



CO₂ Removal by Seaweed



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

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

Newsletter

Issue No. 3 December 1, 2008

The 4th Workshop of the Working Group for the Asian Network for Using Algae as a CO₂ Sink

The 4th Workshop of the Working Group for the Asian Network for Using Algae as a CO₂ Sink was convened as a satellite meeting of the 5th Asian Pacific Phycological Forum, November 10-14, 2008 at the Rutherford House, Victoria University, Wellington, New Zealand. The program included the hands on CO₂ workshop, "Measurement of primary productivity of marine macroalgae and seagrass".

A total of 12 members from 10 countries were in attendance: John Beardall (Australia), Zhengyu Hu (China), Put O. Ang Jr. (Hong Kong), Dinabandhu Sahoo (India), Grevo S. Gerung (Indonesia), Sung Min Boo (Korea), Ik Kyo Chung (Korea), Jin Ae Lee (Korea), Hiroshi Kawai (Japan), Siew Moi Phang (Malaysia), Wendy Nelson (New Zealand) and Yuwadee Peerapornpisal (Thailand). Four new observers, Prof. Jana Tjahjana Anggadiredja, Agency for Assessment & Application of Technology, Indonesia, Mr. You Hack Churl, C.E.O., Pegasus International, Korea, Prof. Catriona Hurd, University of Otago, New Zealand and Prof. Khanjanapaj Lewmanomont, Kasetsart University, Thailand, participated in the workshop.

The workshop agenda was as follows: 1) to review and endorse the Meeting Report of the 3rd Workshop of the working group, 2) to present the interim report of the Network on publication, R&D, and Network activities, 3) to discuss the

membership of the Working Group of the Asian Network for Using Algae as a CO₂ Sink, APPA, 4) to discuss the convening of follow-up meetings.

Prof. John Beardall informed the group of the progress of a review paper on the using marine algae for carbon sequestration, which will be published in the Journal of Applied Phycology. The research proposal of Charles Vairappon, the University of Malaysia Sabah, for a photosynthesis monitoring system would involve the collaboration of the network members, John Beardall and Jin Ae Lee. The Network activities at the 4th Global Conference on Oceans, Coasts, and Islands, "Advancing Ecosystem Management and Integrated Coastal and Ocean Management in the Context of Climate Change", Hanoi, Vietnam, 7-11 April 2008, and at the 11th International Conference on Applied Phycology, Galway, Ireland, 21-27 June 2008 were reported in detail. It was agreed that the present membership system entailing a single representative from each country will be basically maintained, and that others will be invited as observers for specific future meetings.

As a part of their Network activities, Working Group members will participate and present the work at South China Sea 2008, Kuantan, Malaysia, 25-29 November 2008, United Nations Climate Change Conference, Poznan, Poland, 1-12 December 2008, and at the World Ocean

Conference, Manado, Indonesia, 11-15 May 2009. The meeting ended with the announcement that the 5th Working Group workshop will be held during the 9th International Phycological Congress, August 2-8, 2009, Tokyo, Japan, and

that Prof. Hiroshi Kawai will provide prior to the conference, lab facilities at the Kobe Marine Station for a one-week hands-on training programme in CO₂ measurement. 



1. The 4th Workshop of the Asian Network for Using Algae as a CO₂ Sink was convened at Rutherford House, Victoria University, Wellington, New Zealand, during the 5th APPF, November 10-14, 2008.



2. APPA president Prof. SM Phang and the secretary, Prof. JA Lee, preside over the APPA working group meeting of the Network at the 4th workshop in Wellington.



3. The participants having a discussion on the membership of the Working Group of the Asian Network for Using Algae as a CO₂ Sink, APPA.



4. The participants having a discussion on the convening of follow-up meetings.



5. APPA working group members of the Network having a working lunch at the workshop.



6. Group photograph of the members of the Network at the 4th workshop at Rutherford House, Victoria University, Wellington, New Zealand.

The 5th Asian Pacific Phycological Forum, November 10-14, 2008, Wellington, New Zealand

The 5th Asian Pacific Phycological Forum was successfully held at Rutherford House, Victoria University, Wellington, New Zealand, November 10-14, 2008. The forum was hosted and sponsored by Victoria University of Wellington, the National Institute of Water and Atmospheric Research (NIWA) and the Australian Society for Phycology and Aquatic Botany (ASPAB) under the auspices of the Asian Pacific Phycological Association. More than 230 delegates from over 20 countries of the Asia-Pacific region participated in the forum. In the era of unprecedented global climate change, the major theme of the forum was

determined to be "Algae in a changing world". There were 9 mini-symposia deliberating various topics in phycology including the "Acidification / Climate change". President Siew Moi Phang of the Asian Pacific Phycological Association expressed deep respect for the activities of the Asian Network for Using Algae as a CO₂ Sink in her opening address. Prof. Ik Kyo Chung, Pusan National University, Korea gave the plenary address to the forum on "Seaweed solution: Coastal adaptation and mitigation measures in the context of climate change." 



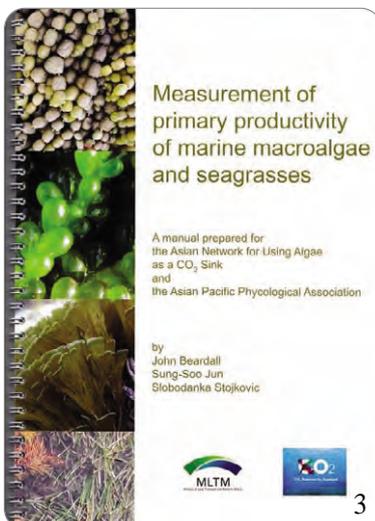
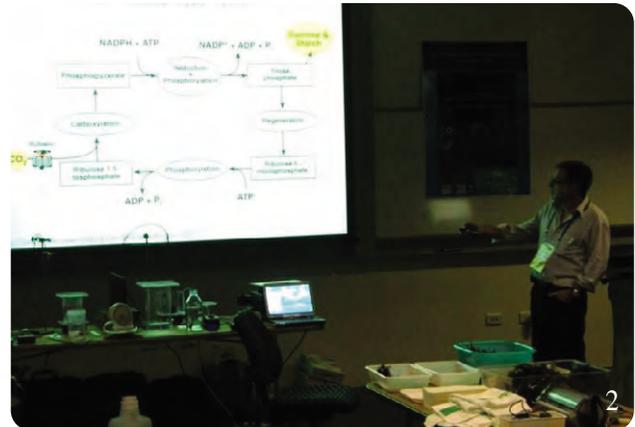
1. The major theme of the 5th Asian Pacific Phycological Forum (APPF), which was deemed appropriate in an era of unprecedented global climate disruption, was "Algae in a changing world."
2. APPA president Prof. SM Phang giving the opening remarks of the 5th APPF, emphasizing the activities of the Asian Network for Using Algae as a CO₂ Sink.
3. Prof. IK Chung giving the plenary address to the 5th APPF on "Seaweed solution: Coastal adaptation and mitigation measures in the context of climate change."
4. Group photograph of the participants at the 5th Asian Pacific Phycological Forum, Victoria University, Wellington, New Zealand, November 10-14, 2008.

The CO₂ Workshop on the Measurement of Primary Productivity

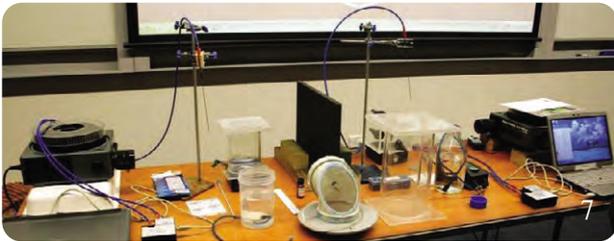
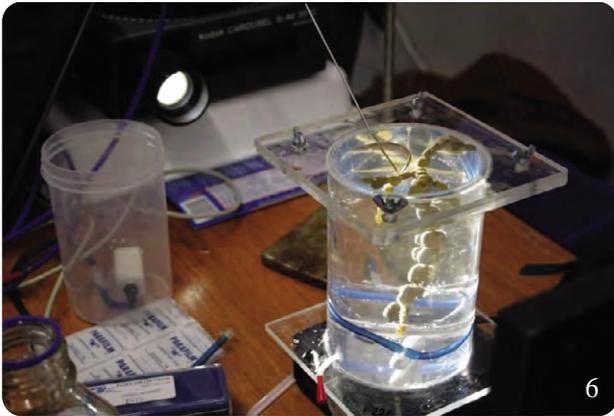
The 1st hands on workshop on the measurement of the primary productivity of marine macroalgae and seagrass under the auspices of the Asian Network for Using Algae as a CO₂ Sink and APPA was held at Rutherford House, Victoria University, Wellington, New Zealand during the 5th APPF, November 10-14, 2008. The workshop was prepared by Prof. John Beardall and Dr. Slobodanka Stojkovic, Monash University, Australia, and Prof. Sung-Soo Jun, Kyungwon University, Korea with the assistance from Prof. Catriona Hurd, Dr. Chris Hepburn and research assistants from Otago University, New Zealand. The workshop was financially supported by the Project "CO₂ removal by seaweeds", the Ministry of Land, Transport and Marine Affairs, Korea, the manual for the workshop having been provided to all of the

registrants of the 5th APPF. More than 40 phycologists from the Asia-Pacific region joined in the fruitful hands-on workshop.

The workshop was carried out with an introduction on photosynthesis and carbon assimilation, biomass changes as estimates of primary productivity, measurements based on uptakes of inorganic carbon, measurements based on the evolution of oxygen, measurements based on chlorophyll fluorescence and application of techniques to field situations. Prof. John Beardall strongly recommended that all productivity data, in order to facilitate useful comparison with other values in the literature, be expressed on a number of bases, including per gram dry weight, per gram chlorophyll a, per gram wet weight and per unit surface area. 



1. The 1st hands-on workshop on the measurement of primary productivity of marine macroalgae and seagrasses for the Asian Network for Using Algae as a CO₂ Sink and APPA was held at Rutherford House, Victoria University, Wellington, New Zealand, during the 5th APPF, November 10-14, 2008
2. The workshop was run by Prof. John Beardall (Monash University) with assistance from Prof. Catriona Hurd, Dr. Chris Hepburn, and research assistants from Otago University.
3. The workshop was financially supported by the Project "CO₂ removal by seaweeds", the Ministry of Land, Transport and Marine Affairs, Korea; the workshop manual was provided to all registrants of the 5th APPF.



4-5. More than 40 phycologists from the Asia-Pacific region joined in the fruitful hands-on workshop.

6-7. The workshop introduced the major techniques of oxygen exchange, carbon assimilation and chlorophyll fluorescence with a demonstration of optodes and fluorometry.

8. Group photograph of the participants of the workshop on the measurement of primary productivity of marine macroalgae and seagrasses in Wellington, New Zealand.



Selected Media Coverage of Member Countries of algae as CO2 Sink or Biofuel

Coal-sequestering algae announced

Joint venture for coal-sequestering algae announced
 Posted by [Walter](#) on November 21, 2007



The Australian firms, [Cyan Energy](#) and [BioCoast](#), have partnered together in a joint venture to sequester carbon dioxide emissions from Australia's coal-fired power plants to use as feed for fertiliser, while sequestering its produce as additional energy.

The companies will spend \$5 million to build a prototype reactor in Christmas, which will use the carbon dioxide emissions from the power plant to grow algae, which will then be dried and used as biofuel or as the original fertiliser.

Algae is considered a superior source of biofuel feed, since the organism can easily absorb carbon dioxide from the power plant's emissions, with 100 per cent removal possible but unlikely due to the required costs.

"We're very confident we're going to be able to make a significant impact on emissions," added [Helen](#), director of coal research at BioCoast.

The joint venture is expected to start building a full-scale bio-reactor, at an estimated cost of \$20 million to \$40 million.

An earlier project, in a similar-based company, is also working to refine a full spectrum of algae to convert into biofuel. Further plans to produce 100 million litres of biofuel annually, using carbon dioxide and various other emissions from the La Trobe coal-fired power station.

With [Walter](#), managing director for [BioCoast](#), says that the process could produce 10 to 100 times as much biofuel per hectare as crop-based biofuels, such as sorgho. The first tonnes of algae-based biofuel could be produced within five years.

(Source: [GreenSourceMedia](#), [Star News Group](#))

<http://www.fishbase.org.au/news/2007/11/21/joint-venture-for-coal-sequestering-algae-announced/>

Australia

Algae: New Source of Biofuel



海藻：生物燃料的新来源

海藻被认为是生产生物燃料的理想原料。中国科学院大连化学物理研究所的研究人员表示，他们正在开发一种新的海藻生物燃料生产方法。这种方法利用海藻的固氮能力，可以在没有外加氮源的情况下生长，从而降低生产成本。此外，海藻的生长速度非常快，可以在短时间内收获多次。研究人员还发现，海藻的油脂含量很高，是生产生物柴油的理想原料。目前，该研究所已经建立了一个中试规模的藻类培养系统，并正在进行进一步的优化和放大研究。

<http://www.sina.com.cn/tech/2007-11-23/09111725214.shtml>

China

Algae Becomes the New Favor of Biofuel



藻类成为生物燃料的新宠

随着全球对清洁能源的需求日益增长，生物燃料成为替代化石燃料的理想选择。近年来，藻类作为生物燃料的原料受到越来越多的关注。藻类具有生长速度快、油脂含量高、不占用耕地等优点。中国科学院大连化学物理研究所的研究人员表示，他们正在开发一种新的海藻生物燃料生产方法，旨在降低生产成本，提高生产效率。此外，藻类还可以吸收二氧化碳，有助于减少温室气体排放。目前，该研究所已经建立了一个中试规模的藻类培养系统，并正在进行进一步的优化和放大研究。

<http://www.sina.com.cn/tech/2007-11-23/09111725214.shtml>

China

All about algae: Can pond scum power our future?

by [Tara](#) on October 21, 2008



ALGAE: THE NEW FUEL - This year, the last thing the world had on its mind, was the "Tsunami" of energy. The world is now in a race to find a sustainable energy source that can power our future.

Algae is being seen to have a number of advantages over other biofuels. It can be grown in a wide range of environments, including in brackish water. It can be harvested and processed into biofuel in a relatively short time. Algae also has a high oil content, which makes it a good source of energy. Additionally, algae can be grown in a way that does not require the use of fertilizers or pesticides, which makes it a more sustainable option.

The potential of algae as a biofuel source is being explored by researchers around the world. In the United States, the [National Algae Biofuel Consortium](#) is working to develop a sustainable algae biofuel production process. In the United Kingdom, the [Algae Biofuels Project](#) is also working to develop a sustainable algae biofuel production process. In China, the [National Algae Biofuel Consortium](#) is also working to develop a sustainable algae biofuel production process.

<http://www.sina.com.cn/tech/2008-10-21/09111725214.shtml>

Hong Kong

"Algae Biofuels: The REAL Story" webinar.

Can Algae Biofuels Save the World's Growing Biofuel Needs? Upcoming Webinar Shares the Latest Commercialization Strategies and Challenges

October 21st, 2008

The webinar will feature speakers from the commercialization projects of [Algae Biofuels](#), [The REAL Story](#) webinar. This webinar is designed to provide a critical overview of the current state of the algae biofuel industry, including the latest commercialization strategies and challenges. The webinar will be held on October 21st, 2008, at 10:00 AM (GMT+8). The webinar is free of charge, but registration is required. To register, please visit www.algaebiofuels.com/webinar.

<http://www.algaebiofuels.com/webinar>

Hong Kong

Seaweeds and Global Warming



Seaweed can take on warming

Scientists are exploring the potential of seaweed as a biofuel source. Seaweed is a fast-growing, renewable resource that can be harvested and processed into biofuel. It also has a high oil content, which makes it a good source of energy. Additionally, seaweed can be grown in a way that does not require the use of fertilizers or pesticides, which makes it a more sustainable option. Researchers are currently working to develop a sustainable seaweed biofuel production process.

<http://www.timesofindia.com/2007/10/23/09111725214.shtml>

India

Genetically Engineered Algae - A Powerhouse of Hydrogen Fuel



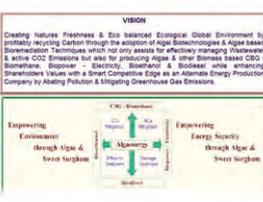
Genetically Engineered Algae - A Powerhouse of Hydrogen Fuel

This article discusses the potential of genetically engineered algae as a source of hydrogen fuel. Algae can be genetically modified to produce hydrogen gas, which can be used as a clean, renewable energy source. Researchers are currently working to develop a sustainable algae biofuel production process.

<http://www.oneindia.com/2007/10/23/09111725214.shtml>

India

Algae Biofuels



Algae Biofuels

The diagram illustrates the process of algae biofuel production. It shows the flow from algae cultivation to biofuel production. The process involves the cultivation of algae in a bioreactor, followed by harvesting and processing into biofuel. The biofuel can then be used for various applications, such as transportation and power generation.

<http://www.algaebiofuels.com>

India

Algae Biofuel Summit 2008



Algae Biofuel Summit 2008

The summit will focus on the latest developments in the algae biofuel industry, including the latest commercialization strategies and challenges. The summit will be held on October 21st, 2008, at 10:00 AM (GMT+8). The summit is free of charge, but registration is required. To register, please visit www.algaebiofuels.com/summit.

<http://www.algaebiofuels.com/summit>

India

Kertas dari Rumput Laut, Mengapa Tidak?



Kertas dari Rumput Laut, Mengapa Tidak?

This article discusses the potential of seaweed as a source of paper. Seaweed is a fast-growing, renewable resource that can be harvested and processed into paper. It also has a high cellulose content, which makes it a good source of paper. Additionally, seaweed can be grown in a way that does not require the use of fertilizers or pesticides, which makes it a more sustainable option. Researchers are currently working to develop a sustainable seaweed paper production process.

<http://www.kompas.com/2007/07/23/09111725214.shtml>

Indonesia

Manado Post



Manado Post

This article discusses the investment of Pegasus Inc. in Indonesia. Pegasus Inc. is a company that specializes in the production of biofuel from seaweed. The company has invested in Indonesia to develop a sustainable seaweed biofuel production process.

<http://www.manadonews.com/2007/09/23/09111725214.shtml>

Indonesia

Research for JP-8 (jet fuel) from biofuel of algae



Research for JP-8 (jet fuel) from biofuel of algae

This article discusses the research being conducted to develop a sustainable jet fuel from algae. Algae is a fast-growing, renewable resource that can be harvested and processed into jet fuel. It also has a high energy density, which makes it a good source of jet fuel. Additionally, algae can be grown in a way that does not require the use of fertilizers or pesticides, which makes it a more sustainable option. Researchers are currently working to develop a sustainable algae jet fuel production process.

<http://www.researchgate.net/2007/07/23/09111725214.shtml>

Japan

Bioethanol production (4 million ton/yr) research from 2013



Bioethanol production (4 million ton/yr) research from 2013

This article discusses the research being conducted to develop a sustainable bioethanol production process from 2013. Algae is a fast-growing, renewable resource that can be harvested and processed into bioethanol. It also has a high energy density, which makes it a good source of bioethanol. Additionally, algae can be grown in a way that does not require the use of fertilizers or pesticides, which makes it a more sustainable option. Researchers are currently working to develop a sustainable algae bioethanol production process.

<http://www.comenews.com/2007/06/23/09111725214.shtml>

Japan

UPCOMING EVENTS

United Nations Climate Change Conference

- COP 14 (The 14th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC))
 - The 4th Session of the Meeting of the Parties to the Kyoto Protocol
- 1-12 December, 2008
Poznan, Republic of Poland

Proposed Side Event & Exhibition

- Greenhouse gas emissions reduction using seaweeds Marine Research Institute, Pusan National University & Pegasus International Inc (Organizer: Ik Kyo Chung, Pusan National University, Korea)
- http://www.woc2009.org/woc_toward.php

World Ocean Conference

11-15 May, 2009
Manado, Indonesia

- International Ocean Science, Technology, and Policy Symposium 2009
- Sessions 32. Asian Network for Using Algae as a CO₂ Sink
: Seaweed Industry in the Context of Climate Change
Ik Kyo Chung (Chairman) & Grevo Gerung (Local organizer)
- http://www.woc2009.org/woc_toward.php

IXth International Phycological Congress

2-8 August, 2009
the National Olympic Memorial Youth Center
Tokyo, Japan

- Symposium "Algae, biofuel and CO₂ sequestration", (Organizer: Ik Kyo Chung, Pusan National University, Korea)
- <http://www.ec-japan.jp/ipc9>

The members of the Working Group for the Asian Network for Using Algae as a CO₂ Sink, Asian Pacific Phycological Association

Prof. Siew-Moi Phang
President of Asian Pacific Phycological Association
University of Malaya, Kuala Lumpur 50603,
MALAYSIA

Prof. John Beardall, Monash University, Victoria
380, AUSTRALIA

Prof. Zhengyu Hu, Chinese Academy of Sciences,
Wuhan 430072, CHINA

Prof. Put O. Ang, Jr, The Chinese University of
Hong Kong, Hong Kong SAR, CHINA

Prof. Dinabandhu Sahoo, University of Delhi, Delhi
110007, INDIA

Prof. Grevo S. Gerung, Jl. Kampus Bahu, Manado
95115, INDONESIA

Prof. Hiroshi Kawai, Kobe University, Kobe 657-
850, JAPAN

Prof. Sung Min Boo, Chungnam National
University, Taejon 305-764, KOREA

Prof. Ik Kyo Chung, Pusan National University,
Pusan 609-735, KOREA

Prof. Jin Ae Lee, Inje University, Gimhae 621-749,
KOREA

Prof. Charles Santhanaju Vairappan, University of
Malaysia Sabah, Sabah 88999, MALAYSIA
Dr. Wendy A. Nelson, NIWA, Wellington
6241, NEW ZEALAND

Prof. Danilo Largo, University of San Carlos, Cebu
City 6000, PHILIPPINES

Prof. Yuwadee Peerapornpisal, Chiang Mai
University, Chiang Mai 50200, THAILAND
Dr. Dang Diem Hong, Vietnamese Academy
of Science & Technology, Hanoi 10000,
VIETNAM

CONTACT

Prof. Siew-Moi Phang

President

Asian Pacific Phycological Association
Institute of Biological Sciences
University of Malaya
Kuala Lumpur 50603, MALAYSIA
phang@um.edu.my

Prof. Jin Ae Lee

Editor & Secretary

The Asian Network for Using Algae as a CO₂ Sink
Asian Pacific Phycological Association
School of Environmental Science & Engineering
Inje University Gimhae 621-749, KOREA
envjal@inje.ac.kr