

UDK 502.14(599)

## BUILDING RESILIENCE AND POVERTY ALLEVIATION THROUGH TILAPIA-BASED SKILLS AND LIVELIHOOD DEVELOPMENT IN NORTHERN MINDANAO

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*The project aimed to teach beneficiaries skills and assist them in establishing a tilapia-based livelihood, with the objective of building resilience and alleviate indigence amidst environmental challenges. A survey of organizations and site evaluation were conducted to determine qualified beneficiaries and suitability of area. Thirteen people's organizations, one Local Government Unit and a school were qualified as partner-beneficiaries. They were trained the technologies on tilapia hatchery operations, tilanggit production and tilapia grow-out and were assisted in starting their own livelihoods, applying the acquired skills. Start-up materials were provided: fingerlings, cage materials, feeds and equipment. They were also given trainings on value-adding, feed formulation, entrepreneurship, bookkeeping, gender and development, and climate change. Government agencies were engaged for sustainability of the initiative. At the end of the project, seven organizations were already operating their hatcheries, producing fingerlings for their use and for market. The tilanggit processed by women were highly demanded in markets and festivals. Their grown-out tilapia is sold in retail and in bulk. As a strategy, the beneficiaries planted indigenous trees in river banks in exchange for free fingerlings. It was shown that bringing science to poor communities helps mitigate impacts of climate change.*

**Keywords:** resilience, tilapia, tilanggit, livelihood, climate change.

### **Tilapia as a source of income**

Tilapia (*Oreochromis* spp.) has been referred to as the “aquatic chicken” as it can grow fast, breed easily and is very hardy. Its culture and propagation is simple and requires low feed inputs and water quality management. Tilapia grow-out has been a good source of income in many parts of the world. The drawback however is that the fish is marketable only at least 4 months after stocking hence a grower is left penniless for the time that the fish is being cultured. Three tilapia-based technologies are being promoted by the Mindanao State University at Naawan, as sources of income, namely: hatchery operations for fingerling production, tilanggit production and grow-out culture. These technologies are interrelated. Hatchery operation is desirable because aside from the income from selling fingerlings, it ensures a stable supply of the seeds for grow-out culture. Tilanggit production allows intense stocking density for a given culture space because 2-month old fish can be thinned out for tilanggit processing leaving only the number equivalent to the carrying capacity of the facility. A reality that emerged from several studies is the absence of livelihood options for fisherfolks and some sectors like the women and the youth. The technology on tilanggit production can be taught to these sectors so

they can have a source of income without necessarily abandoning the household responsibilities that are associated with wives and women. The processing can be done even in their own kitchen hence is considered a good source of income for non-working members of the household. Grow-out is the most common livelihood activity but many are prevented from engaging because they are constrained by limited supply of fingerlings. Records have also shown that fishing communities are among the most vulnerable groups to climate change impacts. Teaching them skills and providing them assistance in starting a livelihood applying the skills they have acquired could be a key to preparedness. Anchored on these premises, the project hoped to alleviate poverty among fisherfolks and make them more resilient to the impacts of environmental challenges.

With funding from the Commission on Higher Education, we shared the technologies to fishing communities with two goals: 1) To contribute to the income, food security and nutrition of vulnerable households through tilapia-based skills and livelihood development, and 2) to contribute to resilience building of the fishery ecosystems and the communities dependent on them amidst potential impacts of climate change.

Initial activities included entry protocols, identification of vulnerable communities with the help of the local government units, and assessment of sites for suitability to tilapia-based activities. Carefully selected representatives from each partner organization underwent skills training on the three technologies. For sustainability and holistic development, skills training and livelihood development were paralleled by other relevant trainings, namely: entrepreneurship and bookkeeping, marketing, gender and development, climate change, and feed formulation. A training on entrepreneurship and marketing was conducted to prepare them to enter the tilapia industry. A seminar-workshop entitled bookkeeping for non-bookkeepers and accounting for non-accountants was necessary because many organizations fall apart due to unsound financial management. The organizations were proactively capacitated to handle finances. An activity on gender and development, with emphasis on the roles, functions and opportunities in gender within the fisheries sector, could bring about awareness that both husbands and wives can equally contribute to achieving development goals. Because building resilience amidst climate change was a goal, people's understanding of the climate change issue was addressed through training-workshop that included resource mapping with emphasis towards climate resiliency and sustained resources management. Since the project can provide only start-up feeds for their livelihood, the partner communities were also taught to formulate feeds using indigenous materials. In other words, the process of transferring the tilapia-based technologies included lectures, training-workshops, hands-on activities, and on-site livelihood establishment.

A total of 12 people's organizations, a local government unit and a Fisheries school in Northern Mindanao, Philippines were chosen as project partners. The socio-economic survey and livelihood profiling revealed that households in these areas were living on a hand-to-mouth existence with no clear livelihood options.

#### **Training and seminars: establishing a tilapia-based livelihood**

21 individuals from the various partner organizations took part in the training on tilapia hatchery management. The activities included lectures coupled with actual exercise on broodstock selection, maintenance of good-quality broodstock, sex identification, classification of *Tilapia* species used in aquaculture, breeding or spawning enclosures, hatchery methods, and ways to increase production yield and, sex reversal and its advantages. Based on the participants' performance and the readiness of their facilities back

home, some broodstocks were a take-home for some trainees so that they could already start their hatchery operation. The ocular visits to the partners' areas revealed that a hatchery complex owned by a local government unit had remained idle for years. Technical assistance was provided to rehabilitate the facility and broodstocks were given for the facility to immediately operate. Within the duration of the project, tilapia hatchery was already operational in five project sites, with highest fingerling production in this LGU-owned hatchery complex. The local government had already dispersed significant number of tilapia fry/fingerlings. The other groups that succeeded in establishing hatcheries had intensified their grow-out activities because their fingerling supply was already sufficient.

Another set of representatives from partner organizations, mostly women and youth, joined the training on tilanggit processing and production. *Tilanggit* is a dried tilapia product well-known for its taste and crunchiness, meatier, tastier and crunchier than any dried fish product. Tilapia is prolific, matures sexually at 90 days, escalating food competition when cultured. But a shorter culture period could mitigate competition. In tilapia farming for tilanggit production, fingerlings are stocked at its maximum stocking density in shorter period, to body weight of 20-30 grams. These approximately 2-month old tilapia are then processed for tilanggit.

The technology on tilanggit production was successfully adopted by three organizations only. The products of these organizations were already sold locally, displayed in trade fairs and in some supermarkets. One adopter, a federation of fisherfolks, had already transferred the same technology to members of its federation. For the other partner organizations, the low adoption of the technology was attributed to organizational dynamics like movement of trained members to another place, or withdrawal of membership from the organization, or simply was more focused on the grow-out culture. The project committed to conduct an on-site training under its regular extension activities, as per request from the partner organization. The success among the few adopters of the tilanggit technology can be attributed to the groups' implementation strategy. To persuade members to participate in the processing, the organization adopted an incentive scheme. For every volume of fish processed to tilanggit, a member got a corresponding volume of fresh fish to be brought home for the family. The impact was good because for members, there was an immediate gain for the effort of participating in the processing, in addition to the share from the organizational sales. Socially, the members got pre-occupied

with the work instead of just sitting down and playing cards and the like. Monetarily, *tilanggit* production showed a viable earning of 31.47% in just 2 months of culture. The ROI could potentially increase once volume is increased. According to the group, it was better to engage in *Tilanggit* production rather than put the money in the bank which may earn only 2-4% for annual time deposit.

A special partner of MSUNaawan in this project is the Iligan City National School of Fisheries (ICNSF). Per request by the school head, some of its faculty members joined the training on *tilanggit* production. The faculty in turn transferred and shared the technology to their students. As an offshoot, a training for the parents of the students was initiated through the Parents-Teachers' Association.

Knowledge on packaging and value adding for *tilanggit* is necessary to ensure competitiveness in the market. Training on this marketing component, participated by 24 representatives from the partner organizations, was therefore organized and conducted in collaboration with the Department of Trade and Industry (DTI) Caraga Region.

The team also conducted training on feed formulation, putting emphasis on the use of available local materials. In all the trainings, the participants joyfully expressed appreciation for the skill they have acquired, saying that the same skill can be used in other livelihood activities like feeds for piggeries, pancit and noodle-making and the like. All organizations were equipped by the project of the basic gadgets for feed formulation, including a corn mill and a pelletizer. These would already enable them to immediately start formulating feeds, taking advantage of abundant raw materials like corn bran.

#### **Tilapia-based technologies: operating practices**

Tilapia grow-out has long-been seen as a promising industry. All partner organizations adopted the grow-out technology upon return to their place. The size and the design of their cages varied, depending on water supply, relative location, and some other factors unique to the locality. Some cages were established along the river where current is continuous and unidirectional while the fish grown in relatively stagnating lakes maybe exposed to lower-oxygen environment. The results of the grow-out revealed some new information for aquaculture as well as the state of the environment. The groups that established their cages in an environment where shrimps were abundant invested only a little for the feeds yet had a good harvest. The fish turned out to have a good high-protein supply because they were feeding on the natural food, mainly the shrimps, available in the environment.

In another group that established their cages along the Agusan River, the return of investment was also very high. This was attributed to the good water exchange in flowing water, providing good oxygen supply to the fish. However, the presence of janitor fish in the river was further confirmed in this project. The intrusion of this pest was already reported in previous studies. When the nets were lifted out of the water during harvest, the nets already had holes which could mean that some fish had escaped hence affecting their total harvest. But the average body weight of the fish cultured in the river was higher than those grown in standing waters. Other groups also reported that they were using some natural food supplements like squash, camote tops, *kangkong* and other edible plant materials available in their area. Given these variations in their feeding management, it was very difficult to compare growth performance of the fish among the project sites. Suffice to say though that the grow-out technology was successfully adopted, with the beneficiaries introducing some innovations in management to achieve good harvest. These innovations have become the subjects for research with the goal of determining the most effective culture system in the natural environments experienced by the different groups.

#### **Workshop-seminar on climate change**

Another project was the workshop-seminar on climate change focused on mapping resources and vulnerable areas and brainstorming on activities aimed to mitigate measures that would lessen the negative impact of deleterious weather disturbances. To ensure that such measures would be adopted by group members, the chosen participants were the leaders of the organizations. The project team's staff provided lecture inputs on climate change and also facilitated the workshop on mitigating measures. We also recommended protected sites for cage establishment but raised the issue on how to continually protect their environment. The group agreed to plant indigenous trees along the banks. In exchange, the project gave them free fingerlings for every tree planted. The project also extended technical assistance to the community groups on how to construct flood-resistant cages, along with the provision of essential cage construction materials.

To further sustain the initiative, an agreement with the Bureau of Fisheries and Aquatic Resources was crafted, for them to continue assisting the organizations. Overall, the goals were achieved and researchable areas were identified, specifically in developing aquaculture structures that are adoptive to environmental changes.