FEB 28/13

NEWRI UPDATE

STAY CONNECTED WITH NEWRI - YOUR GLOBAL RESEARCH & TECHNOLOGY PARTNER

DHI-NTU

SMTC

R3C

AEBC

ECMG

EE2

NEWRITech

N.PhD

Dear Colleagues:

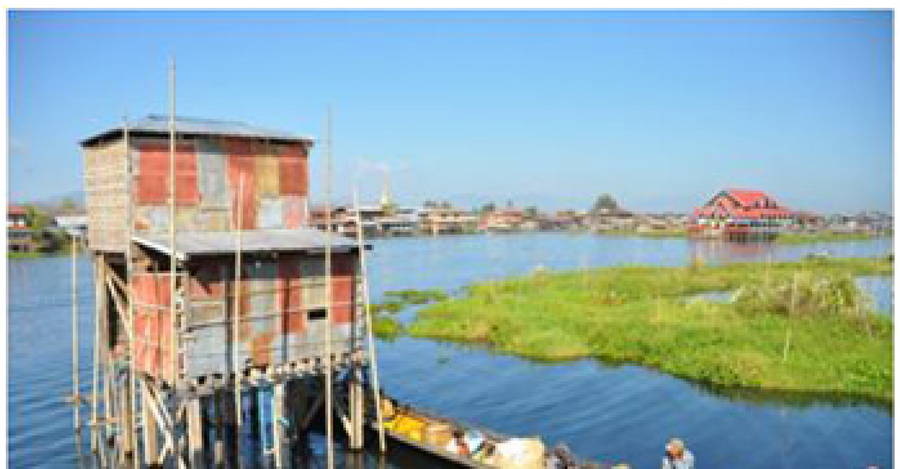
I take this opportunity to wish you all that is good in 2013. Much has happened at NEWRI in 2012 but I should think 2013 shall be no less exciting. NEWRI continues to deepen its scientific research efforts while widening application of technologies developed from the research outcomes. This NEWRI Newsletter is sent to you to provide you with an update of activities already undertaken and those which shall be undertaken soon.

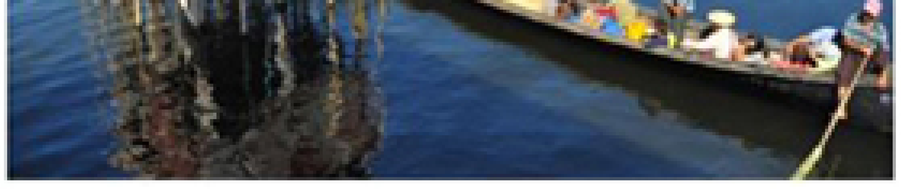
1. NEWRI IN THE 2nd PHASE:

I am pleased to inform we anticipate funding for NEWRI ecosystem's second phase operation soon. The total budget for this phase of operation is S$132.5M and this funding comes on the basis of NEWRI's research-translation-development performance over the last 5 years. With this funding, NEWRI's cumulative funding from all sources is expected to reach some $400M by the end of this phase. I take this opportunity to thank you for your support without which such performance would not have been possible and with which it has become possible for NEWRI to continue pursuit of good science, novel technologies, and relevance to community and industry.

2. NEWRI EE-2 IN MYANMAR:

NEWRI as a research organisation is almost unique in that it carries its own philanthropic unit, Environmental Endeavour-2, which is supported by the Lien Foundation. EE-2 is an important component of the NEWRI ecosystem because it allows NEWRI, with its technical capabilities, to reach out to communities in the region and offer assistance in the clean water and good sanitation domains. The activities undertaken aside from helping those less fortunate also provide opportunities for NEWRI's researchers and students to be involved in project implementation and at locations outside of Singapore. Such experience can be very useful when these researchers and students go on to develop careers after their stay at NEWRI. The EE-2 team is working on provision of clean water for local residents, the Intha. The team visited Nyaung Shwe, the base town, on 10 Oct 2012 to review the ongoing project with LEF Dr Khin (Lien Environmental Fellow) and to investigate possibilities for expansion of activities. The





team was fortunate to have the opportunity to meet with colleagues and students from Yezen Agricultural University and Taunggyi University, and with the Minister of Inn National Development, His Excellency U Win Myint. Lake Inle is an ASEAN Heritage Site famed for its floating market gardens. For more information on EE-2 and opportunities for participation, do contact NEWRI-EE-2 Senior Manager Panner at dpselvam@ntu.edu.sg. I attach an EE-2 photo-essay on the project for your information.

3. VTT TEAM VISITS NEWRI:

A delegation from VTT of Finland led by Prof Suokas visited NEWRI's laboratories on 9 Oct 2012. VTT is a comprehensive national R&D organization which carries research clusters with interests which have overlaps with NEWRI's R&D interests. Such overlaps where complementary are important as these offer opportunities for collaboration. NEWRI is exploring such collaboration with VTT and possibilities of attachments for NEWRI's researchers and students in Finland. Following the management meeting on 9 Oct was a joint NEWRI-VTT Research Cooperation Workshop from 22Oct to 23Oct 2012, led by VTT's Principal Scientist Mona Arnold and NEWRI's Cluster Leader Tang Chuyang. The researchers exchanged research interests on environmental biotechnology & bio-refinery, membrane & advanced oxidation technologies, environmental modeling & monitoring, and resource reuse & reclamation. Research leaders, from VTT and NEWRI, also explored research directions during the workshop.

Image courtesy of David Castillo Dominici/ FreeDigitalPhotos.net

4. NEWRI-SMTC WINS EWI PROJECTS:

Membrane technology plays a key role in Singapore's move into water reclamation and desalination. An important goal is to make the membrane processes as sustainable as is possible. In late 2012 SMTC won three projects in the EWI Request-for-Proposal (RFP) Research Programme Call RFP 11/02. The topics of the projects include (a) the advancement of two-stage anaerobic fluidized bed membrane bioreactor for energy positive sewage treatment; (b) a novel extractive membrane bioreactor for recalcitrant organics removal; and (c) the development of pressure retarded osmosis (PRO) membranes with high power density for osmotic power harvesting. It is anticipated successful implementation of the projects shall contribute to the development of novel membrane technologies with improved sustainability for water and wastewater processing by either energy production or reduced energy consumption.

Image courtesy of jscreationzs / FreeDigitalPhotos.net

5. NEWR-AEBC MAKES TECHNOLOGY DISCLOSURES:

At NEWRI, technology disclosures are made before the process of patent filing is initiated. Novelty and IP (intellectual property) ownership are important because NEWRI works towards establishing presence in both the scientific and industry worlds.

towards establishing presence in both the scientific and industry worlds. NEWRI bridges these two worlds and hence the need for industry relevance. Consequently while publication of scientific outcomes in journals and other learned publications is actively pursued, it is not considered sufficient. All NEWRI research, translation and development units also make technology disclosures and thereafter pursue these further where appropriate. AEBC has recently made technology disclosures or filed for patents on the following –

Image courtesy of Stuart Miles / FreeDigitalPhotos.net

a. CO2 capture and conversion for enhanced energy recovery (TD.7);

b. WAS pretreatment with sonication and enzymes for improved biogas production (TD.10);

c. Thermal-alkaline sludge treatment for enhanced anaerobic destruction of solids (TD.11);

d. C-capture to reduce loads ahead of aerobic processes with bio-augmentation and bio-sorption (TD.14).

6. VIEW POINT: "RELEVANCE OF PROCESS MODELLING" – PROF TAN SOON KEAT:

"On-line and direct measurements of physical, chemical, and biological properties can be expensive and consequently are not typically incorporated in process monitoring for economic reasons. Instead, such data are derived through data modelling techniques. Regression and statistical methods are frequently adopted for estimating the principal process variables. Other models such as those based on artificial neural networks (ANN), neuro-fuzzy systems, and Gaussian process regression methods, are also widely accepted as useful techniques for online prediction. The current development in NEWRI hinges on "soft sensor" and process model based on recursive or adaptive technique using a moving-window to adapt to changes in the process." ~ Prof Tan Soon Keat (Deputy Executive Director, NEWRI)

Publications in the domain include:

1. **Wangdong Ni**, Ke Wang, Tao Chen, Wun Jern Ng, Soon Keat Tan. Gaussian process regression with online adaptive filtering and correction for data-driven modeling of dynamic systems. **Control Engineering Practice**, 2012, 20: 1281-1292.

2. **Wangdong Ni**, Soon Keat Tan, Wun Jern Ng, Steven D. Brown. A local adaptive soft sensor for dynamic process modeling. **Industrial & Engineering Chemistry Research**, 2012, 51: 8025-8039.

3. **Wangdong Ni**, Soon Keat Tan, Wun Jern Ng. Recursive GPR for nonlinear dynamic process modeling. **Chemical Engineering Journal**, 2011, 173: 636-643.

Till the next update – best wishes,

Prof WJ Ng
Executive Director - NEWRI

NANYANG TECHNOLOGICAL UNIVERSITY
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NEWRI ECOSYSTEM
Your Global Research & Technology Partner

EE2 PHOTO ESSAY:

SUSTAINING THE INTHA COMMUNITY AT INLE LAKE

HOLISTIC DEVELOPMENT BY THE LIEN ENVIRONMENTAL FELLOWSHIP

Decline in the traditional and unique mode of Intha fishing is partly due to lake pollution.

Whilst tourism can potentially lift the economy, there is a need to protect Inle Lake, an ASEAN heritage site.

Yezin Agricultural University (YAU) students work with NTU staff and students, to help conduct tests to assess water quality.

Lien Environmental Fellow, Dr Khin Lay Swe, plans to encourage more sustainable organic farming, at the floating market gardens, a traditional farming activity and tourist attraction.

Appropriate waste dye management will also need to be encouraged for the traditional silk and lotus fibre weaving factories.

Most water sources such as wells and storage tanks are not adequately protected from contamination.

Families have to travel long distances to collect spring water from the hills as lake waters have become increasingly polluted.

Engaging government and community helps the LEF team understand ground-level sentiments before designing clean water supply solutions.

The LEF supports local stakeholders to sustainably use Inle Lake so that it shall not be a heritage lost to the young Intha.