NACA Newsletter

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Cooperation with the Bangladesh Shrimp and Fish Foundation

Left to right: Dr Cherdsak Virapat, Executive Director of ITD (and former NACA DG), Dr Imtiaz Ahmed, a Director on the BSFF Executive Committee, Dr Huang Jie, present Director General of NACA, and Dr Eduardo Leano, Coordinator of NACA's Aquatic Animal Health Programme.

The NACA Secretariat had the privilege of hosting a delegation from the Bangladesh Shrimp and Fish Foundation (BSFF) to discuss opportunities for further cooperation under the Memorandum of Understanding previously signed by BSFF and NACA in May 2018. The delegation consisted of Dr Imtiaz Ahmed, a Director of the BSFF Executive Committee who is very well known within the network, and Dr Cherdsak Virapat, the previous Director General of NACA and now a member of the BSFF Advisory Committee and Executive Director of the International Institute for Trade and Development under the Thai Ministry of Commerce.

Discussions were wide ranging but BSFF and NACA will examine opportunities to continue to facilitate technical training of Bangladesh personnel on *P. monodon* culture, and long-term institutional capacity building. Strengthening capacity in aquatic animal health management is another area of mutual interest where NACA can broker sharing of experience and technical expertise from within the network and member states.

NACA appreciates the partnership with BSFF and the rewarding collaboration that has taken place to date in improving the capacity and livelihoods of small-scale farmers and related businesses, and looks forward to building on these initiatives.

Separately, NACA has just opened discussions on areas of potential collaboration with the International Institute for Trade and Development, with details to follow in due course.

Global Conference on Aquaculture 2020 update

Preparations for GCA2020 are ratcheting up with the International Organizing Committee meeting in the margins of the recent Tenth Session of the COFI-Sub-Committee on Aquaculture, 23-27 August 2019, Trondheim, Norway.

A series of flagship reviews have been commissioned on the status of aquaculture development in different parts of the world. The conference will kick off with presentation of these regional reviews and a global synthesis, to provide context for the thematic reviews and expert panel discussions that follow.

The full technical programme and details of speakers will be announced shortly.

Quarterly Aquatic Animal Disease Report, January-March 2019

The 81st edition of the Quarterly Aquatic Animal Disease report contains information from twelve governments. The foreword discusses the proposed Regional Collaboration Framework on Aquatic Animal Diseases in Asia and the Pacific. This will initially focus on building a framework of actors with the aim of strengthening laboratory capacity for aquatic animal disease activities in Asia and the Pacific, for example to support emergency response.

The report is available for free download from:

https://enaca.org/?id=1061

A fresh look at inland fisheries and their role in food security and livelihoods

Simon Funge-Smith (FAO) and Abigail Bennet (Michigan State University)

Abstract

The role of inland fisheries in livelihoods, food security and sustainable development is often overshadowed by the higher profile interest in ocean issues. Whilst inland fisheries' catch and contribution to global nutrition, food security and the economy, are less than that of marine fisheries, global-level comparisons of fish production obscure considerable livelihood impacts in certain countries and sub-national areas. To highlight these contributions, this paper synthesizes recent data and innovative approaches for assessing such livelihood contributions and their importance in countries with limited access to ocean resources and aquaculture. Inland fisheries are crucial for many socially, economically and nutritionally vulnerable groups of people around the world, but the challenges in monitoring inland fisheries preclude a complete understanding of the magnitude of their contributions. This situation is rapidly improving with increasing recognition of inland fisheries in development discourses, which has also encouraged research to enhance knowledge on the importance of inland fisheries. We review this work, including collated information published in a recent Food and Agriculture Organization report, to provide an up to date characterization of the state of knowledge on the role of inland fisheries.

Full article available on an open-access basis from the journal Fish and Fisheries (2019; 00:1-20):

https://doi.org/10.1111/faf.12403

Tuskfish 2 Beta: Testers wanted

Tuskfish has progressed to beta status with the first public release expected before the end of the year. Tuskfish 2 is a rewrite of Tuskfish CMS, the software that runs the NACA website. It is distributed for free under the GNU General Public License V2. Tuskfish 2 builds on the experience gained in the first version to produce a faster, leaner and more efficient code base. Additional changes since the alpha (see last issue) include:

- Adoption of the DICE dependency injection container.
- Abstraction of the tagging and metadata systems into traits to facilitate reuse.
- Convert session system to non-static implementation.
- Add admin-side search functionality to facilitate content management.

If you're interested in helping to test Tuskfish 2 in a voluntary capacity please send an email to simon@enaca.org.

You will need to have your own infrastructure and previous experience in operating a content management system (eg. Wordpress, Joomla, Drupal etc). However, Tuskfish can also be set up locally on a PC with XAMPP or equivalent in a couple of minutes. I would also be interested to hear from people interested in trying to install it on alternative webservers such as NGINX or IIS.

APAARI Regional Workshop on Underutilized Fish and Marine Genetic Resources and Their Amelioration

NACA participated in a regional workshop held in Colombo, Sri Lanka from 10-12 July, convened by the Asia-Pacific Association of Agricultural Research Institutions, Sri Lanka Council of Agricultural Research and Policy, Asia-Pacific Consortium on Agricultural Biotechnology and Bioresources, Council of Agriculture, and Australian Centre for International Agricultural Research; in collaboration with the Sri Lankan National Aquatic Resource Research and Development Agency, National Aquaculture Development Authority, Marine Environment Protection Agency and Ministry of Fisheries and Aquatic Resource Development and Rural Economy.

The scope of the workshop was very broad, in the sense that it addressed genetic resources in different contexts. These included fishing, bycatch, by-products and discards; aquaculture, genetic management of broodstock and development of improved lines; conservation of genetic resources and biodiversity; bioprospecting, chemical and pharmaceutical application; intellectual property rights and access and benefit sharing arrangements; and the related livelihood and social issues. In exploring the potential of underutilised genetic resources the workshop was a contribution towards the 2030 Sustainable Development Goals.

The objectives of the workshop were to:

- Assess the current status of underutilised aquatic genetic resources at regional level and to assess R&D status of priority species with potential for use in food and agriculture.
- Discuss the knowledge gaps and way forward in defining regional priorities concerning underutilised aquatic genetic resources and create awareness on their potential role and value in diversification of food production and livelihood generation.
- Formulate strategies for strengthening the institutional framework for management of aquatic genetic resources and legal and policy frameworks to promote their conservation and sustainable use at the regional level.

The workshop provided a platform for sharing of knowledge and experience. Participants discussed the status of R&D in exploring underutilised aquatic genetic resources, conservation and sustainable use, development of commercial applications and benefits to rural communities. The possibility of establishing a regional network for knowledge sharing and other related issues at regional level was also considered.

NACA presented a discussion paper on information systems on fish and marine genetic resources, reviewing the objectives and status of public databases. Most databases can be broadly categorised as biodiversity and taxonomy oriented; geographic distribution and occurrence records; fisheries catch and effort; environmental monitoring and management; molecular genetics; or some combination of the above. In terms of data coverage and quality, excepting molecular genetics where data collection is rigorous and routine, most are patchy with records collected opportunistically due to the sheer magnitude of the task at hand. Existing systems are therefore of limited use in identifying underutilised genetic resources.

In the aquaculture context, looking at the existing public information systems, and noting the present low utilisation of genetically improved varieties, there is an apparent gap with regards to breeders registries, an issue identified at a Regional Expert Consultation on Genetically Responsible Aquaculture, organised by the ICAR-National Bureau of Fish Genetic Resources in India in February. An online federated system linking breeders registries could assist smaller hatcheries to participate in a large virtual broodstock population, assisting in genetic management and reduction of inbreeding while maintaining a high level of adaptive capacity.

The proceedings of the workshop will be published by APAARI in due course (www.apaari.org). NACA would like to thank APAARI for both the opportunity and financial support to participate in the workshop.

Joint Research Project on Utilization of Thailand Local Genetic Resources to Develop Novel Farmed Fish for Global Market

The Project for the “Unitization of Thailand Local Genetic Resources to Develop Novel Farmed Fish for Global Market” is a research project led by the Tokyo University of Marine Science and Technology and the Department of Fisheries, Thailand, with other notable research institutes in both Thailand and Japan.

The project will span five years from 2019-2024, supported by funding from the Japan International Cooperation Agency and the Japan Science and Technology Agency from the Science and Technology Research Partnership for Sustainable Development programme (STREPS). In order to share and promote the project, a kick off meeting was held on 26 July 2019 at the Centara Hotel, Central Ladprao, Bangkok. Participants were from project collaborators and representatives from other partners, with NACA attending in an observer capacity. There are a total of twelve project partners from Thailand and six from Japan.

The project is research-oriented and will address long overdue research and development needs such as the development of seabass and banana shrimp culture industries. Both species are native to Thailand and ASEAN nations and possess great culture potential.

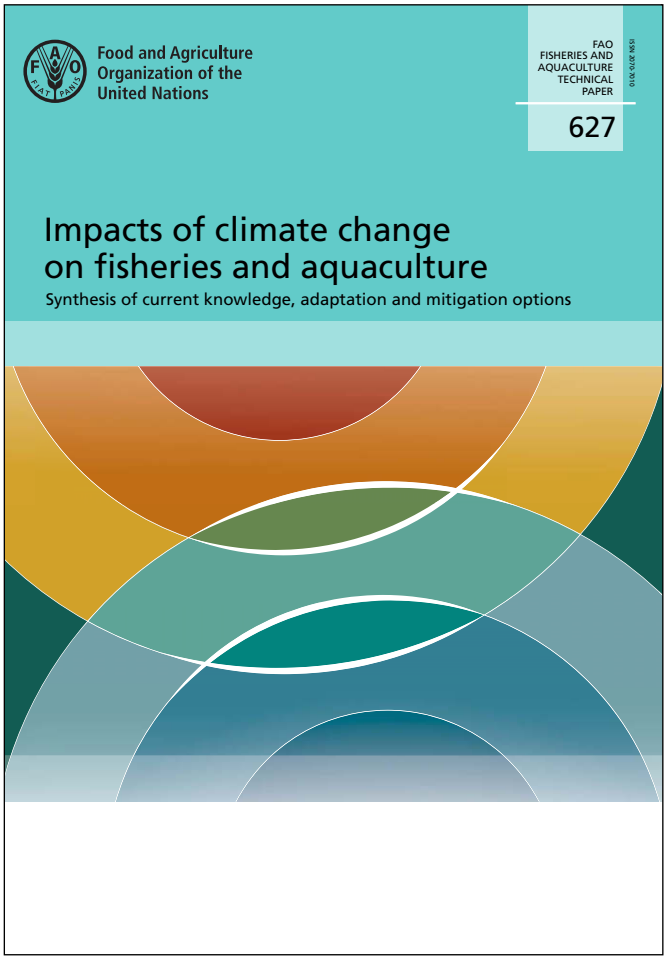
The expected outputs of the project include:

- Development of molecular-supported breeding programmes for both seabass and banana shrimp.
- Development of preventative methods against infectious diseases in aquaculture, for both fish and shrimp.
- Development of new methods for production of high value added fish and shrimp, including nutrient enrichment methods, all-female populations and control of maturation methods for banana shrimp, and development of banana shrimp culture technology.
- Conservation of genetic diversity of native Thai species through establishment of a seed bank and development of germ cell preservation methods in fish and shrimp.

Impacts of climate change on fisheries and aquaculture

FAO has published a synthesis of current knowledge, adaptation and mitigation options. This is a must-read for all concerned with the aquaculture industry in any capacity. The abstract follows below. The publications is available for free download from:

http://www.fao.org/policy-support/resources/resources-details/en/c/1152846/



The 2015 Paris Climate Agreement recognizes the need for effective and progressive responses to the urgent threat of climate change, through mitigation and adaptation measures, while taking into account the particular vulnerabilities of food production systems. The inclusion of adaptation measures in the fisheries and aquaculture sector is currently hampered by a widespread lack of targeted analyses of the sector's vulnerabilities to climate change and associated risks, as well as the opportunities and responses available. This report provides the most up-to-date information on the disaggregated impacts of climate change for marine and inland fisheries, and aquaculture, in the context of poverty alleviation and the differential dependency of countries on fish and fishery resources. The work is based on model projections, data analyses, as well as national, regional and basin-scale expert assessments. The results indicate that climate change will lead to significant changes in the availability and trade of fish products, with potentially important geopolitical and economic consequences, especially for those countries most dependent on the sector.

In marine regions model projections suggest decreases in maximum catch potential in the world's exclusive economic zones of between 2.8 percent and 5.3 percent by 2050 according to greenhouse gas emission scenario RCP2.6, and between 7.0 percent and 12.1 percent according to greenhouse gas emission scenario RCP8.5, also by 2050. While at the global scale this average is not particularly large, the impacts are much greater at regional scale, because projected changes in catch potential vary substantially between regions. Although estimates are subject to significant variability, the biggest decreases can be expected in the tropics, mostly in the South Pacific regions. For the high latitude regions, catch potential is projected to increase, or show less of a decrease than in the tropics. It is important to note that these projections only reflect changes in the capacity of the oceans to produce fish, and do not consider the management decisions that may or may not be taken in response. It is concluded that the interaction between ecosystem changes and management responses is crucial to minimize the threats and maximize the opportunities emerging from climate change. Production changes are partly a result of expected shifts in the distribution of species, which are likely to cause conflicts between users, both within and between countries.

The vulnerability of marine fisheries to climate change and existing and potential responses to adapt to the changes are examined in more detail for 13 different marine regions covering a range of ecological, social and economic conditions. It is concluded that adaptations to climate change must be undertaken within the multifaceted context of fisheries, with any additional measures or actions to address climate change complementing overall governance for sustainable use. It is recognized that some of these measures will require institutional adaptation.

In relation to inland fisheries the Technical Paper highlights that in the competition for scarce water resources the valuable contributions of inland fisheries are frequently not recognized or undervalued. The Paper assesses country by country impacts and provides indications of whether levels of stress are expected to change and to what extent. Pakistan, Iraq, Morocco and Spain are highlighted as countries that are currently facing high stresses that are projected to become even higher in the future. Myanmar, Cambodia, the Congo, the Central African Republic and Colombia, are among the countries that were found to be under low stress at present and are projected to remain under low stress in the future. The implications of climate change for individuals, communities and countries will depend on their exposure, sensitivity and adaptive capacity, but in general they can be expected to be significant. Some positive impacts are also identified, like increased precipitation leading to the expansion and improved connectivity between some fish habitats, but to take advantage of them, new investments as well as flexibility in policies, laws and regulations, and post-harvest processes are needed. It is recommended that adaptive management measures be within the framework of an ecosystem approach to fisheries to maximize success.

Short-term climate change impacts on aquaculture can include losses of production and infrastructure arising from extreme events such as floods, increased risks of diseases, parasites and harmful algal blooms. Long-term impacts can include reduced availability of wild seed as well as reduced precipitation leading to increasing competition for freshwater. Viet Nam, Bangladesh, the Lao People's Democratic Republic and China were estimated to be the most vulnerable countries in Asia, with Belize, Honduras, Costa Rica and Ecuador the most vulnerable in the Americas, for freshwater aquaculture. Uganda, Nigeria and Egypt were found to be particularly vulnerable in Africa. In the case of brackish water production, Viet Nam, Egypt and Thailand emerged as having the highest vulnerabilities. For marine aquaculture, Norway and Chile were identified as being the most vulnerable, due to their high production, although China, Viet Nam, the Philippines and Madagascar were also considered to be highly vulnerable. Climate driven changes in temperature, precipitation, ocean acidification, incidence and extent of hypoxia and sea level rise, amongst others, are expected to have long-term impacts in the aquaculture sector at multiple scales. Options for adaptation and resilience building are offered, noting that interactions between aquaculture, fisheries and agriculture can either exacerbate the impacts or help create solutions for adaptation.

The Technical Paper also investigates the impacts of extreme events, as there is growing confidence that their number is on the increase in several regions, and is related to anthropogenic climate change. Climate-related disasters now account for more than 80 percent of all disaster events, with large social and economic impacts. Not all extreme events necessarily result in a disaster, and the extent of their impacts on fisheries and aquaculture will depend on how exposed and vulnerable the socio-ecological systems are as well as their capacity to respond.

An often unrecognized impact of climate change is on food safety, for example through changes in the growth rates of pathogenic marine bacteria, or on the incidence of parasites and food-borne viruses. Climate change may also bring increased risks for animal health, particularly in the rapidly growing aquaculture sector, for example by changing the occurrence and virulence of pathogens or the susceptibility of the organisms being cultured to pathogens and infections. Effective biosecurity plans that emphasize prevention are essential.

In the final sections the Technical Paper recognizes that the impacts of climate change on the fisheries and aquaculture sector will be determined by the sector's ability to adapt. Guidance on the tools and methods available to facilitate and strengthen such adaptation is provided. Because each specific fishery or fishery/aquaculture enterprise exists within unique contexts, climate change adaptations must start with a good understanding of a given fishery or aquaculture system and a reliable assessment of potential future climate change. The Paper provides information on the tools available to inform decision-makers of particular adaptation investments and of the process to develop and implement adaptation strategies. It presents examples of tools within three primary adaptation entries: institutional and management, those addressing livelihoods and, thirdly, measures intended to manage and mitigate risks and thereby strengthen resilience. It is noted that adaptation should be implemented as an ongoing and iterative process, equivalent in many respects to adaptive management in fisheries.

Finally, the contributions of the sector to global emissions of carbon dioxide are presented. Globally, fishing vessels (including inland vessels) emitted 172.3 million tonnes of CO_2 in 2012, about 0.5 percent of total global CO_2 emissions that year. For the aquaculture industry, it was estimated that 385 million tonnes of CO_2 equivalent (CO_2 e) was emitted in 2010, around 7 percent of those from agriculture. While the sector is a small contributor, options for reducing fuel use and greenhouse gas emissions are identified. In the case of capture fisheries, reductions of between 10 percent and 30 percent could be attained through use of efficient engines, larger propellers, as well as through improving vessel shapes or simply by reducing the mean speed of vessels. There are also opportunities to reduce greenhouse gas emissions in aquaculture, which include improved technologies to increase efficiency, use of renewable energy sources, and improving feed conversion rates, among others.

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NACA is a network composed of 19 member governments in the Asia-Pacific Region.

The Technical Paper highlights the multifaceted and interconnected complexity of fisheries and aquaculture, through which direct and indirect impacts of climate change will materialize. Efforts to adapt to and mitigate climate change should be planned and implemented with full consideration of this complexity. Failure to do so would increase inefficiency and maladaptation, exacerbating rather than reducing impacts.

Finally, the Technical Paper is a reminder of the critical importance of fisheries and aquaculture for millions of people struggling to maintain reasonable livelihoods through the sector. These are the people who are most vulnerable to the impacts of climate change, and particular attention needs to be given to them while designing adaptation measures if the sector is to continue to contribute to meeting global goals of poverty reduction and food security.