

Aquaculture Division

Aquaculture is important for contribution to food security and nutrition in Myanmar. Myanmar depends heavily on the aquaculture sub-sector, as a critical contributor to national and regional socio and economic development with contributions to the rural economy, export income.

The structure of Aquaculture Division comprises with Fish and Shrimp Culture Section, Aquatic Animal Health and Disease Control Section, Freshwater Fish Research Section and Crocodile Farm. The main responsibilities of Aquaculture Division are:

- (a) to produce good quality fish and prawn/shrimp seeds for fish farmers,
- (b) to ensure replenishment of fish and shrimp seeds into the natural water bodies such as rivers and lakes and men-made water bodies such as reservoirs and dams for enrichment of fisheries resources,
- (c) to conduct researches of potential marine and freshwater aquatic species for aquaculture development,
- (d) to contribute and transfer of basic and applicable aquaculture technology to fish farmers and
- (e) to conduct environment-friendly and sustainable aquaculture methods such as Good Aquaculture Practices (GAqP) to align with ASEAN Guidelines of Good Aquaculture Practices and international market requirement.

Duty and Function of Aquaculture Division

- (a) Producing of good quality fish and shrimp seeds by DoF fisheries stations,
- (b) To ensure conservation of fisheries or sustainable aquatic resources by the releasing of hatchery produced fish and shrimp seeds to natural water body,
- (c) Formal services of analyzing water and soil quality for fish pond management and of diagnose the fish and shrimp diseases, giving guidance of disease control and prevention for fish farmers,
- (d) Monitoring, control and given good management and regulation on aquaculture industry,
- (e) Strengthening good management for the development of environment-friendly aquaculture system and the encourage of cultured based capture fisheries to increase of fish production,
- (f) Issuing the amendments of aquaculture laws, legislation and regulation as the requirements of current situation and emerging issues,
- (g) Supervision of expertise for the establishment of short-term and/or long-term aquaculture development programs,
- (h) Data collecting, recording and analyzing on aquaculture areas and land use right status of whole country and fish and shrimp seeds production from DoF fisheries stations and private sectors,
- (i) Increase implementation of the National Standard of Good Aquaculture Practices (GAqP) in compliance with the international and ASEAN guidelines of Good Aquaculture Practices (GAqP)

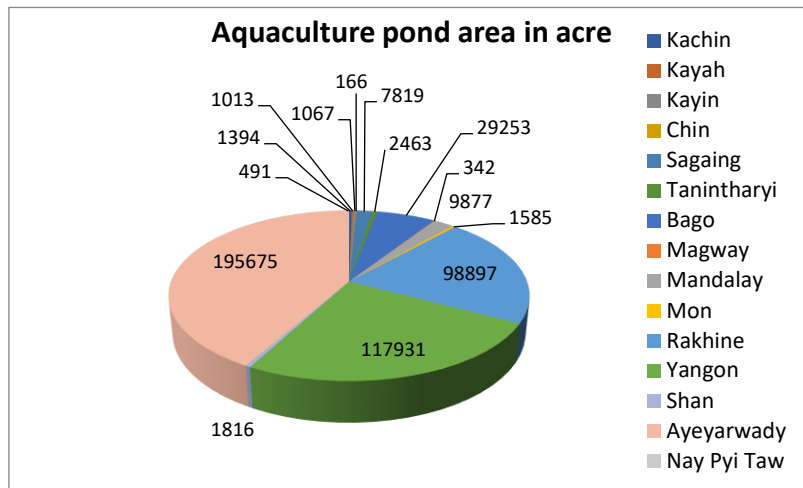
- (j) Support to conduct trainings of basic fish farming and fish breeding technology for local fish farmers and capacity building of skillful technology and techniques of aquaculture systems,
- (k) Seeking the improved technologies of aquaculture and providing extension and training for sustainable development and expanding of aquaculture industry as a whole,
- (l) Data collecting and managing to be able to fully imposing of revenue for aquaculture registration,
- (m) Regularly observing the aquaculture industry development as a whole and recording and reporting the extraordinary phenomenon of climate change impacts on aquaculture industry and emerging fish diseases to prevent and adapt from these impacts.

Freshwater Aquaculture

First attempts of fish culture were made in 1954 with the exotic species like common carp, tilapia and gorami. Myanmar has high quality fishes like major carps such as rohu (*Labeo rohita*), catla (*Catla catla*), mrigal (*Cirrhinus mrigala*), butter catfish (*Silonia silonia*) etc, but scientific technology was not well established among the local farmers. Later, in 1968, induced breeding of indigenous major carps was successfully conducted. Currently over 20 species of freshwater fishes including common carp, Indian major carps, Chinese carps, Tilapia, Pangasius and walking catfishes and Pacu are being cultured. Rohu (*Labeo rohita*) withstands as the most common and commercial cultured species which is native to Myanmar. Actually the collection of fry and fingerlings from the wild has not been permitted so as to conserve and enhance the natural fish stocks. This is as a measure of follow-up of the Law Relating to Aquaculture that was promulgated in 1990. In order to promote and distribute the quality fish seed, DoF has tried to upgrade the broodstocks quality by proper management through its 27 fishery stations that are conducting seed production and providing technical assistance to farmers.

The potential important freshwater fishes such as *Heteropneustes fossilis* (Catfish), *Ompok bimaculatus* (Sheat fish), *Notopterus notopterus* (featherback), *Cyprinus intha* (Nga phane), *Trichogaster pectoralis* (Snake skin gouramy), *Pangasius bacourti* (Basa catfish), *Prochilodus lineatus* (Taung paw nga tha lott), *Leptobarbus hoevenii* (Sultan fish) were successfully induced breeding by experimental scale.

Aquaculture production represents 18% of the total fisheries industry in Myanmar. The actual aquaculture area was about 469790 acres and the production of aquaculture was 1211020 MT in 2023-2024. Most of the commercial fish and shrimp farming are conducting in lower part of the country, especially Yangon, Bago, Ayeyarwaddy, Tanintharyi and Rakhine.



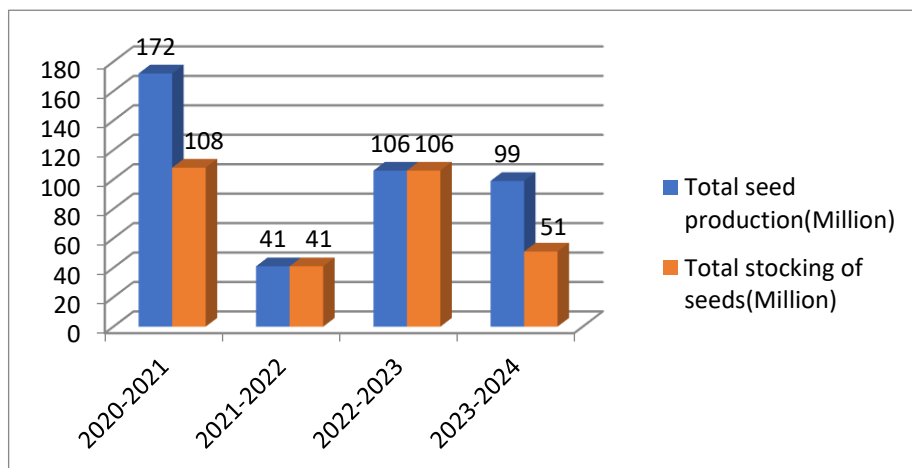
Workforce

In the field of aquaculture, a total of 29086 fish and shrimp farmers were involved in various aquaculture systems. Due to Myanmar's aquaculture is mainly based on pond cultured system, mostly men labours are working in fish/shrimp ponds. There are 63664 number of permanent men labours working in 2023-2024 fiscal year.

Fish Fry and Fingerling Production

At present 26 freshwater fishery stations under Department of Fisheries are operating in all strategic areas, and conducting seed production and stock enhancement activities in order to enhance aquaculture industry. In 2023-2024 the DoF hatcheries produced 98.72 million fingerling (2 inches) size of freshwater fish and totally 43 private hatcheries around Myanmar had produced an impressive amount of 2665 million of fry and 151 million of fingerling size of fish species.

The Department of Fisheries has made a fisheries resource management strategy that is to conduct stock enhancement in the natural water body including men-made reservoirs and main river system. Thus, the quality fish species may establish in these waters and may assist in the food security and improvement of livelihood of people in the rural areas. In 2023-2024, the 50 % of the total fish seed production were replenished and the remaining 50% of fish seed were sold and distributed to fish farmers by reasonable prices. Data on production and stocking of seeds from 2020-2021 to 2023-2024 appears as a graph there under.





Freshwater prawn culture

The most common and prioritized species is commercially important giant freshwater prawn, *Macrobrachium rosenbergii*. Monoculture of *M. rosenbergii* was conducted on semi-intensive level by a few farmers and productivity was better than polyculture system. The hatchery operation and culture technique become well established in government and private sector. Recent year, many fish farmer's benefits from poly-culture of freshwater prawn and major carps due to reasonable price of freshwater prawn. Therefore, freshwater prawn seeds requirement is increasing in recent years. Many backyard hatcheries for freshwater prawn are being set up to fill up the gap of high demand freshwater prawn seeds but last year, most of the freshwater prawn hatcheries were encountered the low survival rate due to disease infection from the brood stock and impact of climate change.

Shrimp Culture

Penaeus monodon has been initiated since early 1980 practicing trap and hold method particularly in western coastal area. Natural post-larvae of *Penaeus monodon* were trapped into the pond during the high tide period through sluice gates. There were no inputs in terms of pond preparation, eradication of predators, water fertilization, feeding etc. However 70 to 123 kilograms of large size of shrimp per hectare of culture area were harvested. As the ponds were usually as large as 123.55 acre to 247.11 acre. Having no laws concerned with aquaculture, those shrimp ponds existed as illegal ponds up to 1990. In the year 2000, the Ministry of Livestock and Fisheries reinforced and encouraged many potential investors to be involved in the shrimp aquaculture development. At the same time, the Government formed a State Level Committee to promote a drastic development of shrimp aquaculture industry by formulating first three-year plan from 2000 to 2003 and second plan from 2003 to 2005. Since 2000, a number of semi-intensive and intensive shrimp farming emerged. After 2002, there was founded success and failure in semi-intensive and intensive shrimp culture. In the year 2002, a pilot demonstration on Mangrove Friendly Shrimp Culture was conducted as a measure of verification of semi-intensive shrimp culture technique through collaboration of Myanmar DoF and SEAFDEC-AQD.

As of 2023-2024, Myanmar have the four types of shrimp farming systems: Intensive shrimp ponds 1827.49 acres, Semi-intensive shrimp ponds 896.57 acres, extensive or traditional shrimp ponds 135049.73 acres totaling 137773.79 acres. The total production of fresh water prawn and marine shrimp in 2023-2024 were 76180.00 MT. Recently, the Department of

Fisheries encouraged to development of fish and shrimp culture in every states and regions for self-sufficient of local consumption and increasing for export market.

Status of Shrimp Hatcheries

In the year 2000, total numbers of shrimp hatcheries amounted to 13 only and in 2003 altogether 26 shrimp hatcheries (include in Backyard Hatcheries) were fully operating with capacity of 190 million shrimp post-larvae. Hatchery system is mainly based on clear water system. The breeders are collected from Bay of Bengal and Andaman Sea. It is well famous that the brood stocks from Andaman Sea are supreme in terms of quality and size. However, recent years, many hatcheries including private and public are facing the difficulties of the availability of the sufficient amount of shrimp brood stocks from the wild when required. Therefore, local shrimp hatcheries could not produce sufficient amount of shrimp seeds for local demand and shrimp post larva had to import from Thailand. In 2023-2024, the total imported numbers of giant freshwater prawn and *Penaeus vannamei* were 122.93 million and the total value of USD 0.612 million were imported from Thailand. Thus, brood-stock management technology for shrimp hatcheries is needed.

White shrimp culture

Penaeus vannamei has the many advantageous factors for culture but it may also cause the negative impact to other shrimp aquaculture industry. DOF has been aware that *P. vannamei* may carry and outbreak the Taura Syndrome Virus (TSV). After a regional workshop in 2005 at Manila, that assessed the culture of *P. vannamei* ASEAN countries agreed to culture at reasonable documentation. At present 4 private farms are culturing of commercial scale of *P. vannamei*. Only PCR negative the Pacific white shrimp SPF *P. vannamei* seeds has been permitted to import for culture in domestic water. In 2023-2024, the total numbers of 1827.44 acres of shrimp culture ponds produced 6476 MT in Tanintharyi Region. The total numbers of 615.67 acre of shrimp culture produced 640.67 MT in Ayeyarwaddy Region.



Marine Finfish Culture

In terms of marine fin-fish farming, seabass, red snapper and grouper are the most common and commercial species in Myanmar. Stock fish or the fish seed are usually collected from the wild. But the hatchery seed production technology of seabass has been succeeding since 2004 in both DoF and private sectors. First the broodstocks were collected from the wild and later induced breeding that seabass are used as broodstocks. However the grow-out culture of seabass is done by only a few farmers. It is due to the fact that adequate supply of seabass seeds, trash fish and formulated feed is inconsistent.



Oyster and clam culture

The Department of Fisheries (DoF) cooperated with Myeik University and the Department of Livestock and Aquaculture Research (DLAR) are conducting the marine fish, oyster and clam culture farming supported by fisheries research fund of Tanintharyi Region.

Others Mariculture

Others aquatic species such as oyster, clam, seaweed culture are initial stage in Myanmar. The farming of Eucheuma Seaweed has been started since 2003 through the collaboration of DoF, a Korean private company. The Korean company brought in the seaweed of Eucheuma cottonii and domesticated as the seed stock for other private farmers. Upon the whole, DoF Myanmar is carefully assessing in the promotion of proper new stock strains to produce better quality seed. Recently, Make Smart Company has already constructed a processing plant and storage building. The new endeavor will create employment opportunity for local people and also technology transfer to the local entrepreneurs and communities. The production of dried seaweed is 41.733 MT in 2023-2024.



Mud crab seed production

Mud crab fattening has become the booming industry as domestic consumption and export demand are growing rapidly. Soft shelled mud crab farming has become very popular as it commands high price. At the same time, supply of crab juveniles from nature is decreasing due to over exploitation, habitat deterioration caused by man impact and world climate change. Adequate supply of mud crab seed for soft shell mud crab farming has become urgent need and included in the future plan. DoF has

initiated the mud crab hatchery since 2009. However, hatchery operation performs very low survival rate. There needs to do more research and extension work for dissemination of mud crab culture techniques to local small-scale farmers and conservation of mud crab resources as setting up the protected area of no crab fishing zone or conservation of mud crab habitats such as mangrove.



Ornamental fish

The ornamental fish industry is one of the sectors to generate income through export. The production of ornamental fish was 729979 pieces and US\$ 0.102 million in 2023-2024.

Aquaculture for rural development

Promote aquaculture as an integrated rural development activity within multiple use of land and water resources available through inter-agency coordination in policy formulation, project planning and implementation, stakeholder consultation, extension services and technology transfer. One of the national policy is the poverty alleviation and to carry out rural development through agriculture and other sectors.

To improve the technology knowledge of aquaculture, the basic aquaculture and fish breeding trainings are providing annually to improve the livelihood of rural people and earn the regular income. Moreover, aiming to create job opportunities, increase fish production and cost-effective fish production, DoF is conducting the demonstrated freshwater cage culture system at water sources such as natural water bodies, reservoir, stream and lakes.

Fisheries sector of evergreen village development project supported 30 million kyats as revolving fund for each village of 394 villages where have potential to develop in fisheries sector in 15 Regions and States from the funding sources of government's capital budget. DoF is trying the best to achieve the objective of the development of fisheries sector for rural people.

Application of Good Aquaculture Practices (GAqP)

The GAqP are a series of considerations, procedures, and protocols designed to foster efficient and responsible aquaculture production and expansion, and to ensure final product quality, safety, social aspects and environmental sustainability. GAqP is regarded by the FAO as a necessary tool in the overall development of a sustainable aquaculture sector. For Myanmar the introduction of GAqP will lead to a paradigm change from traditional to modern sustainable production in aquaculture. The DoF is therefore striving to introduce GAqP for the whole

aquaculture sector in Myanmar, especially in following up previous work which had concentrated on the food safety component of GAqP.

The DoF established as National Task Force for implementation of GAqP application in Myanmar and considered to follow up and practices on ASEAN's Standard on GAqP for shrimp farming in compliance with the current status of shrimp farming practice in Myanmar. Myanmar learns and tries to follow the Strategies Plan on the Development and Implementation of ASEAN GAqP for food fish. Support to GAqP, DoF established the Directives and Regulation for prohibiting the use of chemical in aquaculture. The DoF has issued GAqP certificates on 3560.21 acre for 13 farmers and also gave the awareness and training of GAqP, 107 times to 2846 numbers of stakeholders in 2023-2024.



A GAqP Model Farm demonstration has been set up at the hatcheries owned by DoF in every region and state. The purpose is specified for the farmer to come and observe the aquaculture practice system and then follow it to increase the fish farming with GAqP System.

The National GAqP Standard is a fundamental tool in the intensification of a sustainable aquaculture sector and the National Standards for Good Aquaculture Practices (Final Draft) has already finished the stage of National Standard Committee of Livestock and Fishery product. The DoF is striving to be approved of the National GAqP standard.

Aquaculture support services

In 2023-2024, the coordinating plan of Aquaculture Division, Regional and State of DOF and the fish hatcheries stations supported to fish farmers for providing breeders and technical advices to small-scale farmers for poverty reduction and rural development at the township level. Under supervision of aquaculture division, aquatic animal health and disease control section and Freshwater fish research section formed groups of Mobile Team giving on-site support services for fish farmers who want to check their ponds water/soil parameters and health condition of their cultured fish for preventing the fish disease and farm management. In addition, Aquatic animal health and disease control section also provides PCR check on shrimp diseases of shrimp seeds for shrimp farmers. In 2023-2024, Freshwater fish research section gave services of water quality analysis on 257 cases and soil analyses on 13 cases. Aquatic animal health and disease control section provided support services of on-site field analyses on 29 cases, lab disease analysis on 546 cases, PCR check for disease on 1568 cases, Health Certificate issued on 94 cases and provided the lecture for 22 times.

Implemented activities of Aquaculture Division

Aquaculture in fisheries sector is important for food security and nutrition. Aquaculture is also supporting in rural economy and income generation of foreign exchange through socio-economic development at the national and local level.

The DoF has been implemented two inches in size of fish seed releasing plan for sustainable the fisheries resources by fish seed releasing in rivers, streams and lakes which was guided and encouraged by the Government. The plan aims to increase the fish stock, to replenish of fisheries resources, to improve the survival rate of released fish seed and to ensure the sustainability of fisheries resources in natural water. In 2023-2024, DoF has already replenished totally 551.11 million of two inches size of fish seeds into natural water. The main fish species stocked into rivers, streams and lakes are Labeo rohita, Common carp and Tarpian. The government is releasing millions of fish seed into natural water by a cost of million kyats, which is beneficial for the people who are catching, selling and consuming those fish. As technology transferred on fish farming and breeding techniques to rural people and fish

farmers, the basic aquaculture and practically fish breeding trainings are being conducted annually to improve technical knowledge on fish breeding and farm techniques. In 2023-2024, there were conducted 122 times of the basic aquaculture and fish breeding trainings and totally 3362 trainees were participated.

The DoF provides the employment opportunity for the rural people, especially who are low income and landless, to create the job opportunities by conducting the small-scale cage culture system. That aims to increase family income and engage in nutrition through individual's and commercial's activities.

Way forwards

To be sustainable development of Myanmar's Aquaculture Sector, it is cooperating and implementing the guidelines of international and regional organizations such as FAO, WOA, SEAFDEC and NACA. DoF will emphasize on production of good quality fish seed, importing, research and experimental for potential indigenous fish species and fish culture technology to adapt the climate change, prevention and control the fish disease outbreak, encouraging on fish culture by applying quality fish meal, promoting the implementation of Good Aquaculture Practices (GAQP). Then DoF is implementing the chemical residue management for aquaculture products due to National Residue Monitoring Plan (NRMP).