IOC/WESTPAC and ORI-JSPS HAB RG1 "Cyst Mapping" surveys and also provides a review of available bio-geographical information on dinoflagellate cyst assemblages and distributions from the recent surface sediments of the tropics and/or Southeast Asian waters mainly on the context of HAB dynamics. Few results of such studies are reviewed and included in this paper as examples only with the end of view of providing insights on how cyst mapping could contribute to the harmful algal bloom (HAB) expansion in the Southeast Asian region.

Keywords: *dinoflagellate cyst mapping, harmful algal bloom, sediment dynamics, HAB geographical distribution and expansion, Southeast Asia*

2-6

The GEOHAB Asia program: Initiative for collaborative and comparative HAB studies in Asia

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The Global Ecology and Oceanography of Harmful Algal Blooms (GEOHAB) program was launched in 2000 as a joint program of IOC and SCOR with the purpose of promoting and coordinating collaborative studies on HABs. GEOHAB Science Plan made grouping of HAB studies into five distinct program elements, namely biodiversity and biogeography, nutrients and eutrophication, adaptive strategies, comparative ecosystems, and observation, modeling and prediction. The east and southeast Asian regions are amongst those most severely affected by HAB events. There also seemed to be a gradual evolution of HAB types from the predominance of PSP in the 1970s and 1980s to ichthyotoxicity in the 1990s and early 2000s, to noxious blooms in recent years. PSP events were caused by *Pyrodinium bahamense* and *Alexandrium* spp. Potential ichthyotoxic blooms were formed by *Cochlodinium polykrikoides*, *Karenia mikimotoi* and *Prorocentrum minimum*, while noxious blooms of *Phaeocystis globosa*, *Noctiluca scintillans* and *Ceratium* spp have also become more common. The real extent of benthic dinoflagellate blooms is largely unknown, although there have been sporadic reports of ciguatera fish poisoning events. There are high levels of interest and motivation to carry out HAB studies among researchers in the countries affected. There are, however, quite significant differences in technical and infrastructural capabilities among countries. It was thus recognized that a comparative and collaborative framework based upon the GEOHAB program may perhaps offer the best route to gain better understanding of HAB events. Towards this end two open science meetings were convened to come up with a science plan for GEOHAB Asia. The outcome was the report entitled "Harmful Algal Blooms in Asia: A Regional Comparative Programme" (www.geohab.info). It is hoped that starting in 2011 at least a few of the priority research areas identified in the report will be implemented.

Key words: GEOHAB, Asia GEOHAB, HABs

2-7

Review of HAB science development in Indonesia

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Phytoplankton blooms usually provide positive effect on fisheries. The high primary productivity of the waters indicates good fishing ground, and also provides excellent sites for fish farming activities. But in some cases, severe health hazards were observed, leading to human mortality among people living along the coastline. Seafood is a delicacy to these people, but during the harmful blooms, fish price fell down drastically, and it affected to livelihood of the fisherman. It is difficult to have an estimate of the economic cost of such cases. In Lampung the economic loss was estimated roughly around USD1.755 million as a result of the sea water discoloration. The amount of fish caught decreased greatly. Mass mortality of shrimp and fish was estimated to occur in 870 hectare ponds. Early harvesting had to be carried out in the 347.5 hectare shrimp and milkfish ponds, causing a drastic decrease in production. Normal production of 350 kg/2.5 hectare decreased to 5-50 kg/2.5 hectare. Based on this cases, The Ministry of Marine and Fisheries had the order No.17/KEPMEN/2004, and a monitoring program 2004-2009 were conducted for safety confirmation of shellfish in Indonesia waters with parameter PSP, DSP and ASP by Mouse Bioassay and HAB phytoplankton. For HAB monitoring development several nuclear technologies including the receptor binding assay (RBA) method are recommended to be transferred to the Asian and Pacific, but there are technical limitation, especially continuous provision of toxin standard.

Key words: Review, HAB, Science, Development, Indonesia

2-8

Data on paralytic shellfish poisoning (PSP) toxin in shellfish at some aquaculture areas in Northern and North-central coastal zone in Vietnam

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In the framework of national project coded KC-09-19, the study on PSP toxin in shellfish at some aquaculture areas in Northern and North-Central coastal zone of Viet Nam had been carried out during 2004-2005. Shellfish samples collected in the same study areas were also processed in IMER and then sent to a laboratory of Kitasato University (Japan) for PSP toxin analysis under the JSPS/ORI-HAB project (2001-2010). The results showed that PSP toxin level in viscera tissue of clam *Meretrix meretrix* and green mussel *Mytilus edulis* collected at Do Son (Hai Phong Province), Cat Ba (Hai Phong Province), Tien Hai (Thai Binh Province) and Lang Co (Thua Thien Hue Province) did not show large variation during period from May 2004 to April 2005. The monthly average level of PSP toxin in *M. meretrix* collected at Do Son was the lowest, ranging from 0.03 to 1.97 $ng.gr^{-1}$ tissue, while the toxin in *M. edulis* collected at Lang Co was the highest (max. 21.27 $ng.gr^{-1}$). The level of PSP toxin, however, detected in thses species in studied areas was lower than the regulation limit for PSP toxin. No clear correlation between the level of PSP toxin and the cell density of *Alexandrium* was observed in the studied area.

Key words: Paralytic shellfish poisoning, PSP toxin, Alexandrium*, Haiphong, Vietnam*

2-9

Taxonomy of the armored dinoflagellate genus *Heterocapsa* based on body scale ultrastructure

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The genus *Heterocapsa* is composed of relatively small armored dinoflagellates including a harmful red tide species responsible for shellfish mass mortalities, *Heterocapsa circularisquama*. Since the cells of *Heterocapsa* have an identical thecal plate arrangement and are superficially similar to one another under a light microscope, reliable morphological character for species identification and their taxonomy have been required to distinguish the harmful species from all others. We examined ultrastructure of *Heterocapsa* body scale, a characteristic cell covering found from all *Heterocapsa* species, by transmission electron microscopy. The body scale is tiny organic cell covering situated on the cell surface, composed of a reticulated basal plate ca. 200-500 nm in diameter and a three-dimensional ornamentation on the plate. Body scale structure is stable in each species and different from other species. For example, the outline of basal plate is circular in *H. circularisquama*, *H. horiguchii* and *H. pygmaea*, hexagonal in *H. lanceolata*, and more or less triangular in all other species. A hole on the basal plate was found only in *H. lanceolata*, *H. psammophila* and *H. rotundata*. About half of *Heterocapsa* have 6 marginal uprights on the basal plate, while others have 9 uprights. By using combination of these scale ultrastructure and cell shapes, 16 species have consequently been distinguished. Of these 7 species, *H. horiguchii*, *H. huensis*, *H. lanceolata*, *H. orientalis*, *H. ovata*, *H. psammophila*, and *H. pseudotriquetra*, were revealed to have their own scale structure or cell shape different from those of previously reported *Heterocapsa* species, and therefore described as new species. One species, *H. huensis*, was found from Hue, Vietnam during distribution survey of a harmful species *H. circularisquama*.

Key words: Body scale, dinoflagellate, Heterocapsa, *red tide, ultrastructure*

2-10

Benthic diatom *Nitzschia navis-varingica* that produces amnesic shellfish poisoning toxins; distribution in Asian waters and its toxin composition

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During the screening of diatoms that produce domoic acid (DA) in SEA countries, a benthic diatom *Nitzschia navis-varingica* was isolated as a new species from a shrimp culture pond in Do Son, Vietnam. Screening of this diatom was later expanded to the Philippines, Japan as well as in Vietnam. This species was found to distribute widely in brackish water areas in these countries and to produce significant level of DA. All of the diatoms producing DA were *N. navis-varingica*. During the screening, some strains of *N. navis-varingica* isolated from Bulacan Estuary, Manila Bay did not produce DA but did produce only isodomoic acids A (IA) and B (IB) as major toxin components. Toxin production of this species was reinvestigated for DA, IA and IB on the strains already isolated from above mentioned countries. Screening of toxin-producing *N. navis-varingica* was also explored for DA, IA and IB in newly selected brackish water areas of Luzon Island, the Philippines, Thailand, Malaysia and Indonesia. As a result, 5 types of the toxin composition namely DA, DA-IB, IA-IB, IB and DA-IA-IB were confirmed in the isolates. DA or DA-trace IB toxin composition types were seen in the isolates from northern Japan, Bangkok in Thailand and South Sulawesi in Indonesia. DA-IB type which appears to be the major toxin composition type was observed in the isolates from Okinawa, southernmost area in Japan, southern areas of the Philippines (southern Luzon and Tacloban) and northern Vietnam (Do Son, Ha Long). IA-IB, only IB and DA-IA-IB types were seen in the isolates from limited areas of Luzon Island, the Philippines. Toxin composition of the sub-strains were the same as that of the parental strain showing that toxin composition is stable in a strain, although ratio of IB varies in DA-IB or DA-trace IB type strain.

Keywords: Southeast Asia, Nitzschia navis-varingica*, amnesic shellfish poisoning, domoic acid, isodomoic acid*

2-11

Genetic diversity of *Pseudo-nitzschia pungens* (Bacillariophyceae) from Borneo, Malaysia

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Pseudo-nitzschia pungens is a chain forming marine pennate diatom with wide distribution from tropical to temperate waters. While some strains of *P. pungens* produced low level neurotoxin, domoic acid (DA) that responsible for ASP, no detectable amount of toxin was observed in Malaysian strains. *P. pungens* is commonly found in the phytoplankton assemblages of the Malacca Strait and South China Sea. In this study, clonal cultures of *P. pungens* were established from several locations in Sabah and Sarawak. Mid exponential phase cultures were harvested for genomic DNA extraction and rRNA genes amplification. Nucleotide sequences of ITS1-5.8S-ITS2 rDNA region obtained were used in the secondary structures modeling based on homologous modeling and free energy minimization. Secondary structure of *P. pungens* revealed four helices (I-IV) and one pseudo-helix (IIa) in the ITS2 transcript with pyrimidine-pyrimidine (U-U) mismatch and motifs of AAA between Helix II-III and UGGU in the Helix III. Unambiguous orthologous structural sequence alignment was subsequently used in genetic population analyses. Two distinctive subclades were inferred from the Profile Neighboring Joining (PNJ) tree in the South China Sea populations. One CBC was observed between the two subclades. A total of ten haplotypes were found in the South China Sea populations and seven were from the Borneon populations. High F_{ST} value (>0.72) revealed no gene flow among the populations of *P. pungens* in the South China Sea.

Key words: Pseudo-nitzschia pungens*, ITS rDNA, population genetic, haplotype*

2-12

Harmful algal blooms in Malaysian waters: Events, organisms and activities

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Harmful algal blooms (HABs) events have been increasingly reported in the country, not only the frequency and severity, but also species with no prior record. In this paper, a decadal review of HABs events, organisms and training activities in the country is summarized. Several bloom events caused by dinoflagellate species including the shellfish poisoning events are highlighted. Paralytic shellfish Poisoning (PSP) is no longer restricted to Sabah coasts and *Pyrodnium bahamense*, with the occurrence of other toxic dinoflagellates, *Alexandrium* spp. and *Gymnodinum catenatum*. Bloom of *A. minutum* was reported for the first time in Peninsula Malaysia; with six persons hospitalized including one casualty after consuming the contaminated benthic clams. This euryhaline species with shade adaptation to light enable the species to proliferate in turbid brackish estuarine environments. Several algal blooms and fishkills events have been reported and associated with severe losses in finfishes aquacultures industries. The culprits of these bloom events have been identified as *Cochlodinium polykrikoides, Ceratium furca, Prorocentrum minimum, Noctiluca scintillans*, and raphidophyte, *Chatonella ovata*. Some of these HABs species have been characterized morphologically and genetically, including their toxicity that were documented in more than fifty scientific publications. To address various emerging regional HABs issue and strengthen research collaboration, scientific exchanges activities between Malaysia and other JSPS member countries have been carried out. Five capacity building training workshops have been successfully conducted in Malaysia, with participation from research and government agencies in the region. Two training modules and micrograph collection of HABs organisms have been developed for these training workshops. With the increase of coastal utilization and eutrophication, this regional research network and collaboration should be further strengthening in dealing with expansion of HABs in the region.

Key words: Harmful algal Blooms, Malaysia, paralytic shellfish poisoning, Alexandrium minutum

2-13

Unarmored harmful dinoflagellate *Cochlodinium* in Southeast Asia

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In Asian waters, five species belonging to the genus *Cochlodinium* have been observed up to date. These are all photosynthetic with morphologically variable chloroplasts, and have more or less made blooms; *Cochlodinium catenatum* Okamura, *Cochlodinium convolutum* Kofoid and Swezy, *Cocnlodinium fulvescens* Iwataki, Kamami and Matsuoka, *Cochlodinium* cf. *geminatum* (Schütt), and *Cochlodinium polykrikoides* Margalef. *C. polykrikoides* has been well known to form large-scale blooms. In Southeast Asia, *C. polykrikoides* was first detected in 2002 in the Philippines and in coastal waters of Hong Kong, Palawan of the Philippines and Sabah, Malaysia. Recent progress on a molecular phylogenetic study on dinoflagellates, *C. polykrikoides* is differentiated into at least four ribotypes (American-Malaysian type, Philippines type, and East Asian type including the so-called *Cochlodiniu*m sp. Kasasa). *C. fulvescens,* morphologically similar to *C. polykrikoides*, was recorded from Harun Bay of Sumatra, Indonesia. *Cochlodinium* cf. *geminatum* was initially found in coast of Hong Kong accompanied with damages to the aquaculture. This species can produce a resting cyst preservative in sediments. *C. convolutum* characterized by having a roundly rectangular nucleus located in the center appeared frequently in west Japan, but rather harmless. In Southeast Asia, only few cases of fish-kill events caused by *C. polykrikoides* have been reported from Luzon of the Philippines and Saba of Malaysia in Southeast Asia. Other photosynthetic species of *Cochlodinium*, *C. fulvescens* and *C.* cf. *geminatum* are harmful, but no incidents given by these species were reported so far. *C. polykrikoides* can be transported in less nutrient of off-shore area for so long distances, over 500km in the case of Sabah to Palawan.

Keywords; Cochlodinium*, fish kill, harmful dinoflagellate, Southeast Asia*

2-14

Philippines Harmful Algal Blooms Situation and Mitigation: A Review

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The Philippines has experienced major health and economic problems caused by harmful algal blooms (HABs) for almost three decades now. The toxic dinoflagellate species *Pyrodinium bahamense* var. *compressum* has been responsible for the major HAB outbreaks associated with paralytic shellfish poisoning (PSP) since 1983. There are more than 40 outbreaks of *P. bahamense* blooms in 27 coastal areas which have been reported to date. Consequently, there have been 2,465 PSP cases with 146 deaths from 1983 to date. Evidence of the increasing frequency, intensity and sporadic geographic expansion of *P. bahamense* blooms and PSP events countrywide has been observed since the late eighties and early nineties. These phenomena have widely affected the Philippine coastline causing extensive direct losses to the mussel farms industry and the indirect losses to fisheries industry as well due to lack of consumer confidence in seafood products. In early 2000's, occurrence of *P. bahamense* blooms has dramatically declined while few new HAB species have emerged in few scattered coastal areas. Some new bloom events caused massive fish kills probably reflect indigenous and/or introduced population that have been discovered because of better detection methods and skilled plankton analysts.

This paper reviews the state of knowledge of scientific studies done in the Philippines related to HAB episodes caused by various microalgae species, improved monitoring and management strategies that possibly lessen their negative impacts to human health and economy. It also presents the collaborative research projects on HABs where the Philippines is engaged in, particularly in the JSPS-AORI multi-lateral cooperative HAB research program in Southeast Asian region, TTR IOC/WESTPAC HAB Project and highlights on the DOST-funded PhilHABs research program implemented by the UP-MSI.

Keywords: Pyrodinium bahamense var. compressum, harmful algal bloom episodes, paralytic shellfish poisoning, dinoflagellates, Philippines

2-15

Confirmation on the existence and morphology of *Metadinophysis* – a poorly known genus of Dinophysiales

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After its first description in 1940s, there has been no further confirmation on appearance and morphology of genus *Metadinophysis*. In this study, by examining materials taken from various places in Thailand (Chonburi) and Vietnam (Ben Tre) and comparing them with the original description, we confirm the existence, morphology and ecology of the genus. Various characteristics that are specific for genus *Metadinophysis*, such as their long collar (cingulum), the deflected head (epitheca), the system of thick lists, the heteromorphic hypothecal plates and the heavy furnishment of thecal surface, were confirmed. Specimens from Vietnam and Thailand waters formed two morphotypes, which are morphologically distinct from each other. A re-examination on materials described by previous publications, yet, resulted in a third morphotype of *Metadinophysis*. These materials were referred as *Dinophysis* cf. *acuminata* (material from Kenyan waters) or *Dinophysis* sp. (material from Tonkin Gulf) by previous authors, but their morphology indicates that they are undoubtedly a third morphotype of *Metadinophysis*. In other words, there may be up to three species involving in the genus. *Metadinophysis* appears to be an inshore genus, since all findings of this genus so far is restricted to the coastal waters. Live material shows patches of chloroplast, indicating that this is a chloroplast-holding genus. *Metadinophysis* appeared to be a rare genus in most cases, but in one case, they formed very high density (28,000 cells/l) after a red tide caused by diatoms in Chonburi waters of Thailand. This is the highest density ever recorded for a dinophysoid other than *Dinophysis*.

Key words: Metadinophysis*, morphology, Vietnam, Thailand*

2-16

Harmful microalgae in Southeast Asia

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In the last decade many harmful microalgae, both red tide causative species and toxin producing species, have been found in Southeast Asia through various international researches funded by JSPS Multilateral Cooperative Research Program on Coastal Marine Science. Case number of incidents caused by these species has been not high so far, but it is worried that various types of harmfulness may occur along with the development of coastal area utilization.

Red tide causative species recognized are; *Chattonella marina, Noctiluca scintillans, Prorocentrum minimum, P. sigmoides, Cochlodinium polykrikoides, Akashiwo sanguinea, Karenia mikimotoi, Polykrikos schwartzii, Ceratium furca, C. fusus,* and *Heterocapsa circularisquama.* Some of their red tides associated with fish mass mortality.

Paralytic shellfish poisoning (PSP) and its causative toxin contamination in shellfish are most serious problems in Southeast Asia. *Pyrodinium bahamense*, *Alexandrum mimutm, A. tamarense, A. tamiyavanichii,* and *Gymnodinium catenatum* are found as the causative dinoflagellates. Other toxin producers responsible to Diarrheic Shellfish Poisoning (*Dinophysis mitra, D. miles*), Amnesic Shellfish Poisoning (*Pseudo-nitzschia multiseries, P. caciantha, P.* spp. *Nitzschia navis-varingica*), Ciguatera Fish Poisoning (*Gambierdiscus toxicus*) are found widely in the region.

This report aims to describe morphology and distribution of these species, together with some biological and ecological characters.

Keywords: HAB, harmful microalgae, red tide, toxic species, morphology

2-17

Noctiluca scintillans: red tide species associated with eutrophication in Southeast Asian waters

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"Red tide" of *Noctiluca scintillans,* which harbors the endosymbiotic green alga *Pedinomonas noctilucae*, is a common phenomenon that causes greenish discoloration in Southeast Asian eutrophic waters such as Jakarta Bay, Manila Bay and the upper Gulf of Thailand. While *N. scintillans* is considered to be a harmless species, dense blooms of green *Noctiluca* occasionally cause mass mortality of fish and reduction of yields in shrimp cultures. The presence of the photosynthetic symbiont in green *Noctiluca* implies different dependence on environmental conditions compared with that of red *Noctiluca* which lacks the symbiont, and the symbiont appears to ensure survival of green *Noctiluca* during shortage of food particles. Both field and laboratory studies on physiological ecology of green *Noctiluca* during the JSPS multilateral programme confirm the importance of the endosymbiont in green *Noctiluca* as a food supplier to the host. However, phagotrophy is more vital in population growth of green *Noctiluca*. A seasonal study in the upper Gulf of Thailand showed that eutrophication enhances standing stock of phytoplankton, and accordingly increases food availability for green *Noctiluca.* This agrees well with a laboratory study that showed that phagotrophy on *Pyrodinium bahamense* var. *compressum* contributed significantly to the growth of green *Noctiluca.* Eutrophication does not seem to affect directly the growth of *Noctiluca*. However, our knowledge on field phenomena is much limited, and could be considered still in its infancy stage. Challenges include knowing the possible role/s of *Noctiluca* in eutrophic systems in temperate and tropical areas and its impact/s on the food chain in these ecosystems. The establishment of a new framework for international cooperative studies on eutrophication and expansion of green *Noctiluca* blooming is requisite not only to advance our scientific knowledge, but also to obtain data and information for better governance of coastal waters.

Key words: Noctiluca scintillans*, red tide, eutrophication, Southeast Asian waters*

2-18

HAB Occurrences and research activities during the last decade in Thai waters

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Red tide in the Gulf of Thailand was first reported by Charernphol in 1958, since then the study on red tide has focused on the occurrences and their impacts on fisheries. Green *Noctiluca scintillans* and *Ceratium furca* were main causative red tide organisms in the inner Gulf and recently red tides of those species were also found in Andaman Sea. The only one case of PSP occurred in 1983 at Pranburi river mouth, Prachuabkirikan Province. Since then, the studies were carried out more intensively, especially in the collaborative study between Thai and Japanese scientists under NRCT-JSPS Program. The results revealed that red tide in the inner Gulf, in particular those by *Noctiluca,* seemed to be a seasonal phenomenon in association with monsoon system. During the last decade, red tides in the Gulf of Thailand due to *N. scintillans*, *C. furca,* diatoms (including one case of *Pseudo-nitzschia* sp.), *Dinophysis* sp. and *Metadinophysis sinensis* were observed 24, 14, 6, 1 and 1 cases, respectively. In Andaman Sea at Phuket, Phangnga and Krabi Provinces, in 2007, red tides caused by *C. furca*, *Chaetoceros* sp., *Trichodesmium erythraeum* and *N. scintillans* were reported 4, 2, 1 and 1 cases, respectively. Fishes kill due to *Noctiluca* and *Ceratium* red tides were also reported occasionally. The HAB research development in Thai waters is going on very well via the collaborative research under ORI-HAB program, such as the study of *Noctiluca* red tides, JSPS seminars and WESTPAC workshops. The output from ORI-HAB project is not only several scientific papers published in international journals, but also our nice friendship among member countries. However, our knowledge on both field phenomema and laboratory study is still limited. The establishment of international cooperative studies is needed to advance our knowledge for enhancement our ability to conserve the coastal resources.

Key words: HAB, occurrences, research activities, Thai waters

2-19

The study of algal blooms phenomenon in connection with the development of early warning system in Jakarta Bay

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Algal bloom is now an important problem in Jakarta Bay, as it caused an impact on environmental and economic side. Due to the increasing trend in frequency, scale and impact, red tide has become one of the most serious problems that need to be resolved urgently in marine environmental resources, and raised attention from government, scientists and public. Monitoring of algal blooms has been conducted intensively in Jakarta Bay. The results from monitoring during those periods revealed that algal blooms in Jakarta Bay seemed to be a seasonal phenomenon. During periods of December to February (rainy season) were observed outbreaks of *Noctiluca* and *Chaetoceros*, from March to May (transitional from rainy to dry season) outbreaks of *Chaetoceros* and *Skeletonema*, from June to August (dry season) the outbreak of *Chaetoceros* and *Noctiluca*, and from September to November (transitional from dry to rainy season) the outbreak of *Noctiluca*, *Skeletonema* and *Chaetoceros*. Blooms of other red tide organisms such as *Leptocylindrus*, *Thalassiosira,* and *Nitzschia* were also sometimes observed. Remote sensing is now being developed for the use of early warning system in Jakarta Bay for more efficient algal blooms monitoring and prediction system in near future. Monitoring using satellites imagery has been conducted to predict algal blooms phenomena. The concentration of chlorophyll-*a* was estimated using satellites data and then applied as an indicator of eutrophication. Algal blooms were monitored by using chlorophyll-a concentration maps which derived from empirical model developed using the satellite imageries. These empirical models of chlorophyll-*a* were developed for each seasons separately for the need of early warning system.

Key words: Algal bloom, eutrophication, satellite imagery, early warning system

3F-1

Revision of the genus Aulacocephalus (Actinopterygii, Perciformes, Serranidae)

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The serranid fish genus *Aulacocephalus* Temmicnk and Schlegel, 1843 has long been considered that it includes a single species, *Aulacocephalus temminckii* Bleeker, 1854. Recently, the second author collected three specimens of the genus in Indonesia. The detailed examination of the specimens reached a conclusion that the genus contains two valid species, *A. temminckii* and *Aulacocephalus schlegelii* Günther, 1859.

Temminck and Schlegel (1843) established the genus *Aulacocephalus* based on the drawing of Siebold's Fauna Japonica, but they did not describe the species. Subsequently, Bleeker (1854) named the species as *A. temminckii*. The other two available names belonging to the genus exist: *A. schlegelii* was described based on the two syntypes collected from Mauritius and Temminck and Schlegel's drawing, and *Centropristis saponaceus* Valenciennes, 1862, was established on the basis of two syntypes collected from Réunion and Mauritius. Of these three available names, we concluded the first two names are valid and the last name is a junior synonym of *A. schlegelii*.

Diagnostic characters of both valid species are as follows. *Aulacocephalus temminckii*: a narrow yellow longitudinal band running from snout tip though eye and dorsal-fin base to upper caudal-fin base; lateral line passing partly along or beneath the lower margin of the yellow band; caudal-fin base without yellow vertical band; caudal-peduncle deep (13–16 % standard length) and first dorsal-fin spine long (6.0–8.4 % standard length). *Aulacocephalus schlegelii*: a wide yellow longitudinal band dorsally on body; lateral line passing partly in the longitudinal yellow band; caudal-fin base with a yellow vertical band; caudal-peduncle slender (11–13 % standard length) and first dorsal-fin spine short (4.2–5.6 % standard length).

3F-2

Fish Larval Composition and Spatio-Temporal Variation in the Estuary of Pendas River, Southwestern Johor, Peninsular Malaysia

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The temporal and spatial patterns of family composition and abundance of fish larvae in the Pendas River mangrove estuary (Southwestern Johor) of Peninsular Malaysia was studied monthly using bongo net towed during the daylight. Environmental parameters (water temperature, salinity, dissolved oxygen, pH and conductivity) were also taken *in situ* during sampling. In total, 2687 individuals representing 17 families were collected during the twelve months sampling period (October 2007 to September 2008). The fish larval community was dominated numerically by a few typical brackishwater families. Clupeidae was the most abundant constituted up 41.0% of the total larval catch. This was followed by the Blennidae (24.33%), Terapontidae (8.66%) and Gobiidae (5.44%). These four families constituted 79.43% of the total larval catch; the remaining 20.55% consisted of another diverse 13 families. The family composition of fish larvae varied with season and location within the estuary. Several families showed a distinctive high abundance during the southwestern monsoon. The diversity of the ichthyoplankton assemblage in the Pendas River mangrove estuary of 17 families is comparatively lower the figures reported from other estuaries in the southeast asian region.

Key word: Fish larvae, Composition, Spatio-temporal, Estuary

3F-3

Phylogeny and morphological delineation of leiognathids in the waters of Peninsular Malaysia

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Taxonomic identification of leiognathids, which although are morphologically conservative fishes, is still problematic. In this study, a molecular phylogenetics approach was used together with morpho-meristic characterization to determine the taxonomy of leiognathid fishes collected Pulau Tinggi, Pulau Perhentian, Tanjung Sepat and Kuala Kedah, Malaysia. Phylogenetic relationships of 48 specimens from 18 morphospecies of leiognathids in this study together with 45 sequences from GenBank were inferred from 16S mitochondrial rRNA gene sequences. Neighbor-joining analysis showed that molecular phylogenetic positions of leiognathids were in congruence with morphological delineation at either genera or species levels. The only exception at genera levels was the resurrection of *Aurigequula* Fowler, 1918 from synonmy with *Leiognathus* Lacepède, 1802. Members of both genera were recovered together as a monophyletic group in this study. At species levels, the exceptional were *Eubleekeria jonesi* and *Photopectoralis bindus*. *Eubleekeria jonesi* and *Photopectoralis bindus* specimens were morphologically identical. Molecular phylogenetics analysis placed *Eubleekeria splendens* in the same group with *E. jonesi* while *Photopectoralis panayensis* grouped together with *P. bindus.* A revision of the number of genera in the family Leiognathidae is proposed from current 9 to 8, namely *Gazza*, *Leiognathus*, *Secutor*, *Photopectoralis*, *Nuchequula*, *Eubleekeria*, *Equulites* and *Karalla.* All genera of leiognathids in present study are monophyletic. Combination of these two approaches can resolve the taxonomic uncertainties of leiognathids.

Keywords: Leiognathidae, molecular phylogenetic relationship, morpho-meristic taxonomy

3F-4

Review of ichthyology in Vietnam: past, present and future perspectives

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Ichthyology in Vietnam started in the early 20th century with the publication of Pellegrin (1905) about marine fishes in Ha Long Bay. Since then, other French scientists work at the Indo- China Institute of Oceanography (Nha Trang Institute of Oceanography) such as Chabanaud (1924), Chevey (1932) focusing on the biological characteristics of the commercial fishes. After the French-Vietnam war finished, the country was separated into two parts, North and South, ruled by two different governments. In the northern part, all the research activities were implemented by the National Scientific Council with the key research institutes like the Marine Research Center (Institute of Marine Environment and Resources) and the Research Institute for Marine Fisheries. The major collaborative expeditions included Vietnam- China joint survey in the Tonkin Gulf (1959–1965), Vietnam-Russia (1960–1961). In the southern part, most of research activities were carried out by American and Vietnamese scientists from Indo-China Institute of Oceanography by using the US research vessels from the Scripts Institute of Oceanography (1959–1961) and Strangers (1968–1971). Some crucial results came from the research expeditions such as Orsi JJ (1974) reporting a checklist of Vietnam marine and freshwater fishes with the total number of 1458 species in 173 families.

After the reunion period (since 1975), ichthyology developed in broader scale to solve the needed demands from social economic development and conservation issues. The international collaborations also enlarged, especially after the 1990s (renovation economy period), with many foreign partners including Russia, Japan, Germany, EU and other South East Asian countries. These collaboration projects have been helping Vietnam solve the research problems, provide training for young scientists and stimulate young ichthyologists to join the international scientific community resulting the new phase of ichthyology in Vietnam.

Key words: Ichthyology, marine fishes, international collaboration

3F-5

A review of accumulating information on ichthyofauna of southwestern Thailand, the Andaman Sea

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Information on marine and estuarine fishes of the Andaman Sea coast of Thailand was gleaned from published literature, recent unpublished survey results of the projects that the author took part as well as the fish collection database of the Phuket Marine Biological Center (PMBC) and compiled into the present provisional checklist. A total of 1,710 species belonging to 199 families, 39 orders, and 3 classes are listed here. The 10 most speciose families are the Gobiidae (229 species), Labridae (78), Pomacentridae (72), Serranidae (61), Apogonidae (60), Blenniidae (52), Carangidae (52), Scorpaenidae (45), Lutjanidae (38), Chaetodontidae (37) and Acanthuridae (32), and these together account for 44% of the total fish fauna. The majority (about 53%) of species are widely distributed either in the Indo-Pacific or Indo-West Pacific. Other considerable portions of the fauna include species having more restricted distribution ranges within the West Pacific or its subregions (16.3%), those having Indian Ocean ranges (10.5%), and those ranging across western Pacific and east-central Indian Ocean (15.5%). There are 32 species currently known only from the Andaman Sea, thus indicating endemism of about 2%. The number of species found in each of the 4 simply categorized inshore biotopes [viz., mangroves (MG), seagrass beds (SG), coral reefs (CR), and other offshore habitats (OSHR), including both pelagic and benthic realms] varies considerably, i.e., MG = 286 species; SG = 246; CR = 982; and OSHR = 929. Considering the species of fishes currently catalogued in the PMBC Reference Collection they represent only about 64% of the totally known fish fauna in the area, indicating that the fish collection is still not well represented of the Andaman Sea fish fauna. Therefore, efforts must be strengthened in order to make the reference materials more complete and become available for further taxonomic review of the Andaman Sea fishes.

Keywords: Thailand, Andaman Sea, fishes, checklist, diversity.

3F-6

An undescribed species of anthiine fish genus Odontanthias (Perciformes: Serranidae: Anthiinae) from Indonesia

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Eleven specimens of *Odontanthias* (Anthiinae, Serranidae) were collected by hook and line around Lembeh Island, North Sulawesi, Indonesia. The examination on these specimens revealed that this species has never been reported in previous publications. This undescribed species of *Odontanthias* is closely related to *O. wassi*, in sharing some morphological characters; and also very close to *O. chrysostictus* except for the coloration. However, the former is clearly distinguishable from the latter two species by having scales on maxilla and infraorbitals. Other different characters are proportion of snout length, upper jaw length, suborbital width and body depth. Its morphological features, distribution, and color photos are presented.

Keywords: Anthinae, Serranidae, Indonesia, Sulawesi, Taxonomy, Odontanthias.

3B-1

Coral bleaching and the effects of elevated sea surface temperature on the intertidal reefs of Langkawi in the Straits of Malacca

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Elevated sea surface temperatures occurred throughout the northern Indian Ocean, the Andaman sea, the Straits of Malacca and the South China Sea in April to June of 2010. This has resulted in the whitening of coral skeletons as they rid themselves of the symbiotic zooxanthellae within the coral cells known as coral bleaching.

The coral reefs of Langkawi are typified by the fringing reefs of up to 150m wide most of which are in the intertidal zone. Most of the species of corals found here are sediment tolerant species belonging to the Faviidae and the Poritidae families.

Severe coral bleaching was recorded on the intertidal reefs of Langkawi as a result of elevated sea temperatures that started in late March 2010 in the northern part of the Straits of Malacca and the Andaman Sea. Critical levels of ambient seawater temperature of 31 C was reached by early April and remained high for the next twelve weeks.

Photo quadrats taken along a 25 m transect were used to assess the coral bleaching damage on the coral cover of these intertidal areas on the reef flats. More than 73% of the live corals bleached by the mid- April. By this time most of the reef indicated signs of severe bleaching. Associated zooxanthellae animals such as the Tridacnid clams and sea anemones were also affected.

An assessment in late July 2010 indicated some levels of recovery as coral colonies regain their colour on these intertidal reefs but much of the reef still remained affected. After two months following the bleaching event 36% were recovering and were regaining their zooxanthellae, 54% were still bleached and the remaining 10% had died and were covered by algae. Elevated sea surface temperature levels recorded in April 2008 and in April and May 2009 did not result in any bleaching events on the reefs here.

Keywords: coral reef, recovery rate, bleaching

3B-2

A brief review on marine shelled mollusca (gastropoda and bivalvia) record in Malaysia

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Although marine science research has been showing some indication of intensification in the last decade, marine molluscs diversity studies are still overseen by most scientists. The diversity status of Malaysian marine mollusks is being threatened by various factors such as pollution, habitat lost and ornamental collection. The lacks of basic information such as diversity data and species check list make it impossible to assess the rate of population lost among marine molluscs. To date, nobody could claim that they possess the actual number of marine shelled mollusca species existing or existed in Malaysian waters. The single largest record and collection came from Purchon collected between the year 1973 and 1974. His collection of marine molluscs was made along the coastal belt of West Malaysia and Purchon found 301 species belonging to 52 families of marine gastropods and 154 species of 37 families of marine bivalves over a 14 months period of investigation. However, limited progress has been made since then. To date, only 581 species is documented (384 species from class Gastropoda and 197 species from class Bivalvia) from available sources. Some data are not published and some remained as internal circulation. The current research on marine mollusc diversity focuses only in small area of investigation and very limited habitat. There is no record on the sublittoral species though molluscs are in fact common waste product from trawlers. Institutionally, there is no designated depository centre such as the natural history museum where researchers could deposit their collections and hold a record of the diversity record of marine shelled mollusc in Malaysia. These shortcomings and the lack of trained taxonomist have contributed to the slow development of marine molluscs studies in the country.

Key word: Gastropoda, Bivalvia, Mollusca, Diversity

3B-3

Taxonomic study on *Saccostrea cucullata*, marine oyster, in Thai Waters

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Saccostrea cucullata, marine oyster, is widely distributed throughout the tropical Indo-Pacific and has many synonyms. This species names as a commercial cultured, brackish water species, *Saccostrea forskali* in Thailand documents for a long time. The type locality recorded from Ascension Island, Atlantic Ocean was questioned as an error of locality recorded by many authors. I found as error of species name referred to fig. 34b and fig. 34c in Sowerby (1871). This individual called *Saccostrea cucullata* is *Lopha cristagalli*. I consider *Sacosstrea amasa*, *Saccostrea mordax, Saccostrea mordax* ecomorph *sueli*, *Ostrea forskali* var. *mordax* as junior synonyms of *Saccostrea cucullata*.

The name of this species is validly referred to as *Saccostrea cucullata* (Born, 1778). Although Born's original description of this species records the spelling as "*cuccullata*" the name as printed is divided between the double c's justifying the conclusion that this original incorrect spelling was indeed as inadvertent error (ICZN Art. 32 (a)(ii). Born obviously was aware of this error and emended the spelling to "*cucullata*" in the next edition of his work.

Key words: Taxonomy, Saccostrea cucullata*, marine oyster, Thai waters.*

3B-4

Deep sea study on meiobenthic fauna at west Papua waters

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Expedition of Widya Nusantara (Ewin) by R.V. Baruna Jaya VIII has carried out deep sea sampling in Raja Ampat waters, West Papua, Indonesia. During periods of the expedition, November 25 till December 6, 2007, 20 stations of seafloor were sampled using a box corer into the deep of waters ranged from 56 to 4592m. Meiofaunal abundance along these sampling sites were varied from 11 to 752 ind./10^{cm2}. These meiofaunal densities were nearly similar to the former study done in Sulu Sea and adjascent seas, where depth ranged 534 to 5209m and abundance of meiofauna ranged 31-408/10^{cm2}. Analyses among meiofaunal taxa and its total density superimposed on the depth of sampling sites and types of substrates did not reveal any correlation. From taxonomic point of view, some individuals of meiofaunal taxa were considered possibly as new for science and need to be described further.

Key words: Meiofauna, abundance, deep sea, West Papua, Sulu Sea

3B-5

The long term changes in the population, distribution and abundance of the intertidal giant clam *Tridacna crocea* (family Tridacnidae) on the fringing coral reef of Pulau Besar in the South China Sea

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A study on the long term changes in population, distribution and abundance of giant clam *Tridacna crocea* population inhabiting the coral reefs of Pulau Besar (Malaysia) in the South China Sea was conducted from 1998 until 2008. The distribution and abundance of the giant clams were investigated at 10 sites on Pulau Besar, using the line transect method by SCUBA diving or by walking on the reefs during low tide. The shell length of the clams and the depth where the clams were found were recorded during each survey. The environmental parameters such as temperature, salinity and total suspended solids were measured during the study. Over the 10 years study, the number of *T. crocea* had decreased tremendously from 36 individuals per $100m^2$ in 1998 to 7 individuals per $100m^2$ in 2008. The population of the giant clam was naturally patchy in distribution throughout the study duration (10 years). The dominant size class of the *T. crocea* population in Pulau Besar had reduced from 5.0-6.9cm shell length in 1998 to 3.0-4.9cm shell length in 2008. The distribution of majority of the giant clams was at depth 0.5m ACD (60% of the clams) and had distributed at the depth range of 0.5m to 3.5m ACD in 1998. However, the distribution of the clams had extended to deeper depths in 2008, ranging from 0.5m to 8.0m ACD. The long term changes observed in the intertidal giant clam population in Pulau Besar from year 1998 to 2008 will be discussed in relation to the changes in temperature and total suspended solids of the fringing coral reef.

Keywords: Size classes, depth distribution, environmental factors

3B-6

A great contribution of nagisa/jsps program to train source of young scientists in the field of benthos research in Vietnam

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During the JSPS multinational program “Coastal Marine Science”, thirteen workshops on protocol, taxonomy and sampling methods for benthos biodiversity were organised in the region and in Japan in collaboration with NaGISA (Natural Geography In Shore Area) program. We were invited thrice in Shirahama (Japan) and in Indonesia, twice in Malaysia, in Thailand and in Vietnam and onece in Philippine. A total of 41 Vietnameses (8 women, 33 man) from 7 Institutions attended as participants with 63 times of person trained, some of them attended thrice or twice.

At the workshops, Vietnamese participants have got not only useful awareness on taxonomy, sampling methods etc., but also some handbooks from the program, such as, “Sampling Biodiversity in Coastal Communities”, “Hermit crabs of Indonesia”, “Field Guide to the Echinoderms (Sea Cucumbers and Sea Stars) of Malaysia”.

Through workshops, many participants grew up in their study. They believe themselves more in their study jobs, some of them are good at identifying benthos, some of them have completed or soon will complete their Master or Doctoral courses. Field Guide to Benthos in Vietnam has been completed by them. Our success has a great contribution of JSPS/NaGISA Program, and the programs succeeded in capacity building of taxonomy in Vietnam.

Key words: Benthos, Taxonomy, Capacity building, Vietnam, NaGISA

3P-1

Copepod bioversity in seagrass and mangrove ecosystems in the Straits of Malacca

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A study was undertaken to compare the copepod biodiversity of two coastal ecosystems in the Straits of Malacca, a sea grass bed and a mangrove area. The mangrove area had higher nutrient and chlorophyll *a* contents than the sea grass bed due to aquaculture and other anthropogenic activities in the former. A total of 55 species from 23 genera of copepods have been identified from the two coastal ecosystems. Forty eight copepod species from 20 genera and 16 families were recorded from the seagrass area, whereas 35 species from 14 genera and 12 families from coastal waters off a mangrove forest reserve. Copepod comprised of 78.8% and 70.3 % of the total zooplankton populations in the seagrass and mangrove ecosystems, respectively. Among the copepod groups, calanoids were the most abundant inhabiting both the ecosystems studied, taking 54% and 47% of the total copepod populations of seagrass area and coastal waters off a mangrove forest reserved, respectively. The copepods, *Paracalanus* spp., *Oithona* spp. and *Euterpina acutifrons* were the main contributors to the high zooplankton abundance in both ecosystems throughout the year. Copepod densities were higher ($p<0.05$) in the coastal waters off a mangrove forest reserved than the seagrass ecosystems, with a mean total of $120.69 \times 104 \pm 8.5 \times 10^4$ individuals/m^3. The study revealed that the two ecosystems showed opposite copepod community characteristics. The more enriched coastal waters off a mangrove forest reserve was characterized by high-density values, low species diversity (H'=3.279) and species richness (d=3.364), whereas the seagrass area was characterized by low-density values and high species diversity (H'=3.883) and species richness (d=9.607). These results indicated that the sea-grass ecosystem had significantly higher copepod biodiversity and was probably more pristine than the mangrove area. However, the species composition and distribution in both ecosystems remained constant throughout the year, suggesting that growth and reproduction of copepod assemblages occur over the entire range of environmental conditions in the coastal waters.

Keywords: Straits of Malacca, coastal ecosystems, tropical marine copepod, copepod community, biodiversity

3P-2

Ecotoxycological risk of organotin discharge in marine ecosystem for zooplankton community

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Among organotin species, tributyltin (TBT) is the longest present in the lower trophic levels, and accumulated in zooplankton up to 150,000 times that in ambient water, in range from not detected (ND) level to 7 mg/Kg dw In general zooplankton are more resistant to tributyltins than phytoplankton, with toxicity level range from six tenth to hundreds part per billion, but freshwater cladoceran are more sensitive than marine zooplankton such as copepods and meroplankton. However, zooplankton is reported more sensitive than phytoplankton when expose to organotin acaricide azocyclotin, where they have been affected at nominal concentrations > 45 μg/L, while phytoplankton, picoplankton < 2 μm and algae of 2-10 μm, were inhibited by organotin acaricide azocyclotin at nominal concentrations > 135 μg/L. Threshold concentration (i.e. the concentration at which toxicity starts) of acute toxicity for certain copepods is below 0.3 g/L TBTO, while acute TBT toxicity effects on rotifers reveal that freshwater rotifers *Brachionus calyciflorus* is much more sensitive than marine rotifers *B. plicatilis.* Our life table analysis of local rotiers, *B. rotundiformis* in laboratory, 96 h is possible for acute test for this animal without feeding. Rotifers can accumulate 5 and 2 folds that of alga and mysids, respectively. Higher ability of rotifers to accumulate butyltins could be associated with their feeding behaviour as filter feeder. Generally, meroplankton such as veliger larvae of the mussel (*Mytilus edulis*) and lobster larvae (*Homarus americanus*) are more sensitive than the adults. Chronic toxicity levels are in range of one thousandth to one tenth part per billion, and generally the No Observed Effects Level (NOEL) for both phytoplankton and zooplankton is 1 ng/L, but for our local copepods and rotifers, even lower.

Considering the high ecotoxicological risks of organotin to zooplankton community in marine ecosystem, monitoring on zooplankton community is an important ecological basis to evaluate the impacts of organotin compounds discharge. The importance of long term monitoring program for assessment the effectiveness of global ban is obviously necessary.

Key words: organotin, toxicity effects, sensitivity, zooplankton

3P-3

Jellyfish fisheries in Bagan Datoh, Perak, Malaysia

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While the swarms of jellyfish can have negative impacts on human activities, such as damage to fishing gear and/or fishery products, the clogging of water intake systems of electric power plants, and stinging swimmers at the beach, some species have been beneficial to humans because they have been harvested as food, especially in Chinese cuisine. Southeast and East Asian region is the center of the jellyfish fisheries (JF) in terms of the amount of catch. However, the information is still limited on the target species, collection and processing methods, and the ecological impacts and economic aspects in many fishery sites. As a part of the JSPS multilateral Coastal Marine Science Program, we have investigated the JF at several sites in Vietnam, Indonesia, Malaysia, and Thailand. This paper presents the detailed information on the JF in Bagan Datoh, Malaysia. Unlike most of the fishery ground, the fisheries are carried out all year round at the Perak River estuary in Bagan Datoh. The fishermen set out their fishing net at the beginnings of both tides, low and high, usually once or twice a day. By utilizing the tidal current that transports jellyfish into the net, they catch the jellyfish without towing the net. The main harvesting species is *Acromitus hardenbergi* Stiasny, which is rarely collected in other area and their biology is little known. The processing factories are located in the pier, and the jellyfish are processed using a mixture of salt, soda, and alum. The wet weight of processed bell and oral-arms of *Acromitus* become about 20 % and 32 % of live weight, respectively. Processed jellyfish products are sold at 1.2 USD/kg for bells and 0.2-0.4 USD/kg for oral-arms. While the annual income of the fishermen kept secret, our estimates suggest that the income of fishermen's family (including 12 persons) in one day was around 1056 USD.

Keywords: Jellyfish, fisheries, Malaysia, Acromitus, Bagan Datoh

3P-4

Zooplankton community structure in the coastal waters of BinhThuan Province during harmful algal blooms

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Fifteen surveys of zooplankton abundance and species diversity were conducted at 26 stations in 2007 - 2009 in the coastal waters of Binh Thuan Province. A total of 235 species of zooplankton were identified, of which copepods showed the largest number of species of 129, comprising 55% of total number of zooplankton, followed by Tunicata (8%) and Siphonophora (6%). Copepods were dominance with an average of 11.127 inds/m^3, comprising 75 % of total zooplankton abundance followed by invertebrate larvae (10 %). Zooplankton communities were clustered into 2 distinct groups based on cluster analysis using Bray-Curtis similarity index. The first group is included the 20 major stations (KC1-KC20) of the area with no algal blooms and the second is included stations within the algal bloom area (DS1, DS3, DS4, DS5, BS1 and BS2). Zooplankton density was significantly different between the two groups. Average density of zooplankton in the second group was 98.629 inds/m^3, ca. 7.6 times higher than in the first group (12.996 inds/m^3). The highest abundance was in early September, 2007 (9E) with mean density 90.362 inds/m^3.The lowest abundance was in May, 2008 with mean density 2.947 inds/m^3. Both of the species richness d (Margalef's d) and the diversity index (Shannon-Wiener's H') were significantly higher in the first group than in the second, with the mean values of 17.8 vs 5.7 (d) and 3.6 vs 0.7 (H'), respectively. In addition, the total number of species was ca. 2.5 times higher in the first group (176 spp) than the second group (67 spp). Zooplankton communities in early September 2007, when there was a serious algal bloom, was in a low stability but back to higher stability in late September 2007. Zooplankton communities in the first group presented a hight stability compared to those stations in the algal bloom area.

3P-5

Descriptive analysis of fatty acids in selected Philippine zooplanktivorous small pelagic finfishes and their sergestid and copepod crustacean prey

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Fatty acids are useful in marine food web analysis, but information in tropical pelagic organisms is scarce. Six zooplanktivorous small pelagic fish species (*Decapterus kurroides*, *Decapterus macarellus*, *Selar crumenopthalmus*, *Sardinella longiceps*, *Encrasicholina punctifer*, *Stolephorus insularis*), three sergestid species (male and female of both *A. erythraeus* and *A. intermedius*, *Lucifer thompsoni*) and one calanoid copepod *Acartia erythraea* were collected from Mindanao Sea, southern Philippines and their fatty acids profiled using Gas Chromatography with Flame Ionization Detection system. Common to all species were eight fatty acids, three of which were saturated (myristic [C14:0], palmitic [C16:0], stearic [C18:0]) and five unsaturated (oleic [C18:1n9c], linoleic [C18:2n6c], linolenic [C18:3n3], eicosapentaenoic or EPA [C20:5n3], and docosahexaenoic or DHA [C22:6n3]). Cluster analysis and non-metric multidimensional scaling of these common fatty acids indicate very high similarity (> 80%) in concentrations in all species, but differentiation into two cluster groups of fish and zooplankton was obtained. Within each cluster, *Acetes* species, and micro-particulate feeding copepod and *L. thompsoni* formed two distinct sub-clusters, while fishes formed three comprising mackerels, anchovies, and the lone sardine species *S. longipes*. Mackerels (*D. kurroides*, *D. mackerelus*, *S. crumenopthalmus*) had concentrations of DHA that match those of their most common *Acetes* prey. The copepod, *A. erythraea* and the sergestid *L. thompsoni* showed highest values of DHA:EPA ratio probably due to their low trophic level phytoplanktivorous feeding habits. Fish and *Acetes* zooplanktivorous species showed similar DHA:EPA ratio which is about an order of magnitude smaller than those shown by *A. erythraea* and *L. thompsoni*. The baseline fatty acid profiles of these pelagic species may be useful in trophic studies in the tropical marine ecosystem.

Key words: *fatty acids, food webs, tropical, zooplankton, small pelagic fishes, Mindanao Sea*

3P-6

Distribution and sustainable use of Japanese red coral, *Paracorallium japonicum*

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Precious corals, belong to the subclass Octocorallia are harvested only in the waters around Japan and in the Mediterranean Sea, have been used for a long time but its ecology is not well known. Amid growing concerns that years of excessive harvesting will deplete precious coral resources, a proposal was made to list precious coral species on CITES Appendix II at the 15th Meeting of the Conference of the Parties to CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) in March 2010.

Small-scale distribution patterns of Japanese red coral, *Paracorallium japonicum* were investigated at tow stations at the depths of 196 – 211 m off Amami Island, southern Japan in March 2009 using a ROV. The ROV navigated 1,158 and 1,475 m covering the areas of 23,160 and 29,490 m^2 at each station. The average density was 0.47 colonies/100 m^2. Variance/average ratio and Morisita's I δ indicated that the distribution pattern of Japanese red corals was aggregated. Compared with the difference in size frequency distribution patterns between two stations, it seems that one station is located in the un-fished area and the other station is in the area where fishermen had already fished corals.

Using the size frequency distribution patterns and the growth rate, it is possible to estimate the recovery time of the stock. A method of sustainable use of Japanese red coral is discussed.

Key words: octocoral, Paracorallium, distribution, density, sustainable use, CITES

3P-7

Occurrence, growth and horizontal distribution of moon jelly *Aurelia aurita* in the Mikawa Bay, Japan.

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Occurrence, growth and horizontal distribution of moon jelly *Aurelia aurita* in Mikawa Bay were investigated from April 2007 to November 2008. In May and August 2007, dense population of adult moon jelly was occurred in the mouth area of Mikawa Bay, however, no individuals were observed in the water column after September. In 2008, Small size (young stage) of moon jelly were appeared in the western part of the Bay from March to April. Swarm of adult and semi adult stages of moon jelly shifted counterclockwise from the western part to the eastern part of the bay from Spring to Summer. Ephyra larvae were observed in the mouth area of the Bay in January and February of 2008. A large amount of ephyra larvae was observed in January to May 2008 at several stations in two islands where located in the mouth area of the Bay. In August 2008, dense colonies of moon jelly polyps were discovered on the underneath side of floating piers at the two islands. Monthly monitoring of these polyp colonies revealed that these colonies survive and produce a large amount of ephyra larvae continuously to date. These results suggest that the hot spot of life history of moon jelly in the Bay is located in the two islands in the bay mouth area of Mikawa Bay and distribution pattern of young and adult stages of moon jelly are closely related with tidal currents system in the Mikawa Bay.

Key word: Aurelia aurita, Mikawa Bay, Distribution , Life history

3P-8

Food habit analysis of commercially harvested jellyfish in the Perak river estuary, Bagan Datoh, Malaysia: a stable isotopic approach

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Jellyfish fisheries have been carried out in the Perak River estuary in Malaysia (see Nishikawa et al., this conference). A rhizostome jellyfish, *Acromitus hardenbergi* is the main harvesting species, and they are caught at 3-5 km upstream from river mouth. The fishing place is characterized by a low salinity waters and strong tidal currents compared with other fishery places. While ecological studies of this jellyfish are essential for sustainable fisheries, there is no scientific research on the distribution, biomass, and prey items of this species. Because Perak-River water is too turbid to estimate abundance by visual observation, it is very difficult to confirm whether this species is included in marine or freshwater ecosystem. The objective of this study is to clarify the food habit of the edible jellyfish. For this purpose, carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) stable isotope ratio was applied to estimate the food-web structure and the trophic level of the jellyfish. Amino acids nitrogen stable isotope analysis was also appliedto jellyfish as indicator of trophic level. The $\delta^{13}C$ value of *A. hardenbergi* was -19.5‰. Freshwater and marine POM were -25 to -30‰ and -20 to - 23‰, respectively. The $\delta^{13}C$ values for the other freshwater animals ranged from -25 to -30‰. These results suggested that *A. hardenbergi* was included in marine or brackish food web, rather than the freshwater food web. According to bulk $\delta^{15}N$ values main prey items of jellyfish are supposed to be microzooplankton with the size of 200 - 500 μm. Trophic level of *Acromitus* was also estimated as 2 (first predator) from $\delta^{15}N$ of combination of phenylalanine and glutamic acid, but other combinations of amino acids indicated that it was 2-3. We will also present the seasonal variation in the food-web structures with the comparison of other neighboring river.

Key words: stable isotopes, carbon, nitrogen, amino acids, rhizostome jellyfish, food web structure

3P-9

A one year study on the seasonal variation and biomass of zooplankton community in the coastal waters of the straits of Malacca.

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The seasonal variation and biomass of zooplankton community were analyzed from samples collected for a period of 15 months (2006/ 2007) at a fixed station, Station P at Port Dickson, Straits of Malacca. Sampling was carried out monthly using 2 different plankton nets with mesh size, 140μm and 300μm. There were 29 zooplankton taxonomic groups and 19 genera of copepods were identified. The copepods were the most dominant taxonomic group with the highest abundance. The dominant genera among the copepods were *Parvocalanus*, *Paracalanus*, *Canthocalanus* and *Oithona*. Although this study showed no significant difference between the monsoon seasons in the measurements of salinity, temperature and chlorophyll-a, the composition, abundance and biomass of zooplankton was different between each monsoon. Zooplankton biomass was estimated using lenght-weight regressions. It was found out that zooplankton abundance during the southwest monsoon (SW) was higher than the abundance during the northeast monsoon (NE) while the biomass was higher during the NE monsoon compared with SW monsoon.

Key words: Zooplankton, seasonal variation, biomass, Straits of Malacca.

3P-10

Characteristics of copepod patches in Ise Bay, central Japan

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Ise Bay, a semi-closed bay, is eutrophicated with a mean depth 19.5 m and a surface area 1,700 km^2, located along the Pacific coast of central Japan. Along a transect line 21.6 km distance from Tsu (west central coast of the bay) to Noma (east central coast), we undertook continuous sampling of seawater using a submersible pumping gear towed at 3m depth with a ship speed 2.0 m/sec. Sampling was done during the nighttimes of 20:08-23:08 LMT (sunset 18:35 LMT) on 27th April 1993. Seawater pumped up was continuously filtered using plankton nets (mesh aperture 0.33 mm) for every one minute, so we had a total of 180 samples (one sample equivalent to a filtered volume 70-72 L seawater and to 120 m distance).

Copepod patches were defined: samples with densities exceeding the mean of all samples, or characteristic length of between-sample lag with zero autocorrelation coefficient. The back-ground density was defined: the mean density of samples excluding ones with densities exceeding the mean of all samples. Power-spectral analysis was done in order to detect processes generating patches based on the above density data.

Four copepod species were common and abundant: *Acartia omorii*, *Paracalanus parvus*, *Centropages abdominalis* and *Calanus sinicus*. Of these copepods, patches of the three species except *Calanus* were detected at almost same locations with similar characteristic length, contrasting with those of *Calanus* detected at locations much different from those of the other three copepods. Based on the spectral analysis, spatial scales of density variations of copepods were different from those of water/salinity variations, suggesting copepods patches were generated not through abiotic environmental variations but through processes specific to different copepods.

Keywords: copepod, patches, characteristic length

3S-1

The recognition of *species boundaries* of the genus Halophila (Hydrocharitaceae)

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The genus *Halophila* (Hydrocharitaceae) is one of the most important marine plants due to its ecological roles as primary producer. There are 21 species names in ALGAEBASE at present, of which 16 have been flagged as currently accepted taxonomically. Four taxa were listed in a recent review of the seagrass genus *Halophila* in Japan: (i) *H. decipiens* Ostenfeld, (ii) *H. major* (Zoll.) Miquel, (iii) *H. ovalis* (R.Brown) J. D. Hooker, and (vi) *H. nipponica* J. Kuo. During recent field surveys in Okinawa Prefecture, we found peculiar seagrass distributed in 10 m depth of Ie Island, Okinawa Prefecture, Japan (27 June 2010). The gross morphology of this plant is similar to the species belonging to the genus *Halophila*, but leaves are very narrow, up to 1 mm width and up to 4 cm length, and there is no cross veins in the leaves. We examined the phylogenetic position of this plant using molecular phylogenetic analyses of the internal transcribed spacer (ITS) region of the nuclear ribosomal DNA. This plant was included in the *H. nipponica* clade and possessed the identical ITS sequence with samples collected from Nakagusuku Bay and sample from Ooura Bay of Ishigaki Island, Okinawa, Japan. In spite of marvelous *range of morphological variation, this plant can be identified as H. nipponica in the molecular analysis. In this poster presentation, to recognize the species boundaries* of the genus *Halophila*, *we show the ITS rDNA tree and almost of all close-up view of leaves of voucher plants used in the ITS rDNA* molecular phylogenetic analyses. We discuss the *range of morphological variation* of leaves of the species belonging to the genus *Halophila*.

3S-2

Five species of the Laurencia complex (Rhodomelaceae, Rhodophyta) from Samui Isl., Thailand

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Five species of the *Laurencia* complex (Rhodomelaceae, Rhodophyta) were recorded from Samui Isl., Thailand in our expedition on August 2009. Each morphological features of the three species, *L. snackeyi* (Weber-van Bosse) Masuda, *Palisada concreta* (Cribb) Nam and *P. parvipapillata* (Tseng) Nam, correspond to the previous works respectively. Though relatively fewer number of *corps en cerise* per superficial cortical cell in *L. majuscula* (Harvey) Lucas is observed in this study, it is inside the range of geographical diversity (1-3 in Samui's vs. 1-7 in Malaysian). Contradictory with prior study based on Okinawan material, lenticular thickenings in the walls of medullary cells are rare in *L. mariannensis* Yamada from Samui. Similar situation is reported on *L. nangii* Masuda (abundant in Vietnamese vs. rare in Malaysian). The two features, the number of *corps en cerise* per superficial cortical cell and the presence or absence of lenticular thickenings in the walls of medullary cells, are critical and useful characteristics to make species identification in this group, however, it must be considered to exist geographical variations.

Key words: corps en cerise, Laurencia complex, Laurencia majuscula, Laurencia mariannensis, lenticular thickenings, Samui Island

3S-3

Management and rehabilitation of seagrass beds: case study in Nui Thanh, (Quang Nam province), central Vietnam

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Seagrass beds occur in large areas in shallow seawater along the coast, especially in lagoons in central Vietnam. Studied site is located in An Hoa lagoon, Nui Thanh district, Quang Nam province, between $15^0$46' N latitude and 108^0 66' E longitude. These seagrass beds have a high biodiversity (fish and macrozoobenthos), so also have major benefits for communities living near the coast. Recently, these beds are seriously threatened by several causes but the most important were fishing activities in seagrass beds, including destructive fishing gears and methods such as push net, potential pulse net, digging for clam, mollusc and other macrozoobenthos in seagrass substrata. 10 hectares of seagrass beds in this lagoon have been marked for this study. There are 3 species of seagrasse: *Zostera japonica, Halophila ovalis and Halodule uninervis*, among them *Z. japonica* is dominant. About 20% of seagrass distribution area in this region was lost by fishing activities in last five years. A management model of seagrass beds with delegating the responsibility to the communities was proposed. A "seagrass group" of five local people with the support of a vice chairman of local government was organized. The rehabilitation technology of *Z. japonica* was transferred to "seagrass group". This group has responsibility to restore and protect seagrass habitat from destroyed fishing ways, but also have economic interest in reasonable and sustainable exploitation biological resources in seagrass beds under the guidance of scientist.

Key words: *Management, seagrass beds, rehabilitation, protection*

3S-4

Halophila species in Malaysia

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In Malaysia, there are 14 species of seagrass recorded of which 5 or more species belong to *Halophila* and they usually occurred in diverse substrates along the shallow intertidal coasts of mainland Malaysia and off-shores islands. Human-induced environmental changes e.g. land reclamation, sand mining, harvesting of food sources and pollution as well as natural phenomena has been exerting pressures on the seagrass resources. It has become evident that seagrass are vulnerable resource, easily lost in coastal areas facing environmental changes. Based on the records collected covering from 1991 to 2009 from various locations along the coasts and off-shores islands of Peninsular Malaysia, Sabah and Sarawak, the genus *Halophila* has the highest number of species. They also exhibit diverse variation with respect to habitat and ecology, gross morphology, leaf blade features including leaf arrangement and characteristics, coloration, leaf surface cells, sexes and reproductive strategies and, possessing different levels of competitiveness in adapting to the changing environment.

Key words: Halophila, diversity, variability, morphology, Malaysia

3S-5

Comparison on seaweed communities of the two rocky shores

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A study on seaweeds were carried out at Tg. Batu (Lat. 3° 12' 28.3" N, Long. 113° 02' 38.4" E) and Kg. Kuala Nyalau (Lat. 3° 37' 50.8" N, Long. 113° 22' 16.1" E), Bintulu Sarawak from January to October 2008. This study examines the diversity and distribution of seaweeds at two rocky shores with distinct landform characteristics and differences in their environmental conditions. A total of 32 seaweeds were identified belonging to 20 families and 27 genera comprising of 28 species (9 Chlorophyta, 5 Phaeophyta and 14 Rhodophyta) at Kg. Kuala Nyalau and 15 species (5 Chlorophyta, 2 Phaeophyta and 8 Rhodophyta) at Tg. Batu. *Cladophora prolifera, Ulva intestinalis, Padina minor, Sargassum* sp., *Ceramium* sp., *Hypnea cervicornis, Gracilaria salicornia, Hydropuntia edulis, Acanthophora spicifera, Laurencia papillosa* and *Laurencia* sp. were common species where Rhodophyta was dominant at both sites. Based on Bray Curtis similarity evaluation, four distinct clusters on species occurrence in relation to months was observed at Tg. Batu: I-January and February, II-June and July, III-April and August, IV-September and October and, three clusters at Kg. Kuala Nyalau: I-February and March, II-August and September, III-June and July. Environmental factors such as temperature and total suspended solid were the influencing factors determining the differences between seaweed communities of sites.

Key words: Bintulu, diversity, seaweed species, rocky shore

4-1

A Retrospective Analysis of POPs Monitoring in the Philippines

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Monitoring studies using green mussels were conducted to assess the levels of toxic contaminants in the Philippines' coastal waters, particularly in the major mussel culture areas. Our initial studies revealed that PCBs were observed to be generally prominent in green mussels from various mussel culture areas in the country. Relatively higher PCBs levels were measured in green mussels collected around Manila Bay area, which may imply that PCBs contamination could be coming from the more populated and industrialized cities. Similarly, CHLs concentrations in green mussels from the Philippines' coastal waters proximal to urbanized and industrialized areas were observed to be a magnitude higher than the CHLs levels found in mussels collected from the coasts of rural areas. In a subsequent study, mussels from the Philippines were still found to be among those which had high PCBs and CHLs residue levels, while DDTs residues were lower than those found in mussels from other countries. In the case of HCHs residues, a rather uniform residual HCHs concentrations among the mussel sampling sites was noted, but these HCHs residue levels were relatively low in comparison with overseas data. While in another study on resident and migratory waders collected from Calatagan Bay, PCBs were the prominent compounds followed by DDTs, CHLs, HCHs and HCB respectively. The study further revealed that the relative concentrations of CHLs in waders from Calatagan Bay was higher than that from other countries, while the residue levels of other OCs were generally low. The composition of OCs followed the order of DDTs > PCBs > HCHs > CHLs > HCB. This result seem to indicate that on their migratory routes, wader species collected from Calatagan Bay could be wintering and feeding in areas of high DDTs usage. On the other hand accumulation of OCs in the blubber tissues of Fraser's dolphin and spinner dolphin collected from the tropical waters of northeastern Sulu Sea in the Philippines was also examined. Similar to mussels and waders, DDTs and PCBs levels in these cetaceans were found to be considerably higher than the other OCs. Compared with reported DDTs concentrations in cetaceans from different parts of the world, the mean concentration of DDTs and PCBs detected in these cetaceans from Sulu Sea, Philippines were lower than those reported in the literature.

Keywords: organochlorine compounds, Philippines, green mussels, waders, cetaceans

4-2

Monitoring Studies on Human Exposure to POPs in the Philippines

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This paper presents a retrospective analysis of available data on human exposure to POPs among Philippine residents. Earlier studies on toxic contaminants in human breast milk revealed that DDTs and PCBs were the predominantly identified compounds in all the breast milk samples analysed. The concentrations of OCs were found to vary widely and the distribution pattern were in the order of DDTs > PCBs > CHLs > HCHs > HCB > TCPMe. Interestingly, the accumulation pattern of OCs in human breast milk was different from that found in mussels from the Philippines coastal environment, which showed higher levels of PCBs and CHLs, probably because of the difference in exposure routes. However, DDTs was consistently the prevalent OC in both samples, indicating that DDTs is still a major environmental contaminant in the Philippine environment. In comparison with worldwide OC levels, human breast milk from the Philippines contained higher levels of PCBs and CHLs than those reported in other Asian developing countries. Such phenomena could be indicative of elevated sources of these compounds in the country. TCPMe accumulation in the Philippine human milk samples is likewise reported here. Results indicated a significant positive correlation of TCPMe levels with DDTs and other OCs, indicating that the bioaccumulative nature of TCPMe is similar to other OCs, such as DDTs and PCBs. On the other hand, dioxin related compounds (DRCs) were also detected in all the human breast milk collected from the dumpsite areas in the country. The level of TEQ in human breast milk from the Philippines was found to be at 12 pg TEQs/g lipid wt., which was lower than the values from developed nations but comparable with those from other developing countries. Spatial distribution and accumulation of organohalogen compounds in human breast milk from the Philippines revealed that residue levels of these compounds were detected in all the breast milk samples, which seem indicative of its widespread contamination. Mean concentrations of PBDEs found in the human breast milk imply that it may become a major environmental concern in the Philippines as the residue levels were observed to be higher than those in other Asian developing countries. Interestingly, no significant difference was found in residues of BFRs such as PBDEs and HBCDs isomers in human breast milk collected from dumping and reference sites in the Philippines. The variations of PBDE and HBCD congener profiles in human breast milk among the individual mother donors may support the idea that humans were exposed to multiple sources and pathways, and also possibly to different commercial mixtures of these toxic compounds.

Keywords: OCs, PBDEs, TCPMe, HBCD, Philippines, human breast milk, human exposure

4-3

Distribution and Sources of Polycyclic Aromatic Hydrocarbons (PAHs) from Coastal Waters of Timor Sea

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Studies of Polycyclic Aromatic Hydrocarbons (PAHs) was carried out during Arafura Timur Seas (ATSEA) Cruise on 10-16 May 2010. The objective of the study is to determined the concentration of total PAHs compounds and to indentify the potential source of contamination at the Timor sea. Fifteen priority PAHs compound based on US-EPA was analyzed at the RCO-LIPI Laboratory from 12 stations along the coastal waters of Timor island. Our study showed that total concentration of PAHs compounds ranged from 54.5 to 213.7 µg/l with average of 99.8 µg/l in seawaters, and ranged from 23.6 to 24.5 mg/kg dry weight (dw) in sediments. General abundance of PAHs compound in the waters and sediments from the Timor Sea including a carcinogenic activity by the International Agency for Research on Cancer (IARC). Potential source input of PAH contamination at the Timor Sea is from pyrogenic, and petrogenic inputs. Concentration of PAHs was mostly above the sea water quality standard set by the Ministry of Environment, Republic of Indonesia for PAH total is 3 µg/l.

Key word : Polycyclic aromatic hydrocarbons(PAHs), Timor Sea, ATSEA, ratio analysis.

4-4

A review of 10 years heavy metals studies in Malaysia

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Continuous 10-year monitoring programme was conducted to assess the heavy metals (Cu, Zn, Cd and Pb) contamination in the coastal environment of Peninsular Malaysia. Concentrations of these metals were measured in the abiotic components (water and sediment), as well as various biotic communities. The results from the sediment and water samples showed heavy metals were highly concentrated in highly populated areas with intensive anthropogenic activities. However, the contamination was limited in vicinity to pollutant sources. Locations with such conditions include South Channel in Penang, Port Klang and Sepang (Selangor), Lukut and Port Dickson (Negeri Sembilan), Melaka River (Malacca), Minyak Beku, Pantai Lido and Kampung Pasir Putih (Johor), and Kelantan River estuary (Kelantan). The identified anthropogenic input in the environment includes effluents from domestic sewage, manufacturing industries, animal farms and agro-based activities. Johor Strait has been proposed as the hotspot area for studies on heavy metals to understand the fate of these metals in the environment over long period and the effects towards biotic communities. Among the intertidal organisms there are some potential biomonitoring organisms which have demonstrated their suitability to satisfy the criteria for biomonitoring organism. These organisms include green-lipped mussel (*Perna viridis*), rock oyster (*Isognomon alatus*), tropical rockshell/drill (*Thais* spp.), common blood-cockles (*Anadara granosa*), common nerite (*Nerita lineata*), mud-creeper (*Cherithidea obtusa*), mud whelk (*Telescopium telescopium*), fiddler crab (*Uca annulipes*), soldier crab (*Dotilla myctiroides*), giant mudskipper (*Periophthalmodon schlosseri*), Javanese ricefish (*Oryzias javanicus*) etc. Based on these results, the background concentration of heavy metals in the sediment, water and selected biological samples were established as references for future studies. Continuous studies and introducing noble approaches could promote better understanding of hazardous chemicals in the environment. This information is also needed to strengthen local and/or regional environmental quality guideline for better environmental management and conservation.

Keyword: heavy metals, *hotspot*, *abiotic components*, *biotic communities*, *continuous monitoring*

4-5

An assessment of organotin contamination in Malaysia

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Organotins including butyltins, BTs (tributyltin (TBT), dibutyltin (DBT) and monobutyltin (MBT)) and phenyltins, PTs (triphenyltin (TPT), diphenyltin (DPT) and monophenyltin (MPT)) contamination in Malaysian coastal environment have been observed for more than a decade. The elevated values of organotin compounds along the coastal environment of the Straits of Malacca were reported since the 1990's and since then the continuous monitoring of these hazardous chemicals was conducted by expanding the assessments of organotin compounds in different abiotic component and biotic communities. The study area was also expanded to cover the entire Malaysian coast, including the East Malaysia. High level of organotin componds has shown to cause toxic to marine life especially the juveniles. Elevated levels of butyltin compounds in sediments and various biotas were observed in the specific areas such as in southern coast of Peninsular Malaysia. In general, organotin compounds (TBT, MBT, DBT, MPT, TPT) displayed inconsistence levels in sediments and various biotas from different locations. This is may be due to their degradation processes and input of organotin in the environment. The source of contamination might be from previous events occurring in the study areas before the global ban on the use of TBT as an antifouling agent on recreational boats and vessels less than 25 m in length in 2003 and later total ban of TBT as antifouling agents for ship in 2008. Studies on organotin contamination in Malaysian coastal environment should be continued in order to determine the persistent effects of this chemical on existing biotic communities, as well as to compare potential side effects of the alternative biocide to non-targeted organisms in local perspective.

Keywords: organotin, *sediment*, *biotic communities*, *continuous monitoring*, *Malaysian coastal environment*

4-6

Potential biomonitoring and testing organisms for hazardous chemicals in malaysian coastal environment

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After a decade of intensified environmental and monitoring studies, various intertidal biotic communities have been analyzed to determine their suitability as biomonitoring agents for hazardous chemicals in the Malaysian coastal environment. Some of the potential organisms for this purpose include green-lipped mussel (*Perna viridis*), rock oyster (*Isognomon alatus*), tropical rockshell/drill (*Thais* spp.), blood cockle (*Anadara granosa*), common nerite (*Nerita lineata*), mud-creeper (*Cherithidea obtusa*), mud whelk (*Telescopium telescopium*), fiddler crab (*Uca annulipes*), soldier crab (*Dotilla myctiroides*),giant mudskipper (*Periophthalmodon schlosseri*), and Javanese ricefish (*Oryzias javanicus*). Within the existing food web of the coastal environment, these organisms range from filter feeder to predator (lower to upper trophic levels). They have been tested *in situ* and/or *ex situ* for existing chemical concentration and potential tolerance. They could tolerate different degree of chemical concentrations in the aquatic and semi-aquatic environments depending on their habitat. Concentrations of analyzed chemicals in the body burden and in the environment were found to be in positive correlation between the two parameters. Some of the species (e.g. ricefish) are highly sensitive to certain level of specific chemicals in environment. Others (e.g. mudskipper, mollusks and crustaceans) could tolerate high concentration, thus any negative effects could demonstrate negative implications occurring among biotic communities in the specific area. The selection of biomonitoring agent depends on the research objective, habitat and type of pollutants. Continuous efforts should be carried out to explore other potential biomonitors and conduct detailed studies on identified potential biomonitor (including transgenic species) in order to establish a sentinel species for biomonitoring purpose in different environments along the coastal area of Malaysia.

Keywords: *bioindicators*, *biomonitoring, hazardous chemicals*, *tolerance*, *coastal environment*

4-7

An attempt to detect contamination with estrogenic compounds in river water of urban area in Thailand and Malaysia using transgenic medaka

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Detection of endocrine disrupting chemicals with living organisms has many advantages if compared to chemical analysis. We have developed a transgenic medaka strain harboring the green fluorescence protein (GFP) gene driven by choriogeninH gene regulatory elements. Choriogenin H is an egg envelope protein induced by estrogens in the liver. Therefore, the transgenic medaka indicates estrogen-like substances (ELSs) contamination level as green fluorescence in its liver.

Contamination of ELSs in the river and coastal areas in Thailand and Malaysia was investigated using the transgenic medaka. Water samples were collected from two rivers in Thailand, four rivers in Malaysia, and three coastal areas (two in Thailand, one in Malaysia). Generally, no contamination was observed in headwater, river mouth, countryside, and coastal areas. On the other hand, detectable levels of contamination were observed in the river water of urban area. These suggest that contamination by estrogenic substances occurs in urban area, but these substances may be diluted and/or degraded to the undetectable levels until the water reaches river mouth. Relatively high levels of ELSs were observed at Sang Khep River mouth in Thailand and toxic effects were observed in urban area of Sang Khep River as well as urban area and the mouth of the Klang River in Malaysia.

Key words: endocrine disrupter, estrogen, transgenic, medaka, GFP

4-8

Determination of impacted coverage area caused by oil spill in Indramayu, West Java, Indonesia

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The accident of oil spill (3000 m^3) occurred in Indramayu Coast on 14 September 2008 by the broken pipeline which connected a tanker with a single buoy mooring (SBM). The SBM is located approximately 12 miles from the coast. The oil spill spread to surrounding coast and impacted the fishing ground, mangrove ecosystem and beaches.

This study was to determine the impacted coverage area due to the oil spill which occurred in the area of Indramayu Coast. It was very important in relation to claim calculation on social and environmental impact. After determining the impacted coverage area, an economic valuation expert easily calculated the compensation as a result of the spill. Furthermore, the expert's calculation was based on value of economic social and environmental impact on oil spill per hectare or km^2 whereas by multiplying with impacted coverage area (in hectare or km^2) so that the compensation value was resulted.

To determine impacted coverage area of oil spill, satellite image of MODIS, monitoring survey, and oil spill modelling were utilised. The results showed satisfactory argumentations among them which are one result strengthened the others. The deficiency of satellite image of MODIS and oil spill modelling in determining the impacted coverage area was covered and convinced by the monitoring survey along the coast.

Key words: oil spill, impacted coverage area, satellite image of MODIS, oil spill modeling

4-9

Natural and artificial radionuclide in the marine ecosystem of Southeast Asia region

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Briefly this presentation will review the status of natural and artificial radionuclide in marine ecosystem of Southeast Asia region. The information of natural and artificial radionuclide in marine environment is very important for oceanographer and marine science researchers. The concentration levels of radionuclide in marine ecosystems of Southeast Asia nation are varies and corresponding to the local activities. Furthermore, the concentration level of radionuclide in various types of marine samples such as sediment, seawater, porewater, suspended particles and organism are not well documented. The concentration activities of radionuclide in Southeast Asia area are still in the safety level as reported by The Asia-Pacific Marine Radioactivity Database.

Keywords: radionuclide, marine ecosystems, Southeast Asia, level, samples

4-10

Petroleum hydrocarbon residues in the marine environment of Koh Sichang-Sriracha, Thailand

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This study describes petroleum hydrocarbon (PHC) contamination in water, sediment and green mussel (*Mytilus edulis*) of the coastal area of Koh Sichang-Sriracha, Chonburi along the eastern coast of the Gulf of Thailand. The concentrations of PHC in coastal waters, as determined by UVF technique, were found to range from 0.10-12.55 μg/L (chrysene equivalents) with higher values generally confined to port areas. Analysis of surface sediments for PHC revealed that most of the sediments contained appreciable quantities of PHC. The concentrations of PHC in surface sediments varied from 1.1 to 153.4 μg/g dry weight, with the mean value of 32.4±35.5 μg/g. The majority of values of PHC concentration in the surface sediments of Koh Sichang-Sriracha coastal area exceeded 10 μg/g and the trend is indicative of transfer of PHC loads from the inshore areas to the open-shore sediments. The average concentration of PHC burdens in the mussel tissues at Sriracha ranged from 8.1 to 161.0 μg/g wet weight, with the average value of 43.7±55.5 μg/g. Bioconcentration factor (BCF) for PHC in green mussels was determined and found to vary from $1.7x10^4$ to $3.5x10^5$ (mean 3.1×10^4). The contamination levels were found due to anthropogenic origin. These include intensive maritime activities, disposal of wastes from anchorage vessels, lubricating oil and municipal waste from Sriracha town.

Keywords: hydrocarbons, oil pollution, fluorescence, Koh Sichang, Sriracha, Chonburi, Thailand

4-11

Heavy metal contamination in Indonesian coastal marine ecosystems: a historical perpective

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Toxic heavy metals are one of the widespread of environmental contaminants in Indonesian coastal waters. Research and monitoring on heavy metals contamination has been going on since 1979. The development of pollution studies can be divided into three phases, firstly monitoring of heavy metals contamination focused on marine water (1979 – 1990); secondly, research and monitoring focused on biota and sediment (1990 – 2000); and the third phase, the research focused on bioassay and geochemistry of heavy metals (2000 – present). Most metals (Pb, Cd, Cr, Zn and Ni) have been intensively studied in components of coastal ecosystem, but it was lacking on Hg, As and Sn studies. Considering the huge area of Indonesian coastal waters, an elevated heavy metals contamination is mostly recorded in the northern coastal waters of Java island and the eastern coast of Sumatra island, on the other hand the coastal waters of Borneo and the Celebes island are relatively pristine except where mining, oil and gas exploitations exist at an upland area. The concentration of heavy metals in coastal waters and biota is commonly very small in concentration. In contrast, heavy metals in sediments relatively elevate in concentrations especially in areas where land-based activities exist such as mining and industrial activities. Recent research has been directed on metal speciation in sediments and development of bioassay using local species to enhance the effectiveness of government regulations, and to reduce uncertainty when local managers have to make a decision on environmental issues relating to ecological risk assessment and human health risk.

Keywords: *heavy metals, coastal waters, sediments, biota, Indonesia*

4-12

Determination of persistent organic pollutans in malaysia by using different types of matrices: a review paper for past 10 years

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The study of the persistence organic pollutants (POPs) is limited in Malaysia. Data were not well documented and this caused less awareness of the POPs among the public. Hydrophilic nature of the POPs make it partition to the less polar materials such as sediment and organisms fat. Obvious accumulation of PAHs observed since 1875 in Klang City, Near Shore Malacca, Johor City and Johore Straits. Methylphenanthrene to phenanthrene (MP/P) ratio of PAHs indicates that most of the rivers and estuaries in Malaysia for both west and east coast of Peninsular Malaysia controlled by petrogenic input where the ratio ranged from 1.03 to 6.65. However, the dominance of petrogenic input incrementally decreased (r^2= 0.649) as the distance of station increased upstream to downstream which mean; more downstream area carries pyrogenic input. Study on Sterols in Sungai Sepang Besar indicates that Kampung Bagan Lalang is the seriously polluted with sewage based on the ratio of coprostanol/ cholesterol (>0.2). Before that, level of sewage pollution in Malaysia has been determined by using linear alkylbenzenes (LABs) indicator where the lowest I/E (internal to external isomer) given by Port Klang (I/E=0.7); indicating poor sewage handling. Risk assessment of PAHs in fish tissues confirmed that the concentration of PAHs in fish consumed by Malaysian below the limit set by USEPA. Study on P. Viridis demonstrate that hydrocarbon were distributed on any different tissue as follows; gonad> gills> foot> bysus or mantle> remaining soft tissue> muscle. In different, origin of oil pollution can be determined by using cross plot of hopane's diagnostic ratios. This is due to the fact that each oil has their unique characteristic and makes the oil different from others.

Keywords: *organic pollutant, matrices, biomarker, Malaysia*

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