NACA Newsletter

Published by the Network of Aquaculture Centres in Asia-Pacific, Bangkok, Thailand

ISSN 0115-8503

Volume XXXIX, No. 4
October-December 2024

Training Programme on Safeguarding *Artemia* Resources for Aquaculture held in Rome

Participants in the training course during the field trip to Tarquinia Salt Works.

The Training Programme on Safeguarding Salt Lake Brine Shrimp (*Artemia*) Resources for Aquaculture was held in Rome from 2-6 September, as foreshadowed in the previous issue. The training was attended by 37 participants from 15 countries, namely: Belgium, Bolivia, Chile, China, Georgia, Iran, Italy, Kazakhstan, Russia, Saudi Arabia, Sweden, Thailand, USA, Uzbekistan, and Vietnam. 23 organisations were represented, including three government agencies, seven private sector, ten academic and one NGO.

The proceedings were opened by Xinhua Yuan, Deputy Director, Fisheries and Aquaculture Division, Food and Agriculture Organization of the United Nations (FAO).

Welcome remarks were delivered by Philippe De Maeyer, Permanent Secretary, Royal Academy of Overseas Sciences (RAOS); by Simon Wilkinson, Network of Aquaculture Centres in Asia-Pacific (NACA) / International Artemia Aquaculture Consortium (IAAC); and representative of the Alliance of National and International Science Organization for the Belt and Road Regions (ANSO).

The programme was jointly organised by FAO, NACA / IAAC, and by RAOS and ANSO, which provided the financial support that made the activity possible.

The programme featured a series of expert presentations on three themes: Salt lakes, management tools for *Artemia* cyst and biomass harvesting, and *Artemia* biodiversity.

The full programme is appended below, with links to video recordings of the presentations on NACA's YouTube channel.

For more information about the International Artemia Aquaculture Consortium, which is hosted as programme of NACA, please visit the consortium website at:

https://artemia.info

Programme

- Opening remarks
  Yuan Xinhua, Patrick Sorgeloos, and Simon Wilkinson

Salt lakes

- Hydrology and climatology of salt lakes: development and use of appropriate models to safeguard water resources, impact of climate change
  Alishir Kurban

- Presence and role of *Artemia* in salt lakes: biology and ecology, use in aquaculture
  Patrick Sorgeloos

- Urmia Lake, Iran: example of terminal lake, fate of *Artemia* presence
  Naser Agh

- Aral Sea, Uzbekistan: example of terminal lake, fate of *Artemia* presence
  Ablatdyin Musaev

Management tools for *Artemia* cyst and biomass harvesting

- History of the interdisciplinary approach by the State of Utah and stakeholder groups to develop strategy and policy to safeguard Great Salt Lake and its vital resources for wildlife and industry
  Thomas Bosteels and Tim Hawkes

- Management tools and quota systems for the exploitation of *Artemia* resources in China
  Gao Song

- Management tools and quota systems for the exploitation of *Artemia* resources in Siberia, Russia
  Liudmila Litvinienko and Marina Korentovich

- *Artemia* of Greate Yarovoye Lake (Siberia, Russia): characteristics of the population and Artemia resource development
  Galina Tsareva

- Management tools and quota systems for the exploitation of *Artemia* resources in Kazakhstan
  Chingis Sossorbarmayev

- *Artemia* pond production projects
  Nguyen Van Hoa and Patrick Sorgeloos

Artemia biodiversity

- AquaGRIS: the role it can play in characterising, recording and monitoring Artemia genetic diversity
  Graham Mair

- World *Artemia* biodiversity
  Gonzalo Gajardo

- *Artemia* biodiversity in China
  Sui Liying and Xuekai Han

- *Artemia* biodiversity in Russia
  Elena Boyko

- *Artemia* biodiversity in Kazakhstan
  Kamila Adyrbekova

- New techniques for (epi)genotyping of *Artemia* species and strains
  Parisa Norouzitallab

Group discussions

Participants and experts engaged in group discussions on:

- Biological aspects of salt lakes such as models to estimate the role of *Artemia* as a food source for water birds; sampling protocols and methodologies to estimate maximum sustainable yields for *Artemia* cysts and biomass; potential impacts of climate change, ecology and pathogens on *Artemia* populations; and guidelines for establishing sustainable management protocols, harvesting quota and seasons, and measures to enforce / adjust quotas during the harvesting seasons.

- Policy needs and legislative strategies to address issues such as protecting and managing terminal and emerging salt lakes, water resources, salinity regimes, nutrient intake and contamination. The group considered similarities and differences between terminal lakes under different contexts, the policy (legislative) goals required to ensure healthy and sustainable resources, barriers to progress towards these goals and strategies to overcome them.

- Farmed *Artemia* needs to focus on advancing sustainable management and genetic research of *Artemia* resources and salt lake ecosystems. Key actions include establishing a Task Force to apply AquaGRIS, an information system on aquatic biodiversity for food and agriculture (which will be the subject of a follow up article), for commercial *Artemia* sources, developing guidelines for ecosystem monitoring, and promoting sustainable harvest practices. Innovations like satellite imagery and drones should be explored to assess *Artemia* stocks. Joint research should link optimal *Artemia* usage to hatchery outcomes and address climate change impacts. Guidelines for *Artemia* cyst certification, biosecurity, and controlled farming should be developed, alongside preserving gene pools through cyst banks and characterising farmed types for commercial traits.

Videoconference with experts and recommendations

The discussions culminated in the development of a series of recommendations, which were further discussed and agreed during a videoconference on 6 September between the trainees at FAO HQ in Rome and experts at the Palais des Académies in Brussels. The final recommendations were as follows.

- Establish a Task Force to apply AquaGRIS for commercial *Artemia* sources using a stepwise approach to gathering and collating genetic information. The Task Force has been constituted and will begin work shortly.

- Develop guidelines for monitoring, adaptive management, conservation / water rights and sustainable harvest of salt lake ecosystems based on local biology and ecology.
- Share ideas about effective messaging to improve public perception of terminal salt lakes and their role, ecosystem services and socio-economic value.
- Advance the capabilities of *Artemia* stakeholders in translating science into clear and actionable protocols.
- Study the possibility of using innovations such as satellite imagery and drones to evaluate *Artemia* cyst accumulations / stocks and the status of salt lake ecosystems.
- Develop guidelines for *Artemia* cyst certification including good processing practices.
- Implement existing certification schemes for the sustainable harvesting and management of natural *Artemia* resources.
- Recommend good practices including biosecurity for *Artemia* hatching and use in hatcheries as set out in the new FAO *Artemia* Manual and train hatchery technicians in their use.
- Determine the critical role and research the optimal use of *Artemia* in hatchery applications.
- Conduct joint public / private studies to determine the link between optimal *Artemia* usage, both quantity and quality, and its link to good health, growth and harvest outcomes.
- Conduct research on the impact of climate change on natural *Artemia* resources and their host salt lake ecosystems, prioritising commercially or potentially important stocks such as those in Tibet.
- Preserve the gene pool of wild and farmed types through establishment of cyst banks and management of salt lake habitats. It is not good practice to translocate *Artemia* between habitats.
- Establish standardised protocols for the establishment and long-term sustainment of *Artemia* cyst banks and their accession by researchers and industry.
- Promote controlled farming of *Artemia*, including in artisanal ponds, salt affected lands and coastal areas, selecting suitable *Artemia* species / strains for the specific application.
- Evaluate the performance of *Artemia franciscana* relative to other species / strains (including parthenogenetic strains) for use in seasonal farming in different environments / conditions.
- Farmed types should be genetically characterized and their performance evaluated with regards to commercially important traits.
- Evaluate the adaptive capacity (epigenetic and genetic characteristics) of *Artemia* species and strains and their changes over time in different localities / environments.
- Explore opportunities for use of unconventional water bodies for *Artemia* production.
- Produce a summary of key procedures from the new FAO *Artemia* Manual for publication in additional languages and formats / media.

Field trip to Tarquinia salt works

The last day of the programme in Rome featured a field trip to the Tarquinia salt works, a solar facility that has been producing salt since ancient Etruscan and Roman times, with various interruptions, until it finally became uneconomic. While salt production ceased in 1987 the area has since been declared a nature reserve, and a scientific centre has been established on site.

Artemia salina is known to occur in the remains of the salt works. A couple of specimens were sighted by members of the group, but they were not abundant at the time.

Artemia scientists in their natural habitat.

Salt crystals from the floor of the saltern pictured left.

First International Artemia Aquaculture Consortium Conference and Members' Meeting, Ostend, Belgium

IAAC Members' Meeting with online dicussion panels. On screen: Khun Banchong Nissagavanich, shrimp hatchery operator and Artemia biomass farmer.

The first ever IAAC conference was a free half day even held in Ostend, Belgium on 9 September, as a prelude to Larvi 2024, which ran from 9-12 September. NACA would like to thank the Larvi organisers for their kind use of the venue, De Grote Post. Around 80 people attended.

The conference featured twelve presentations introducing the IAAC and providing an overview of many of the issues surrounding *Artemia*, including management of salt lakes habitats that still provide the bulk of global *Artemia* supplies, *Artemia* biodiversity, hatching optimisation, and aquaculture of *Artemia* biomass in tanks and ponds. A key observation from industry, in line with the comments in the Rome training programme, was that shrimp postlarvae survival and growth is significantly improved if the amount of *Artemia* provided is increased past what is currently considered conventional wisdom.

The presentations are listed below, along with links to video recordings on NACA's YouTube channel.

Programme

- Welcome and Introduction (from ISA to IAAC)
  Patrick Sorgeloos
- IAAC organisation
  Simon Wilkinson
- *Artemia* tank cultures: experience from Malaysia
  Yeong Yik Sung
- Development and utilisation of Artemia resources in China
  Liying Sui
- *Artemia* resiliency in response to dramatic changes in Great Salt Lake salinity and volume
  Brad Marden
- Adaptive management of salinity in Great Salt Lake: an adjustable berm provides a unique tool to protect the *Artemia* population
  Phil Brown
- New techniques for (epi)genotyping of *Artemia* species and strains
  Stephanie De Vos
- Predicting *Artemia* nauplii hatching kinetics through temperature measurement
  David Johanson
- Optimising co-feeding strategies for enhanced survival and growth in *Litopenaeus vannamei* postlarvae: a comprehensive study on *Artemia* inclusion and dietary options
  Yattish Ramena

- Reduction of *Artemia* fed to larval shrimp results in inferior pond success
  Robins McIntosh

- Artemia4Bangladesh project
  Meezanur Rahman

- Year-round *Artemia* pond production in monsoon climate in Thailand
  Banchong Nissagavanich

First IAAC Member's Meeting

The first IAAC Members' Meeting was held in the afternoon following the IAAC Conference. The proceedings involved two panel discussions, by the Academic Sector and Private Sector respectively. The panels included remote members participating via Zoom.

The Academic Sector panel was chaired by Gonzalo Gajardo with concluding remarks by Liying Sui, Vice-Chair of the IAAC Steering Committee. The panel featured a series of informative presentations followed by discussions on:

- FAO AquaGris project (Graham Mair).
- *Artemia* China AquaGris (Xuekai Han).
- Genetic stock identification (Li Ke).
- *Artemia*, species-taxonomic issues (Alireza Asem).
- *Artemia*: a model for biological studies (Parisa Norouzitallab and Kartik Baruah).
- Enriching *Artemia* with Bacteria (Annelies Declercq).

The Private Sector panel was chaired by Philippe Léger, who gave a welcome and introduction, with a round up by Patrick Sorgoos and concluding remarks by Yeong Yik Sung, Chair of the IAAC Steering Committee. The panel included presentations and discussions on:

Sustainable harvesting & production: 'Practice' vs 'Ambition'

- 'Ambition' (Tim Hawkes).
- Practice at Great Salt Lake, UT – USA (Thomas Bosteels).
- Practice at Russian & Central Asian lakes (Alexander Nikiforov).
- Practice at China lakes (Gao Song).

Artemia cyst certification & labelling

- Developing guidelines on *Artemia* cyst and biomass certification (Simon Wilkinson).
- Requirements for farmer (David Garriques, Tania Dewolf, Banchong Nissagavanich).
- Situation suppliers: 'can do vs cannot' (Patrick Waty, Thomas Bosteels, Alexander Nikiforov, Gao Song).

Artemia, still the preferred live feed? Why/not? – farmer's perspective

- Why? Perceived constraints? (David Garriques, Tania Dewolf, Banchong Nissagavanich).
- Technology at service (Geert Rombaut).

Future of *Artemia* – Bridging the gap

- Producing more? (Gao Song, Alexander Nikiforov).
- Using less? … using more? (David Garriques, Tania Dewolf, Banchong Nissagavanicho).

Inception workshop: Knowledge brokering for nature-based solutions in aquaculture transformation

Canada's International Development Research Centre (IDRC) is sponsoring the project "Knowledge Brokering for Nature-Based Solutions in Aquaculture Transformation in Asia-Pacific: Support to the Aquaculture Innovation and Investment Hub." The project's inception workshop was held in Bangkok from July 4-5, bringing together project teams from Thailand, The Philippines, and Fiji to discuss approaches and methodologies. The workshop was opened by Dr. Eduardo Leano, NACA Director General, with welcome remarks by Mike Phillips of FutureFish, a co-investigator of the project, and Rebecca McMillan from IDRC.

This project contributes to NACA's recent work with the FAO on aquaculture transformation. FAO and NACA have published a white paper, developed through extensive consultations, that provides a vision for transforming Asia-Pacific aquaculture by 2030. The aim is to create more efficient, inclusive, resilient, and sustainable food systems through innovation, investment, and partnerships. NACA is developing an Aquaculture Innovation and Investment Hub (AIIH) to help realise this vision in the region, providing a facility that will bring together innovators, startups, and investors to accelerate transformation.

Participants in the inception workshop.

The project is part of a wider IDRC AQUADAPT initiative, a four-year partnership running from 2023-2027. AQUADAPT addresses the intertwined challenges of climate change, biodiversity loss, and food insecurity through applied research on nature-based solutions in aquaculture in Southeast Asia and the Pacific region. AQUADAPT emphasises Gender Equality and Social Inclusion (GESI), ensuring that nature-based solutions are inclusive of all genders and marginalised groups.

The project will contribute to developing National Innovation and Investment Plans for Thailand, The Philippines, and Fiji and the development of the hub. As a first step, the project teams will conduct a baseline assessment of the current aquaculture industry structure, performance, policies, innovation and investment activities, status, and needs. This scoping study will address challenges including:

- Climate change.
- Disease prevention and management.
- Environmental sustainability.
- Gender equality and social inclusion.
- Resource utilisation and management.

Country teams will consult widely with the private sector and authorities to identify important innovations in aquaculture, particularly nature-based solutions, that can mitigate challenges, create efficiencies, open new opportunities, or enhance gender equality and social inclusion. This is expected to result in the identification and documentation of innovations, including nature-based solutions, and their adoption.

Each participating country will focus on different aspects of aquaculture based on local contexts. In Fiji, the assessment will cover the whole aquaculture industry due to its relatively small size. The Philippines and Thailand will focus on specific sub-sectors. For example, the Philippines will concentrate on tilapia, milkfish, and seaweed, which are the largest aquaculture sectors nationally and have the most significant economic and livelihood impacts.

The workshop's introductory session included (links to YouTube videos where available):

- An overview of AQUADAPT by Rebecca McMillan, IDRC.
- An overview of the project by Eduardo Leano, NACA.
- Private sector scoping plans by Mike Phillips, FutureFish.
- Gender Equality and Social Inclusion by Sizwile Khoza, Stockholm Environment Institute.
- Innovations and investment opportunities for nature-based solutions by the project teams from Fiji, the Philippines, and Thailand.
- An overview of the Aquaculture Innovation and Investment Hub.

The remainder of the workshop focused on developing guidelines for conducting baseline assessments for each country. Teams discussed the purpose of the National Innovation and Investment Plans, ways to progress implementation of nature-based solutions, and key factors in developing the baseline assessments. They also discussed guidelines for integrating gender equity and social inclusion.

A discussion was held on the private sector scoping activities and an innovation event, which will be held in January 2025 for startups and small and medium enterprises. This event will help businesses realise their ideas in nature-based solutions, overcome key challenges, and access emerging opportunities.

The final methodology for baseline assessments is expected to be ready by the end of August, with fieldwork taking place from September to December. The project's findings will be shared at the next High-Level Meeting in April 2025 in Shanghai, China, and with other AQUADAPT projects.

NACA extends its gratitude to the International Development Research Institute for their financial support, FutureFish, the Stockholm Environment Institute, and the project teams from Fiji, Thailand, and the Philippines for their contributions and collaboration.

For more information please visit the project page at:

https://enaca.org/?id=1361

Reported Aquatic Animal Diseases in the Asia-Pacific Region during the First Quarter of 2024

Listed below are the reported aquatic animal diseases submitted by countries in the Asia-Pacific region, which covers the first quarter of 2024. The original and updated reports can be accessed from the QAAD page.

Finfish Diseases

- Infection with *Aphanomyces invadans* (EUS): Bangladesh in rohu (*Labeo rohita*) and catla (*Catla catla*); and, India in snakehead (*Channa marulius*), freshwater catfish (*Wallago attu*), and mrigal (*Cirrhinus mrigala*).
- Infection with red seabream iridovirus (RSIV): Chinese Taipei in seabass (*Lates calcarifer*); and, India in pearlspot cichlid (*Etroplus suratensis*).
- Infection with Tilapia lake virus (TiLV): India in tilapia (*Oreochromis niloticus*), and Philippines in juvenile tilapia (*Oreochromis* sp.).
- Viral encephalopathy and retinopathy (VER): Chinese Taipei in hybrid grouper (*Epinephelus fuscoguttatus* x *E. lanceolatus)* and seabass (*L. calcarifer*).

Molluscan Diseases

Infection with Abalone herpesvirus: Australia in wild adults black-lipped abalone (*Haliotis rubra*).

Infection with *Perkinsus olseni*: India in mussel (*Perna viridis*), hard clam (*Meretrix casta*), and short neck clam (*Paphia malabarica*).

Crustacean Diseases

- Infection with white spot syndrome virus (WSSV): India in *Penaeus vannamei*; and, the Philippines in *P. vannamei* (PL, juvenile, grow-out culture, and adult), *P. indicus* (grow-out culture), *P. monodon* (PL and grow-out culture) and crabs (grow-out culture and adult).
- Infection with infectious hypodermal and haematopoietic necrosis virus (IHHNV): Philippines in *P. vannamei* (grow-out culture) and *P. monodon* (PL).
- Acute hepatopancreatic necrosis disease (AHPND): The Philippines in *P. vannamei* (PL and grow-out culture) and *P. monodon* (grow-out culture).
- Hepatopancreatic microsporidiosis caused by *Enterocytozoon hepatopenaei* (EHP): India in *P. vannamei*; and, the Philippines in *P. vannamei* (PL and grow out culture) and *P. monodon*.

Amphibian Diseases

- Infection with *Batrachochytrium dendrobatidis*: Australia in an unknown species of frog.

Other Diseases

- Bangladesh reported Infection with *Streptococcus* sp. in Tilapia, and Infection with *Aeromonas* spp. in stinging catfish (*Heteropneustes fossilis*), gulsha (*Mystus cavasius*), and pangas catfish (*Pangasianodon hypophthalmus*).
- India reported Infection with Tilapia parvovirus in *O. niloticus*.

E.M. Leaño
Senior Programme Officer / Director General
Health and Biosecurity

14th Asian fisheries and Aquaculture Forum, India

The 14th Asian Fisheries and Aquaculture Forum (14AFAF) will be held from 12-15 February 2025 in New Delhi, India.

The forum is a scientific meeting organised by the Asian Fisheries Society (AFS) once every three years to understand the global trends and address issues and challenges faced by the fisheries and aquaculture sector.

The main purpose of this Forum is to provide an international platform for eminent scientists, young researchers, and other stakeholders across the globe to share their research experiences and innovative ideas. By facilitating the exchange of diverse range of knowledge and expertise, the Forum with the Theme 'Greening the Blue Growth in Asia-Pacific' aims to address key issues towards developing sustainable fisheries and aquaculture.

The forum will feature technical sessions on:

- Resource Assessment and Management for Sustainable Fisheries.
- Sustainable Aquaculture Intensification and Diversification.
- SMART Aquaculture for Resource-use Efficiency.
- Fish Genetics, Genomics and Biotechnology.
- Aquatic Animal Nutrition, Feed Technology and Alternate Feed Resource.
- Aquatic Animal Health Management and Antimicrobial Resistance.
- Aquatic Biodiversity, Environment and Ecosystem Services.
- Impact of Climate Change on Fisheries and Aquaculture and Resilient Strategies.
- Post-harvest Processing, Value-addition, and Food Safety.
- Socio-economic Dynamics and Extension in Fisheries and Aquaculture.
- Gender in Fisheries and aquaculture.
- Fisheries Education, Skill Development and Technology Incubation.
- Fish Marketing, Value Chains and Trade.
- Fisheries Policy, Law, and Governance.

For more information please visit the 14th Asian Fisheries and Aquaculture Forum website:

https://14afaf.in/

PhD scholarships: Shanghai Ocean University PhD Programme 2025

Shanghai Ocean University (SHOU) is offering full scholarship PhD programmes in a wide range of marine sciences in 2025. Disciplines include: Aquaculture, biology, fishing science, fisheries resources, marine science, food science and engineering, fishery economics and management, marine engineering and information.

Scholarships

The scholarships are open to non-Chinese citizens under 30 years old who have a master's degree with a good academic record and outstanding research potential. The scholarships cover tuition, accommodation, medical insurance and include a monthly stipend.

Applications

Applications are due **1 February 2025**. For details of the programmes, eligibility criteria, required documentation and application procedures, please download the prospectus linked below. If you have any questions, please email admissions@shou.edu.cn or add the Admissions Officer Ms. Louise as a Facebook contact or on WeChat (louise2shou).

Postgraduate opportunities

Postdoc positions are available for excellent graduates and full-time faculty positions are available for excellent international postdocs.

Contacts

International Student Office, Shanghai Ocean University
Phone: +86 21-6190-0763
Email: admissions@shou.edu.cn
Web: https://ieo.shou.edu.cn/18220/list.htm
SHOU Facebook: https://www.facebook.com/SHOU1912/
Instagram: @shou_1912D

Download the prospectus:

https://enaca.org/enclosure/?id=1298

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NACA is a network composed of 20 member governments in the Asia-Pacific Region.