ENERGY STUDIES INSTITUTE

Topic: The Water-Energy Nexus: Saving water and energy in rice production

Speaker: Dr. Bas Bouman, International Rice Research Institute, Los Banos, Philippines

Date: 10th March 2010

Time: 10:00 am to 12:00 noon

Venue: ESI Conference Room
29 Heng Mui Keng Terrace
Block A #10-01
Singapore 119620

For those interested in attending, please send us your name, organisation, designation and email address to esibox2@nus.edu.sg .

## About the seminar:

The water-energy nexus is an understudied field. To oversimplify the issue, water is needed to produce energy and energy is required to process and move water. Given this reality, there is a positive co-relation between water and energy and thus, by default, between water consumption and greenhouse emissions. Consequently, efforts to decrease water consumption globally must be an integral part of the global efforts for mitigating the devastating greenhouse emissions and particularly global warming.

Added to growing consumption of water for personal and industrial purposes, food production is accounting for major global water requirements. While many varieties of agricultural products of global demand (e.g., wheat and corn) are water-intensive, rice is especially so requiring much larger amount of water during the course of its production. It is therefore more energy-intensive than many other crops. Against this background, efforts to reduce water consumption for cultivating rice are especially important given the sheer size of the undertaking as the land used globally for such cultivation is about 150 million hectares producing around 600 million tons of rice for global consumption.

In cultivating rice, farmers aim to maintain 5-10 cm flooded conditions on their field. Because of this, rice production requires two to three times more water than producing similar food products (e.g., wheat). To quantify this, the production of a kilo of rice requires about 2,500 liters of water. Out of this, some 1,400 liters evaporate into the air while the remainder flows into creeks or into the groundwater and can be reused.

Such water consumption is not sustainable globally because of its major contribution to environmental degradation, particularly global warming and also because of the growing scarcity of fresh water thanks to rapid depletion of its resources. Unsurprisingly, water for agrarian purposes is decreasing worldwide. Having a major impact on all types of cultivation, its negative impact on rice farming is estimated to affect 15to 20 million hectares of irrigated rice land by 2025. It is therefore imperative to find ways to produce rice whose demand is increasing with less water.

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To meet this challenge, various cultivation methods and technologies have been envisaged, developed and implemented with a varying degree of success towards achieving this objective. Of these, some can potentially decrease the required water for rice production up to 30 percent without causing any yield loss.

Over the last few decades, the proportion of pumping in irrigation has increased dramatically through the spread of both small-lift pumps and of large pumps drawing water from deep wells or from lower-lying reservoirs and rivers. In India and China (together producing 300 million tons of rice using 70 million hectares of land), it is estimated that 60-70% of all irrigation is by wells. Therefore, reducing water use through the introduction of water-saving technologies will also contribute greatly to reduced energy use for pumping. For both individual farmers with small pumps and for larger pump-based irrigation systems, the reduced cost for pumping is one of the main drivers for adoption of water-saving technologies. With irrigated rice being the largest user of developed water resources, the adoption of water-saving technologies can have large impacts on reducing energy use as well.

## About the Speaker:

Dr. Bas Bouman is the Head of the Crop and Environmental Sciences Division and the Leader of Intensive Rice Production Systems Program of the International Rice Research Institute (IRRI). Having a Bachelor's and a Master's degrees in Civil engineering/ irrigation and drainage and a Ph.D. degree focused on remote sensing and crop modeling for yield prediction from Agricultural University Wageningen/the Netherlands, he draws on 23 years of experience gained through working in different senior capacities for the Research Institute for Agrobiology and Soil Fertility (AB-DLO, former CABO) in Wageningen in the field of agro-ecology, Wageningen Agricultural University and the Centre for Research and Education in Tropical Agriculture (CATIE) in Costa Rica. He has worked since 1999 for IRRI in different senior capacities. His other professional engagements include editorial Board membership in Journal of Agricultural Sciences, Crop Science and Biotechnology, Agricultural Systems and Rice Science as well as being Adjunct Professor in the Department of Agronomy, University of the Philippines, Los Baños. Dr. Bouman has extensive publications, including authoring two and co-editing five books, 74 international peer-reviewed journal articles and 157 peer-reviewed book chapters, proceedings, conference papers and other publications

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