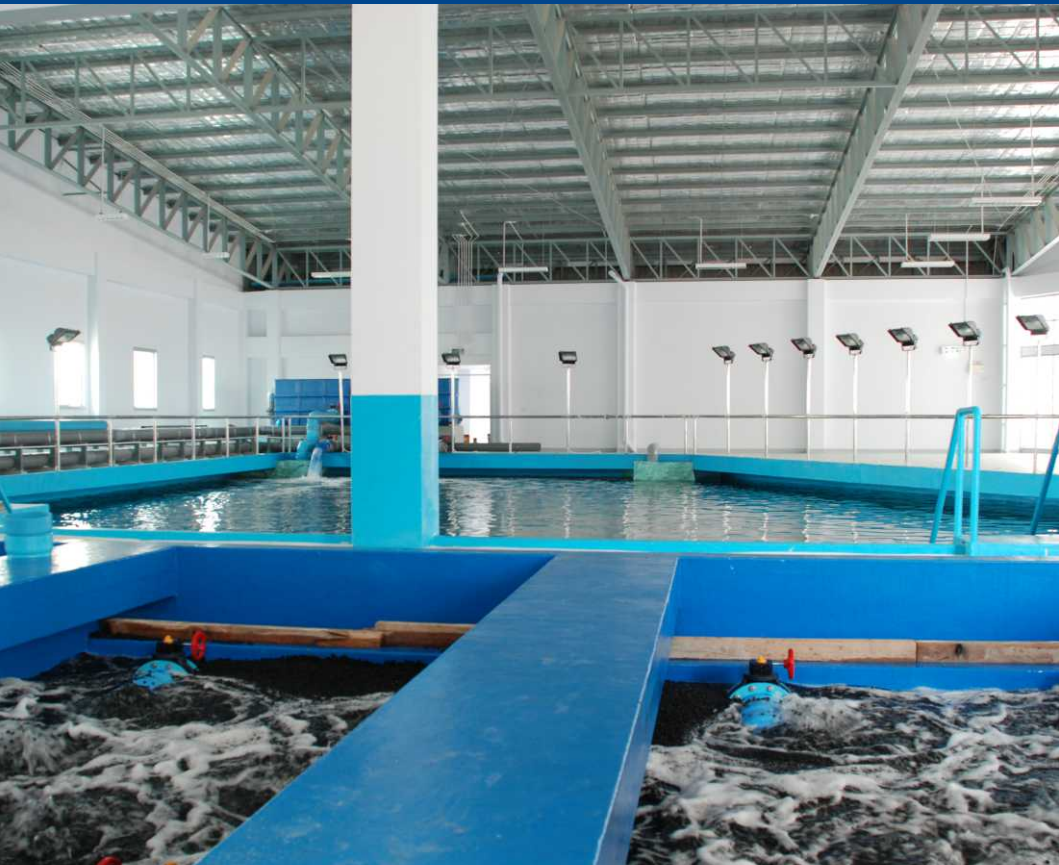


Recirculating Aquaculture Systems & Aquaponics

Design, Engineering, Operation and Management

*Aquaculture and Aquatic Resources Management
Professional Training Series*



9 – 13 November 2015

AIT Conference Centre, Asian Institute of Technology, Bangkok, Thailand



AIT
Asian Institute of Technology

Recirculating Aquaculture System (RAS) is a time-tested technology that has come to stay as a means of conserving water. RAS offers the advantages of reduced use of water and land area, better manoeuvrability of culture conditions, and greater efficiency in the use of natural resources. However, Recirculating systems for fish and shrimp are generally expensive to construct and involve complex operation protocols. Proper training is required to operate Recirculating systems for successful operation and maintenance.

Aquaponics works a step ahead, offering to integrate recirculating aquaculture with plant production systems. This has become popular because of the fact that water treatment is handled in an eco-friendly manner. Waste discharge is eliminated and stocking density can be increased for maximum yield while it benefits from the plants cultured. However, just like RAS, aquaponic systems also often involve complex management and operation procedures, and so would need expert training to acquire the best practical skills.

This training organized by AARM, AIT seeks to provide you with various scenarios of RAS and Aquaponics such as High- tech commercial RAS; Simple, Low technology RAS; high-tech commercial aquaponic systems; and RAS involving seaweeds for aquariums and hatcheries.

Innovative designs that involve low technology input while also conserving use of power are key to achieving sustainability and environmental friendliness. This course will focus on the delivery of knowledge to guide farmers and entrepreneurs in this direction and seek to improve productivity while keeping costs low. Aspects of design, engineering and management that have a wide range of applications will be dealt with.

Who should attend?

The training is intended for:

- Practicing fish and shrimp farmers
- Farm and hatchery managers
- Progressive entrepreneurs
- Researchers in R & D institutions
- Government officers involved in aquaculture and fisheries
- Water conservation experts
- Agriculturists, and
- Enterprising agriculture/aquaculture students from all over the world.

Environmental protection enthusiasts are also welcome to participate and share your knowledge and ideas.

The low-tech systems you learn here have wide range of applications in rural development



Hands-on training
at AIT's RAS and
Aquaponics facility, and
field visit to Marine
Aquarium Complex,
Burapha University,
Thailand.

Duration : 9 – 13 November 2015

Venue : AIT Conference Centre

Asian Institute of Technology, Bangkok, Thailand

RESOURCE PERSONS



James M. Ebeling, Ph.D.

Dr. James Ebeling obtained a Ph.D. in Biological Resources Engineering from the University of Maryland, College Park, Maryland, where he worked on the kinetics of biofilters operating in aquaculture systems. Currently James is an aquaculture engineer with experience spanning over thirty years, written an engineering text book on recirculating aquaculture system design (3rd edition just came out) with Dr. Michael Timmons from Cornell University (*The Yellow Book*), taught numerous workshops and short course (21 and counting) and designed both small scale (Boutique) and large scale commercial aquaculture systems. His background in aquaculture engineering comes from both theoretical and in the real world applications, having designed and constructed research facilities in Hawaii, Ohio, Maryland, and Louisiana. He is currently working with several high schools to design, construct and assist in management of small teaching aquaponics systems.



Wilson A. Lennard, Ph.D.

Wilson Lennard completed a Ph.D in Aquaponics from the Royal Melbourne Institute of Technology. Between 2004 and 2007, he served as a Scientific and Technical Director for Aquaculture and Aquaponics at *Minnamura Aquaponics* in Victoria, Australia. Here he was involved in design, construction, research, development and management of Australia's first truly integrated aquaponic facility with day-to-day management of the Murray Cod RAS and associated hydroponic component. His major skills and experiences include: Aquaponic system design and management, RAS aquaculture system design and management, algal and zooplankton culture, aquaria and aquatic system design and maintenance, water quality analysis and management, urban agriculture, water sensitive urban design, wetland plant production etc.



Vorathep Muthuwan, D.Tech. Sc.

Vorathep Muthuwan obtained a Doctor of Technical Science (Aquaculture) degree from the Asian Institute of Technology, Thailand in 1998. His core competencies include: Concept design and management of Public Aquariums, marine ornamental fish and invertebrate culture, water quality and management in aquaculture, integrated RAS for intensive shrimp culture, and Recirculating Aquaculture System Design. He is currently serving as the Deputy Director, Institute of Marine Science, Burapha University, Thailand.

Who is organizing the program?

Asian Institute of Technology (AIT) is a premier research University in Thailand established in 1959. Being in the hub of aquaculture activity, AIT has a specialized division catering exclusively to Aquaculture and Aquatic Resources Management (AARM) under the School of Environment, Resources and Development (SERD), who organizes this international training program.

Training Costs (1 week or 5 working days): 2200 USD/person (all inclusive)

(Payable to **'Asian Institute of Technology'** before **15 October 2015**. Bank details will be provided to interested participants). Please register early, as the slots will be filled on a first-in, first served basis.

This fee covers training fee, single accommodation in the AIT campus Hotel for 6 nights, all day meals (Breakfast, lunch, and two coffee breaks every day), local transportation for field visits, and administrative fee. Field visit will be arranged to the Marine Aquarium complex at Burapha University in Thailand. Please note that the Training Fee does not cover any international travelling, visa fees, personal travelling, phone calls, medical or insurance charges, contingencies, or any other costs towards such personal effects and miscellaneous expenses. Please arrange sufficient additional funds for all such expenses.

Topics Covered

Introductory remarks (Prof. C. Kwei Lin, AIT)

Recirculating Aquaculture System Engineering (Dr. James Ebeling)

- Overview of RAS Systems Engineering
- Engineering Design – Mass balance Loading and Growth
- Water Quality
- Culture Tank Design
- Solids capture
- Waste Treatment and Effluent Management
- Circulation/Pipe Flow and Pumps
- Biofiltration/Denitrification
- Gas Transfer – Oxygen/CO₂
- A design example
- Biosecurity and Fish Health
- Economics and Risk Assessment
- Group Task: Design of a Grow-out System

Low Cost RAS and Aquaponics Integration in the Tropics (Dr. Wilson Lennard)

- Overview of Low cost RAS and Aquaponics
- Principles of Low cost RAS approach
- Low Cost RAS Design
- Low Cost Fish Tanks and Filter Designs and Choices
- Low Cost RAS Management

- Protective Low Cost RAS & Aquaponic Structures for the Tropics
- Aquaponic System Design and Sizing
- Deep Flow Hydroponic Component Design and Sizing
- Aquaponic Nutrient Dynamics
- Commercial Aquaponic System Management and Operation
- Aquaponic System Buffering Regimes and species
- Aquaponic Food Safety
- Hobby Scale Aquaponics in Australia

Recirculating Systems for Public Aquarium (Dr. Vorathep Muthuwan)

- Recirculating system of a display tank at the Bangsaen aquarium, Thailand – a case study of 1,000,000 liter display tank
 - ◆ Design criteria and its components
 - ◆ Construction
 - ◆ System management
 - ◆ Advantages and disadvantages
- Using seaweed biofilter in a recirculating system for corals and marine ornamental fishes
 - ◆ Design criteria and its components
 - ◆ System management
 - ◆ Advantages and disadvantages



Dr. Krishna R. Salin

Course Director

Aquaculture and Aquatic Resources Management (AARM)

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