



THE ASIAN NETWORK FOR USING ALGAE AS A CO₂ SINK THE ASIAN PACIFIC PHYCOLOGICAL ASSOCIATION



MLTM
Ministry of Land, Transport and Maritime Affairs

This Newsletter was supported by the Project “Algae and Global Warming-Greenhouse Gas Removal by Seaweeds”/the Ministry of Land, Transport and Marine Affairs, Korea.

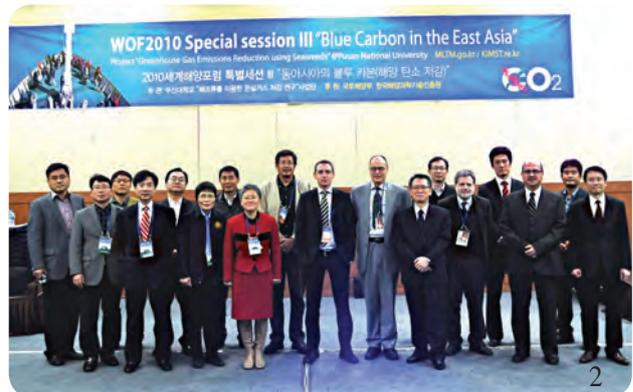
Newsletter

Issue No. 6 December 1, 2010

The 7th Workshop of the Working Group for the Asian Network for Using Algae as a CO₂ Sink

The 7th workshop meeting of the Asian Network for Using Algae as a CO₂ Sink was held at BEXCO, Busan, Korea on November 16, 2010 in conjunction with Special Session III, “Blue Carbon in East Asia” of World Ocean Forum 2010 (Nov. 14 - 17). Professors John Beardall (AUSTRALIA), Zhengyu Hu

(CHINA), Put O. Ang, Jr. (Hong Kong), Ik Kyo Chung (KOREA) and Jin Ae Lee (KOREA) were in attendance. Prof. Among Chirapart, representing Thailand and Prof. Shao Jun Pang, as a representative of China, also participated in the meeting. 



1. The 7th workshop meeting of the Asian Network for Using Algae as a CO₂ Sink was held at BEXCO, Korea in conjunction with a Special Session of World Ocean Forum 2010.

2. A group photograph of the participants at Special Session III, “Blue Carbon in East Asia” of World Ocean Forum 2010.

World Ocean Forum 2010, “Climate Change & Ocean Challenge - Towards the Era of a Blue Economy”

Special session III. Blue Carbon in the East Asia

Background

Recently there has been a good deal of interest in the potential of marine vegetation as a sink for anthropogenic carbon emissions (Blue Carbon, Nellemann *et al.* 2009). Marine primary producers contribute at least 50% of the world's carbon fixation and may account for as much as 71% of all carbon storage in oceanic sediments.

Clearly the algae and marine higher plants such as mangroves and seagrass that comprise the vast majority of oceanic primary producers have the potential to make a real contribution to CO₂ removal and carbon storage. Sustaining or enhancement the ability of primary producers of sequestering carbon in oceans, specially the coastal regions, would be critical aspect

of climate change mitigation.

The contribution of terrestrial ecosystems in the mitigation of climate change has been well understood and financially supported by relevant mechanism such as REDD. The climate change communities just began to recognize the critical role and the capacity of the natural coastal ecosystems, such as tidal salt marshes, mangroves, seagrass meadows and kelp forest, and identified these ecosystems as potential carbon sinks. They also highlighted the Blue REDD as a credit mechanism rewarding marine and coastal ecosystem carbon capture and storage.

Objectives

The objective of the session was to bring together experts in the Blue Carbon to highlight and critically discuss the key issues posing a challenge to Blue REDD mechanism. We aimed to raise awareness of the region as well as develop any future scientific research, regional projects, collaborations and activities related to Blue Carbon.

Presentations

Session 1. Blue Carbon - Concept and Prosperity

Chair: Prof. John Beardall (APPA, Australia)
Prof. Ik Kyo Chung (Pusan National Univ., Korea)

Invited Speakers

Prof. Richard Kenchington (UNEP): Blue Carbon, the role of healthy oceans in the binding carbon
Dr. Jerker Tamelander (IUCN): An introduction to coastal ecosystem-based mitigation
Prof. Ik Kyo Chung (Pusan National Univ., Korea): Seaweed solution, Asian Network for Using Algae as CO₂ Sink and Coastal CO₂ Removal Belt

Panels

Prof. Jin Hwan Hwang (Dongguk Univ., Korea)
Dr. Tonny Wagey (MoMAF, Indonesia)

Session 2. The Roundtable Presentations on the Blue Carbon Issue in the East Asia

Invited panelists discussed on topics of the carbon sequestration and cycle, socio-economic context, management implementation context, policy and market, and case studies related to the Blue Carbon. Invited members of the Working Group of the Asian Network for Using Algae as CO₂ Sink, Asia Pacific Phycological Association (APPA), presented the situation of the Blue Carbon issues in their own country. They reviewed the situation of coastal ecosystems management including coral reefs, mangrove forests, kelp forests, seagrass meadows and salt marshes, and discussed the possible actions to be taken to address the challenge of the Blue-REDD. They explored the options in more detail for developing CO₂ reduction scheme based on seaweeds. They also discussed about future scientific research, regional projects, collaborations and activities related to the Blue Carbon in the East Asia.

Modulator: Prof. Jerker Tamelander (IUCN)
Prof. Jin Ae Lee (APPA, Korea)

Invited Panels

Prof. Richard Kenchington (UNEP)
Dr. Jerker Tamelander (IUCN)
Prof. John Beardall (APPA, Australia)
Prof. Zhengyu Hu (APPA, China)
Prof. Shaojun Pang (CAS, China)
Prof. Put O. Ang, Jr. (APPA, China)
Prof. Grevo S. Gerung (APPA, Indonesia)
Dr. Tonny Wagey (MoMAF, Indonesia)
Prof. Ik Kyo Chung (APPA, Korea)
Prof. Jin Hwan Hwang (Dongguk Univ., Korea)
Prof. Jin Ae Lee (APPA, Korea)
Dr. Yoon Lee (NFRDI, Korea)
Prof. Anong Chirapart (APPA, Thailand)



The 20th International Seaweed Symposium, Ensenada, Mexico, 22-26 February 2010

The 20th International Seaweed Symposium was held at the Coral & Marina Convention Center, Ensenada, Baja California, Mexico, February 22-26, 2010. The symposium was hosted by the Institute of Oceanology and the

School of Marine Sciences of the Universidad Autónoma de Baja California, under the auspices of the International Seaweed Association. About 360 delegates from 40 countries were in attendance, and a total of 18

contributed-papers sessions and 14 mini-symposia were organized, deliberating various topics in seaweed research and utilization to promote applied phycology on a global basis, and to stimulate interactions among research workers and industrialists in all relevant academic institutions and industries, in all countries.

Mini-symposium 6, Biofuels and Seaweeds, co-convended by Bushmann AH and Neori A, included the following presentations.

- Neori A and Turan G: Seaweed for fuel; A survey of past and present activities in the world
 Buschmann AH, Hernández-González MC, Flores R, Gutierrez A, Varela D and Huovinen P: Massive kelp production in Chile; Future prospects, challenges and limitations
 Bakken PA: Seaweed-to-biofuels; What now?
 Yoshikuni Y and Kashiyama Y: Synthetic biology; Fuel production from macroalgae

Mini-symposium 13, Seaweeds for Biofuel and Paper Pulp, co-convended by Chung IK and Buschmann AH, included the following presentations.

- Chung IK, Oak JH, Park KS & Kim JK: Pilot implementation of the coastal CO₂ removal belt (CCRB) in Korea
 You HC, Sohn M & Gerung GS: Red algae pulp and paper, bio-ethanol

Martin P, Mair C and Kraan S: Seaweeds for second generation bioethanol; Can we compete with corn?

Gerung GS & You HC: Cultivation on some species of red algae (Rhodophyta); Producing pulp and bio-ethanol

Bruhn A, Rasmussen MB, Dahl J, Nikolaisen LS, Nielsen HB, Thomsen AB, Sander B and Raven E: Marine biomass - The Danish *Ulva lactuca* project

The Poster session, Biofuel and Seaweeds, included the following presentations.

Afify MR Abd El-Moneim, Shalaby E and Shanab-Sanaa MM: Enhancement of biodiesel production from different algal species

Madera-Santana TJ, Robledo D and Freile-Pelegrín Y: Physiochemical properties of biodegradable polyvinyl alcohol-agar films

Cabrera JC, Pereda SV, Buschmann AH and Hernández-González MC: Nutritional value of microscopic stages of *Macrocystis pyrifera* ; Effects of grazing preferences

Camacho-Hadad O, Hernández-Carmona G and Amador-Martínez MG: Phenology, fucoidan and alginates from *Sargassum cymosum* and *Sargassum* sp. collected at the Columbian Caribbean

Montero M, Aristizabal M and García-Reina G: Isolation of high lipid-content strains of marine microalgae (*Tetraselmis suecica*) for biodiesel (& biojetfuel) production by flow cytometry and single-cell sorting 



- The 20th International Seaweed Symposium was held at the Coral & Marina Convention Center, Ensenada, Mexico, February 22-26, 2010.
- Dr. Amir Neori, Israel Oceanographic & Limnological Research Ltd., National Center for Mariculture, Eilat, Israel, and Professor Gamze Turan, Ege University, Fisheries Faculty, Aquaculture Department, İzmir, Turkey, presented the paper "Seaweed for fuel: A survey of past and present activities in the world" at the Mini-symposium, Biofuels and seaweeds, the 20th International Seaweed Symposium, with the citation of the Korean AGW project and the activities of the Working Group for the Asian Network for Using Algae as a CO₂ Sink of APPA.
- Professor Ik Kyo Chung giving the presentation "Pilot implementation of the coastal CO₂ removal belt (CCRB) in Korea" at the Mini-symposium, Seaweeds for biofuel and paper pulp, the 20th International Seaweed Symposium.

*The International Symposium on “Climate Change Effects on Fish and Fisheries”
Sendai, Japan, 26-29 April 2010*

http://www.pices.int/publications/pices_press/volume18/v18_n2/pp4_Sendai_Symposium_Effects_ofClimate_Change_onFish.pdf

The International Symposium on “Climate Change Effects on Fish and Fisheries: Forecasting impacts, assessing ecosystem responses and evaluating management strategies” was held in Sendai, Japan, April 26-29, 2010. The symposium was co-hosted by the North Pacific Marine Science Organization (PICES), the International Council for the Exploration of the Sea (ICES) and the Food and Agriculture Organization (FAO). The symposium was to provide an opportunity for scientists and policymakers to discuss the potential impacts of climate change on marine ecosystems, as well as the use of resources provided by these ecosystems. A total of 337 scientists from 37 countries were in attendance, and a total of 208 oral presentations and 105 posters were presented. The following are the key outcomes from the symposium (refer to PICES Press Vol. 18, No. 2 for more information).

1. Long-term ocean monitoring programs are needed to track and understand ecosystem and climate change as they occur.
2. Networks of shelf seas ecosystem models have already been developed within several of the world’s LMEs. These models provide a basis for examining structural uncertainty within shelf sea ecosystem models.
3. Three sources of uncertainty in Global Ocean Models (GOMs) are under investigation: (1) parameter uncertainty, (2) structural uncertainty, and (3) scenario uncertainty. Parameter uncertainty is being addressed to

- some degree with sensitivity tests; structural uncertainty is being explored via comparison of different coupled physical-biological models; and scenario uncertainty related to greenhouse gas emissions and economics can only be dealt with using ensemble model sets.
4. There are five approaches to predicting the effects of climate change on fish and fisheries: (a) conceptual predictions, (b) inferences from laboratory studies, (c) statistical downscaling from the GOM to the regional scale; (d) dynamic downscaling to regional ocean models; (e) whole earth system models. Each approach has strengths and weaknesses.
5. Fisheries oceanography and laboratory studies are critical to integrating biological and oceanographic models, evaluating species environmental tolerances and adaptation, and tracking species responses to long-term ecosystem and climate changes as they occur.
6. Models that couple marine social and economic responses are needed in order to evaluate management strategies; however, few examples exist.
7. Issues of food security and marine conservation may require new approaches to satisfy the growing demand for marine resources.
8. Two-way communication between scientists and stakeholders is needed to develop meaningful scenarios for human responses to the impact of ecosystem and climate changes.



6. The International Symposium on “Climate Change Effects on Fish and Fisheries” was held in Sendai, Japan, April 26-29, 2010.
7. Drs. Jung Hyun Oak and Sang-Rae Lee, research scientists with the Korean Project “Algae and Global Warming-Greenhouse Gas Removal by Seaweeds,” participated in the symposium as observers.



The 5th Global Conference on Oceans, Coasts and Islands, Paris, France, 3-7 May 2010

The 5th Global Conference on Oceans, Coasts and Islands (GOC), “Ensuring survival, preserving life, and improving governance” took place at the UN Educational, Scientific and Cultural Organization (UNESCO) headquarters in Paris, France, May 3-7, 2010. The conference was co-hosted by the Intergovernmental Oceanographic Commission (IOC), UNESCO, and the Government of France, in celebration of the 50th anniversary of the IOC and the International Year of Biodiversity 2010. The conference was attended by over 850 participants from 80 countries, including leaders from governments, the UN and other international agencies, NGOs, industry, oceans donors, organized science groups, and networks of museums and aquaria.

The 5th GOC & Asian Network for Using Algae as a CO₂ Sink

The APPA's Asian Network for Using Algae as a CO₂ Sink hosted one of the concurrent sessions, “Algal aquaculture: Food, feed, fuel - Mitigation of localized acidification,” organized by Prof. Ira A. Levine, University of Southern Maine, and Prof. Dinabandhu Sahoo, University of Dehli, India, with speakers, Dr. Stefan Kraan, Ocean Harvest Technology, Ireland, Prof. Keith Cooksey, Montana State University, US, Prof. Ik Kyo Chung, Pusan National University, Korea, Prof. Peimin He, Shanghai Ocean University, China and Dr. Jean-Paul Cadoret, Institut français de recherche pour l'exploitation de la mer, IFREMER, France.

The objectives of the session were to address the following topics: Marine algae cultivation to combat ocean acidification; Seaweed solution – Sink and swim; Mass cultivation of seaweed - a short term CO₂ sink and the answer for sustainable bioethanol production; Why microalgae for biofuel production and the need for physiological studies; Important role of seaweed cultivation in decreasing ocean acidification in China.

The session, in summary, emphasized the following: Marine algae have a great potential to convert oceanic CO₂ into biomass; large-scale algal cultivation can sequester or remove upwards of one billion tons of CO₂ from the oceans; biological CO₂/HCO₃⁻ sequestration from the sea remains a viable option;

marcoalgae, popularly known as seaweeds (e.g. *Ulva*, *Enteromorpha*, *Laminaria*, *Sargassum*, *Porphyra*, *Kappaphycus*, and *Gracilaria*, etc.) are presently cultivated on a large scale for various commercial purposes, including food, feed, fodder, fertilizer, pigments, fine chemicals, and others; in addition to the stated applications, macro- and microalgae can be excellent sources of second-generation biofuels (e.g. biomethane, biodiesel, and bioethanol); “The Asian Network for Using Algae as a CO₂ Sink,” comprising several Asian countries and led by Korea, is a major international initiative in this direction; the development of the Coastal Carbon Dioxide Removal Belt (CCRB) concept, as formulated, merits serious consideration.

Also the following recommendations were made:

1. We propose large-scale seaweed cultivation and artificial reef construction as two of the mitigation mechanisms for combating global ocean acidification, in short, the development of the CCRB.
2. We propose formation of the “Global Network for the Mitigation of Ocean Acidification via Seaweed Cultivation” for international coordination of seaweed aquaculture.

The 5th GOC & Blue-REDD

The Institute for Sustainable Development and International Relations (IDDRI), France organized the Session, “Blue-REDD: Towards a comprehensive program on oceans and climate” at the 5th GOC. The moderator of the session was Dr. Janot-Reine Mendler de Suarez, Former Project Coordinator, Global Environment Facility (GEF), and the speakers were Dr. Monique Barbut, Chief Executive Officer, GEF, Dr. Biliiana Cicin-Sain, Co-Chair and Head of Secretariat, Global Forum on Oceans, Coasts, and Islands, Dr. Dan Laffoley, Marine Vice Chair, World Commission on Protected Areas, IUCN, and Dr. Bill Eichbaum, Vice-President, Marine and Arctic Policy, World Wildlife Fund (WWF).

The objective of the session was to provide a critical analysis of a crediting mechanism rewarding marine and coastal ecosystem carbon capture and effective storage, a summary of which follows.

- 1) Presentation of Blue REDD mechanism - objectives, expectations, possible design
- 2) Brief comparison with Green REDD, and presentation of state of play of international negotiations
- 3) Taking stock of experience using crediting mechanisms:
 - On technical issues: discussing feasibility of designing carbon market mechanism specific to oceans (baseline and metrics elaboration, monitoring issues, credit affectation)
 - On role and capacity of market to create incentives: supply and demand prospects for carbon market after Copenhagen as regards international market; domestic markets; voluntary approaches.

The session discussed the history of, and lessons learned from, reducing emissions from deforestation and forest degradation in developing countries (REDD) within the

UNFCCC process, as well as the need to address the impacts of climate change on oceans. A panelist underlined the inappropriateness of the REDD mechanism for oceans and stressed the need for further scientific research. Panelists underscored the importance of: monitoring, reporting and verification criteria; equitable distribution of credits; creating demand for the credits generated. They recognized the high carbon storage capacity of coastal areas, stressing the need to assess the emissions released by their degradation. Panelists also identified difficulties in the development of a Blue-REDD mechanism, including: capacity development; baseline determination; permanence, monitoring and evaluation; additionality; leakages.

http://www.globaloceans.org/sites/udel.edu/globaloceans/files/Summary_Report_IISD.pdf



8. The 5th GOC took place at UNESCO headquarters in Paris, France, May 3-7, 2010.

9. The APPA's Asian Network for Using Algae as a CO₂ Sink hosted one of the concurrent sessions, "Algal aquaculture: Food, feed, fuel - Mitigation of localized acidification."

10. Prof. Jin Ae Lee, Secretary of the APPA's Asian Network for Using Algae as a CO₂ Sink participated in the Session, "Blue-REDD: Towards a comprehensive program on oceans and climate," at the 5th GOC as an observer.

Visiting UNFCCC

Professors Ik Kyo Chung and Jin Ae Lee visited the main office of the United Nations Framework Convention on Climate Change (UNFCCC) at Haus Carstanjen, Martin-Luther-King-Strasse 8, Bonn, Germany on May 5, 2010. They had an informal meeting with Ms. Kyung Ae Ha, a Project Coordinator, UNFCCC

and Ms. Endo Megumi, an Observer Organizations Liaison Officer, UNFCCC, to obtain information on the 16th Conference of the Parties (COP), which will be held in Cancun, Mexico, from November 29 to December 10, 2010.



11. Professors Ik Kyo Chung and Jin Ae Lee visited the main office of the UNFCCC on May 5, 2010.

12. Group photos of some of the working group members of the Asian Network for Using Algae as a CO₂ Sink and the officers of the UNFCCC in front of the main office of the UNFCCC.

Seaweed International Business Forum and Exhibition (SEABFEX)-III Surabaya 2010

Seaweed International Business Forum and Exhibition (SEABFEX) - III was held at the Sheraton Hotel & Tower in Surabaya, East Java, July 14-17, 2010, with the theme, "Seaweed for a Better Life." This event was hosted by the Ministry of Marine Affairs and Fisheries of the Republic of Indonesia to promote seaweed potency and business opportunities for Indonesia, in continuation of the success of the first meeting in Bali and the second in Makassar. SEABFEX 2010 was designed to become a forum for experts and business people dedicated to sharing information on business development and cutting-edge technology. The exhibition was designed to promote seaweed business opportunities in the potential provinces as well as seaweed-based product processing such as for the food, cosmetics, pharmaceutical, and other supporting industries. Prof. Ik Kyo Chung, Pusan National University, Korea, was

invited as one of keynote speakers at the plenary session, and delivered his talk, "Seaweed for reducing global warming." Prof. Grevo S Gerung and Mr. Hack Churl You participated as speakers in the panel discussion (see next).

Panel Discussion: The Investment Prospects of Seaweed Products

Mr. Darmawan Djajusman, Deputy Chairman for Investment Promotion, BKPM: How to invest in Indonesia

Mr. Hack Churl You, C.E.O. of Pegasus International, Korea: Development of paper and biofuel from seaweed

Dr. Grevo S. Gerung, Sam Ratulangi University, Indonesia: *Gelidium*; Industry, cultivation and diversity

Dr. Dietrich Lorch, Hamburg University, Germany: Biofuel from microalgae 



13. SEABFEX-III was held in Surabaya, Indonesia, July 14-17, 2010, with the theme, "Seaweed for a Better Life."

14. Prof. Ik Kyo Chung giving a plenary speech to the forum on "Seaweed for reducing global warming"

15. Prof. Grevo S Gerung and Mr. Hack Churl You participated in the panel discussion on "The Investment Prospects of Seaweed Products."

Minister Noh Bin Omar Visiting the Algal Paper Factory in Korea

Minister Noh Bin Omar of the Ministry of Agriculture and Agro-Based Industry, Malaysia and Professor Aishah Binti Salleh, University Malaya, had a site visit to Myrang Branch, one of the algal paper manufacturing factories of Pegasus International, on October 2, 2010. After a briefing on the algal pulp processing technology by Mr. Hack Churl You, C.E.O. of Pegasus International, Korea, they had an intensive tour of the facilities for processing

algal paper and bio-ethanol from red algae. Minister Noh Bin Omar said that Malaysia has a huge potential for development of seaweed cultivation and that the government would provide support to seaweed business and industry. Mr. You mentioned that seaweeds are becoming more important as staple commodities, serving food, medicine, cosmetics, paper, and biofuel purposes in Korea these days. 



16. Group photo of Minister Noh Bin Omar and Professor Aishah Binti Salleh with colleagues in front of the Myrang Branch of Pegasus International.

17. Minister Noh Bin Omar touring facilities for processing algal paper and bio-ethanol from red algae.

UPCOMING EVENTS

- 1) **United Nations Climate Change Conference, COP16** (The 16th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC), November 29 – December 10, 2010, Cancun, Mexico
<http://www.cc2010.mx/en/index.htm>
Proposed Exhibition
Seaweed Solution - Sink and Swim!, The Marine Research Institute, Pusan National University
http://unfccc.int/side_events_exhibits/items/5778.php
- 2) **IOC/WESTPAC, 8th International Scientific Symposium** -"Ocean Climate and Marine Ecosystems in the Western Pacific", March 28-31, 2011, Paradise Hotel, Busan, Korea
http://www.kocean.or.kr/westpac_symposium
- 3) **The 6th Asia-Pacific Phycological Forum**, October 9-14, 2011, Yeosu, Korea
<http://www.appf2011.org>

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