

Aiming for Improved Gender Equity in Cambodian Aquaculture

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The population of Cambodia in 2018 is about 16 million with an estimated growth rate of 1.63% per annum and gender ratio of 0.96 male/female (24:25 male:female ratio). As a result of the country's civil war in the mid 1970s, about 50% of its population is under 25 years old. The country's population growth, coupled with the need to improve food and nutrition security for the people and to continue to support economic development, implies that the demand for fishery products will also continue to grow. Thus, the fisheries sector is making utmost effort to supply the increasing demand for food fish, and ensuring that the supply will be continuously available for future generations. In the National Socio-economic Development Plan (NSDP) 2014-2018 and the Agricultural Strategic Development Plan of the Ministry of Agriculture, Forestry and Fisheries (MAFF) of Cambodia, the importance of fisheries is recognized considering that it continues to occupy a crucial position in terms of providing nutrition and income to millions of Cambodians. Specifically, the country's Strategic Planning Framework for Fisheries (SPF) 2015-2025 has identified aquaculture as one of the four pillars of development for achieving food security, poverty alleviation, and economic growth, the other three being capture fisheries (inland and marine), trade, and export. In order to attain this goal, the SPF sets a production target of 250,000 MT from aquaculture in 2018, while the National Strategic Plan for Aquaculture Development (NSPAD) of Cambodia for 2016-2030 had designed and set out a clear vision and strategy for the sustainable development of aquaculture to ensure its enhanced contribution to economic growth, food security, and poverty alleviation. The NSPAD also specifies the need to strengthen the roles and functions of women and youth as the main stakeholders of the country's aquaculture sub-sector, not only in the fish production aspect but also in sustaining the stable supply of seeds for aquaculture, processing, and marketing, for their contribution to the country's socio-economic development.

In 2017, the total fisheries production of Cambodia was 856,363 metric tons (MT), which had increased by about 87% from that of 2014 which was 745,315 MT (SEAFDEC, 2017), gaining an average annual increase of about 22%. It should be noted that as of 2014, the country's fisheries production

from inland capture, marine capture, and aquaculture was 505,005 MT, 120,250 MT, and 120,060 MT, respectively (Table 1). While production from inland capture fisheries comprises a variety of freshwater fishes that have not been classified by species, those from marine capture fisheries had been classified only as marine fishes, marine crabs, natantian decapods, marine mollusks, and cephalopods. Production from aquaculture includes freshwater fishes, crocodiles, freshwater prawn, and marine fishes and shrimps, and the sector has shown considerable growth from 50,000 MT in 2009 to 120,055 MT in 2014. Even though the focus in the past years was mainly on small-scale production, the potential of large-scale production is being considered to maintain a stable supply of fish, and the private sector is being tapped for large-scale aquaculture development in the country's inland and coastal areas.

Aquaculture Sub-sector of Cambodia

As with the other Southeast Asian countries, aquaculture system in Cambodia could be divided into mariculture, brackishwater culture, and freshwater culture. While very little information are available on fish production from the country's mariculture and brackishwater culture, freshwater culture conducted in ponds, cages and rice fields has been progressing well making it easier to collect statistical data on fish production. Nonetheless, fish production from the country's aquaculture sub-sector is shown in Table 2.

As reflected in Table 2, freshwater aquaculture is important for the economy of Cambodia considering the abundant freshwater resources that could be tapped for aquaculture development and the role that freshwater aquaculture could play in the country's socio-economic development, especially the benefits that it could give to the rural communities (Chin, 2014). Since very long time ago, culture of fish in cages and pens had been practiced in Cambodia (Pe and Bun, 2005 cited in FiA, 2010) mainly to fatten fishes during the closed fishing season (Nam and Thuok, 1999). The country's freshwater culture therefore started as a fish fattening system using wild caught fingerlings to increase the market price of fish, and it

Table 1. Total fish production of Cambodia from 2009 to 2014, in metric tons (MT)

	2010	2011	2012	2013	2014
Inland Capture	405,000	445,000	528,000	520,000	505,005
Marine Capture	85,000	114,695	110,000	110,000	120,250
Aquaculture	60,000	72,000	90,000	90,000	120,060
TOTAL	550,000	631,695	728,000	728,000	745,315

Source: SEAFDEC (2017a)

Table 2. Fish production from aquaculture in Cambodia (2009-2014), in metric tons (MT)

	2010	2011	2012	2013	2014
Mariculture	---	2,620	---	4,633	7,416
Brackishwater Culture	---	---	---	91	---
Freshwater Culture	---	69,380	---	85,276	112,639
TOTAL	60,000*	72,000	90,000*	90,000	120,060

Source: SEAFDEC (January 2017b), SEAFDEC (2015), SEAFDEC (2014), SEAFDEC (2013), SEAFDEC (2012)

Note: --- indicates that data is not available

* detailed breakdown is not available

was only recently that this practice became more advanced using freshwater fishponds (Chin, 2014).

Although Cambodia has no tradition of culturing fish in ponds like in some Southeast Asian countries, due to difficulties in keeping the pond water during the dry season, the number of freshwater ponds had considerably increased from 3,455 in 1997 to 11,509 in 2004, increasing by 43% in eight years (Nam and Buoy, 2005), and in 2012 this number increased to 53,452 (Chin, 2014). This development was brought about by the priority given to the development of the aquaculture sub-sector to enhance its contribution to the country's food security and poverty alleviation.

Thus, the aquaculture sub-sector of Cambodia (Fig. 1) had since then developed, and in 2012, aside from the 53,452 units of fishponds of which 36% are located in Takeo Province and about 3% in Kampong Speu, Chin (2014) cited that there were 3,883 fish culture cages about 20% of which are found in Pursat, 280 fish hatchery systems (13% in Takeo Province), and 738 community refuge ponds mostly situated in Kampong Speu (about 24%). She added that the main fish species produced through the country's aquaculture sub-sector include: tilapia (*Oreochromis niloticus*), silver barb (*Barbonymus gonionotus*), common carp (*Cyprinus carpio*), silver carp (*Hypophthalmichthys molitrix*), Indian carp (*Labeo*

rohita), mrigal (*Cirrhinus mrigala*), catfish (*Pangasianodon hypophthalmus*), and walking catfish (*Clarias batrachus*), among others.

Aquaculture extension

It is in the country's Aquaculture Extension that women have mostly developed access through their local and central fisheries offices as well as NGOs that implement aquaculture projects. The target women usually avail of special training and hands-on practice in aquaculture planning, hatchery management, and marketing organized by FiA and its partners, particularly through the Japan International Cooperation Agency (JICA) and the USAID Cambodia HARVEST Project. With the knowledge gained from such training, women are able to carry out in-farm and out-farm activities including fish culture, product promotion, and fish seed production, as well as technology extension to other seed producers and fish farmers in their areas. Under the JICA-sponsored Project "Freshwater Aquaculture Improvement and Extension (FAIEX)" implemented in seven provinces of Cambodia from 2005 to 2014 (JICA and NACA, 2015), aimed at increasing aquaculture production by upgrading aquaculture technical awareness of extension officers and transferred to fish farming households, the women actively took part in every step of the aquaculture extension.

Through the process of technology transfer, the extension officers from FiA promoted the aquaculture techniques to local farmers and the qualified farmers were tapped to collaborate with the Project. With the assistance of the extension officers, a model fish farm was established for the Project and used to demonstrate the adoption of sustainable aquaculture techniques. Training that included fish culture and gender equality were conducted for prospective fish farmers including housewives with support from model farmers using some of their aquaculture materials. With the support from FiA extension officers, a fish seed producers' network was formed for the promotion and marketing of fish seeds that involves mostly the women fish farmers.

The USAID Cambodia HARVEST (Helping Address Rural Vulnerabilities and Ecosystem Stability) was a five-year project (2011-2016) under the Global Hunger and Food Security Initiative (GHFSI) and the Global Climate Change



Fig. 1. Administrative Map of Cambodia
(Source: Google Maps)

(GCC) and Biodiversity Program of the United States of America which aims to reduce poverty and malnutrition by diversifying and increasing food production and income for up to 85,000 rural Cambodian households. Under the umbrella of this Program, the Project was meant to develop sound, agricultural-focused solutions to poor productivity, postharvest losses, malnutrition, lack of market access, environmental degradation, and the effects of climate change on vulnerable rural populations. During the implementation of the USAID Cambodia HARVEST, strategic goals had been set to improve food security, strengthen natural resource management and resilience to climate change, and increase the capacity of the public and private sectors and civil society to support agricultural competitiveness. Implemented in Kampong Thom, Siem Reap, Pursat, and Battambang Provinces of Cambodia (**Fig. 1**), the Project had five major components: Agribusiness Value Chains; Aquaculture and Fisheries; Natural Resource Management; Biodiversity and Climate Change, Social Inclusion, Business Development Services; and Capacity Development.

Under the Aquaculture and Fisheries Component of the abovementioned Project, several training courses were organized targeting the fish farmers including housewives before embarking on their respective aquaculture enterprises, more particularly in the areas of aquaculture planning and management that includes pond preparation, stocking (taking into account the carrying capacity of ponds), feeding, water quality, sampling, conditioning, transport; as well as fish seed production and economic analysis. One of the most successful beneficiaries of the USAID Cambodia HARVEST Project is a tilapia hatchery and fish farm in Siem Reap, owned and operated by a husband-wife team. In the operation of the aforesaid fish farm, the wife is responsible for overseeing the different operations of the tilapia hatchery while pond construction and related works were the responsibility of the husband with the wife participating in the planning and marketing (Nyro, 2016). With the equal participation and responsibility of the wife and husband in the operation and management, this fish farm becomes the top fish seed producer and supplier in the whole Province. The fish farm now produces 15 MT of tilapia per cropping and 4,800,000 tilapia fingerlings per year (200,000-300,000 fingerlings/crop and 2-3 crops/year).

Gender Policy and Mainstreaming Strategy

In Cambodia, women have been involved in aquaculture production by about 50% of the tasks, especially in the planning, development and management of the fish farm operations, and the remaining 50% in processing and trading of fish and fishery products from aquaculture (Chin, 2016). As a result, the Fisheries Administration (FiA) of Cambodia recognizes and promotes the role of women in fisheries through numerous studies and publications on gender issues

that have been published. Moreover, FiA has developed the Gender Policy and Gender Mainstreaming Strategy under the umbrella of the MAFF to ensure that women and men share equal responsibilities in the sustainable development and management of fisheries, especially the aquaculture sub-sector. The Gender Policy is grounded on strong foundation complying with national and international requirements, and directed towards gender equality among men and women with special focus on women, in order to achieve equitable human and socioeconomic development. The Gender Policy also promotes gender equity in fisheries to ensure that men and women are equal partners in development that influences the direction of the social and economic changes that affect their lives.

Meanwhile, the Gender Mainstreaming Strategy aims to enhance gender equality in the agriculture sector through active cooperation between women and men to contribute and benefit equally from the activities of all sub-sectors in the agriculture sector in order to address poverty reduction and gender equality. The objectives of the Strategy are to: 1) increase gender awareness among the MAFF staff at every level of the agriculture sector; 2) integrate gender analysis and sex disaggregated targets and data into the planning of the agriculture sector; 3) increase the authoritative possibilities and number of women that have the adequate attributes necessary for leadership positions in the MAFF; and 4) increase the ability of rural women to access and manage resources and agricultural services.

The principle of the Gender Mainstreaming Strategy complies with human rights and entitlements to education, health care, information, and resources. The high correlation between gender equality and socioeconomic development means that one without the other will not achieve improved quality of life for all men, women and children, which is the standard stipulated in the national goals. Due to changing attitudes and practice takes a long-term process, gender mainstreaming is considered as a learning platform where theories and practice synergize to enhance its implementation including the women-specific efforts exclusively targeting the women (Chin, 2016).

Role of Women and Youth in Aquaculture Sub-sector of Cambodia

In a survey conducted by Chin (2015) in 2012 to study the general socio-economic profile of Cambodian aquaculture, focus was placed on Takeo and Kampong Speu Provinces, because while the former has the largest numbers of fish ponds and hatcheries, the latter has the second largest number of fish ponds but with the largest number of community fish refuge ponds (Chin, 2014). In the Cambodian concept, community fish refuge ponds which are usually man-made, serve as stock enhancement and fish conservation measure meant to improve the productivity of rice field fisheries. The rationale behind the construction of fish refuge ponds is to create refuge areas

for fish during the dry season or sanctuaries for broodstock in seasonally inundated rice fields as the areas can hold water throughout the year even if these are disconnected from permanent natural water bodies (Joffre *et al.*, 2012).

The age of women and youth involved in aquaculture varies from 20 to 60 years. The high proportion of their ages falls in the range between 41-50 years (65.50%) with the same percentage for 20-30 years and 31-40 years at 17.75% each (Chin, 2016). Notwithstanding the gap of the ages between women and youth participating in aquaculture, their management capacity is not significantly different due to the additional training that project implementers provided before the enterprise started, *e.g.* the Cambodia HARVEST Project trained the target farmers not only on aquaculture techniques, but also in aquaculture planning as well as marketing.

Educational background of women and youth is an essential factor as it eases the hatchery heads to absorb new knowledge, technologies, and adaptive measures to improve the management of hatcheries and fish farms. The degree of youth's participation in aquaculture production in Cambodia is

influenced by the development and progress of the aquaculture technologies that attract the youth. In contrast, women have limited educational level, as a result of a traditional culture that women should not necessarily go to school as they are considered to work inside the house doing house works only. Moreover, lack of educational materials has also constrained the women and youth in making decisions on modern hatchery operations and as a result, they continue to do the same traditional ways of breeding without any improvements. Recently however, target women and youth received special training on aquaculture planning, hatchery management, and marketing from FiA and its partners particularly JICA and Cambodia HARVEST Project. Hence, their enhanced knowledge can help them to practice in-farm and out-farm activities, *i.e.* planning for fish culture, seeking customers, extending assistance to new fish seed producers and grow-out farmers. The level of involvement of women and youth the Cambodian aquaculture is illustrated in **Table 3**.

Table 3. Participation of women and youth in freshwater fish culture in Cambodia

Aquaculture Activities	Women's Participation	Youth Participation
Decision making to go into fish culture activities	✓	✓
Planning	✓	✓
Construction of fishpond/hatchery facilities	✓	✓✓
Preparation of ponds	✓	✓
Selection of broodstock and transferring	✓	✓✓
Broodstock rearing	✓	✓
Breeding	✓	✓
Spawning	✓	✓
Fry rearing	✓	✓
Fry nursery	✓	✓
Releasing fingerlings	✓	✓
Feed preparation	✓✓	✓
Water quality management	✓	✓
Harvesting	✓	✓
Selling	✓	✓
Marketing	✓	✓

Source: Chin (2016)

Fish seed production

Results of the survey by Chin (2014) also indicated that the number of women engaged in fish seed production is less than that of men at a ratio of 3:20 (women to men). The high proportion of men working in fish hatcheries could be due to the heavy manual work in hatchery operations (FAIEX, 2009). However, in a focus group interview, Chin (2014) gathered that men and women have practically equal roles in actual fish



Participation of men, women, and youth in Cambodian aquaculture

hatchery operations because while men are mostly involved in fish breeding especially in draining water and collecting the fish seeds for sale, the women take care of the materials to be used for breeding, *e.g.* hormones, chemicals, as well as in taking care of the fish fry, *e.g.* feeding, checking water quality, health monitoring, and marketing of the fish seeds, the duties and responsibilities that have not been generally and duly recognized contributing to the increased “invisible” roles of women in aquaculture.



Inducing freshwater fish to spawn

The involvement of the youth in fish seed production is an aspect that should also be recognized even if results of the previous surveys indicated that the youth groups are more concerned with pursuing higher education and different career paths. In fact, results of the survey conducted by Chin (2015) indicated that 26% of the fish hatchery operators belong to the youth group (24-40 years old), 22% to the median group (41-50 years old), and 52% are aged 51-68 years old (elder group). In terms of educational attainment, 26% of the youth group attended school from elementary level up to higher level and vocational training, 22% from the median group, and 52% from the elder group. Educational background is an essential factor in fish seed production as greater understanding is necessary to grasp the new technologies in hatchery operations. Moreover, although women are dynamically engaged in different types of works, *i.e.* in decision making, planning, hatcheries construction, broodstock selection, transferring and weighing, breeding, spawning, fry nursing, packing, transportation of fingerlings, and marketing, the youth as members of families that operate hatcheries, have been working side by side with the women. Additionally, based on their experience, the women are able to serve as advisors to researchers and officers of governmental research institutions, where their involvement in this aspect is higher than that of the youth who have less experience.

Fish pond operations

The FAIEX Project encouraged local communities to culture fish in earthen ponds so that fish would become cheaper

and more affordable in the rural areas, and in good quality as the source is close to their communities. As a result, fish culture operations are carried out in rural communities by all members in the family with men and women doing their equal share. However, the survey of Chin (2015) showed that more men are involved in fish culture operations at a ratio of 13:87 (women:men). This could be because even if women are involved in every step of pond operations, their services are generally not valued and recognized. For example, women take care of the maintenance of the culture ponds, *i.e.* monitoring the fish stocks in terms of health aspects and water parameters of the ponds, feeding the fish, as well as in harvesting and marketing the produce. Aside from on-farm activities, women are also engaged in off-farm duties to augment the family’s income as well as taking care of the daily household chores.

Fish marketing

Interestingly, youth is more active in the marketing of fish (Table 4). Two activities (communication and on-farm dissemination) out of six activities have an equal participation of women and youth. Women would contact customers by phone to explain their products and other related matters. Moreover, women can also serve as trainers to echo aquaculture techniques to fish grow-out farmers. Nevertheless, women extend less effort than the youth does because there are activities that could not be conducted at their homes. For example, fish grow-out farmers are the main customers of the fish seed producers. The fish seed supplier should deliver onsite training course on aquaculture techniques to those who are interested in culturing fish and guide them how to prepare their ponds in actual condition. After delivering the fish seeds, the supplier provides the techniques for fish culture. In some cases, youth and men are more active than women in exploring strategies to promote their fishery products, *e.g.* by training fish grow-out farmers, distributing business cards and promotional leaflets, and advertisement in social media, TV, magazine, and radio.

Table 4. Participation of women and youth in fish marketing

Fish Marketing Activities	Women’s Participation	Youth Participation
Communication and on-farm information dissemination	✓	✓
Training of other fish farmers	✓	✓✓
Distribution of business name cards and promotional leaflets	✓	✓✓
Dissemination of culture activities through social media	✓	✓✓
Follow-up progress of culture activities at fish farmer’s house	✓	✓✓
Dissemination of techniques to students in schools/universities	✓	✓

Source: Chin (2016)



difficulty in accessing hormones, and lack of communication skills to interact with other farmers, local authorities, fisheries officers, and non-government organizations (NGOs). Moreover, the inadequacy of educational materials restricts women and youth from the modern methods in hatchery management and operations. As a result, they tend to continue the same traditional ways for breeding without improvements. In spite of the constraints, women and youth have the same capacity to undertake aquaculture ventures, especially in the aquaculture operations from the starting point to the end of the culture processes.

Way Forward

Gender equality in the fisheries sector in Cambodia particularly aquaculture would be enhanced through active cooperation between men and women to equally contribute and benefit from fisheries (FiA, 2016). Women are the most important source of labor in fish culture and seed production to enhance the aquaculture production of Cambodia. The FiA should therefore consider strengthening its partnership with NGOs and other agencies working on the development of aquaculture to enhance the capacity of women. Moreover, in order to increase the participation of women in aquaculture activities, the recommendations shown in **Box 1**, should also be taken into consideration in order that gender equity would be achieved in Cambodian aquaculture in the future.

Issues and Constraints

The challenges that hinder women and youth to engage in aquaculture in Cambodia are related to cultural, social, and economic aspects. The custom in Cambodia requires that women should fulfill household duties and not involve in social matters. Notably, women are busy with house works that they do not have time to do aquaculture activities. For families living in rural areas, most women lack the necessary technical knowledge because they do not get the opportunity to travel outside their homes to gain and share knowledge with other fish farmers. Furthermore, women feel unsafe to take care of their aquaculture facilities at night and much more stay away from their homes.

The fact that the youth seems to have higher educational level than the women is because of the Cambodian culture that women do not need to go to school because they are supposed to do houseworks. In fact, in fisheries academic institutions, the number of men is more than that of women because Cambodians believe that women should do only office works not requiring higher education, rather than working in the fields.

Women and youth also do not get much involved in aquaculture activities because of the absence of ownership of the fish farms, inadequate support from local authorities, low price of the locally produced fish seeds, high operating costs involved, insufficient knowledge on hatchery techniques, high interest rates on loans, long dry season, insufficient broodstock,

Box 1. Recommendations to improve women's participation in aquaculture

1. Strongly support and encourage women to participate in social aspects particularly in activities related to aquaculture with their respective spouses, neighbors, and other relevant officials
2. Provide special training courses on specific subjects to women who are unemployed
3. Continue promoting and supporting gender programs in schools and universities
4. Collaborate with the Ministry of Women's Affairs and agencies related to women to promote their participation in the aquaculture sector, *i.e.* providing them study tours
5. Create aquaculture network for women and youth with support from the Department of Aquaculture Development
6. Build capacity of women on negotiation skills to defend their products, to make them confident to talk to customers
7. Train fish farmers on Good Aquaculture Practices (GAPs) in order to respond to food safety requirements and if possible, mainstream it to all levels of the Cambodian society
8. Continue encouraging women farmers to be more actively involved by giving awards for development of model farms as well as providing them local and international study tours
9. Produce short drama and/or comedy films to raise the awareness of women in enhancing their involvement in aquaculture development and management
10. Use women's pictures in advertisement billboards, brochures and posters to illustrate the active role of women farmers in aquaculture activities, *e.g.* applying lime in ponds, feeding the fish stocks

Box 1. Recommendations to improve women's participation in aquaculture (Cont'd)

11. Increase farm facilities such as number of fish ponds and number of broodstocks, and encourage children to pursue aquaculture skills and technology training
12. Strengthen and build knowledge on: a) planning fish culture and hatchery enterprises, b) marketing fish seeds and production of table fish, c) hatchery techniques, d) nursery techniques, e) fish culture techniques, and f) establishment of focal points of aquaculture trainers
13. Enhance aquaculture extension by providing study tours, organizing training courses, convening regular meetings with aqua-network
14. Promote aquaculture development via Facebook, TV, magazine, and radio
15. Conduct training courses on aquaculture techniques and provide aquaculture materials to students in universities
16. Combat illegal importation of fish seeds
17. Increase and strengthen aquaculture network
18. Consider other contributions from the commune council by bringing up aquaculture issues in the commune investment program, making available loans for aquaculture with low interest rates, and establishing fish feed factory in Cambodia

Source: FiA (2016)

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