

Current Status of Fish Stock Enhancement in Thailand

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Abstract

Aquatic animals from natural waters have long been exploited by rural poor as cheap protein food. Natural waters including rivers, canals, swamps, lakes, large reservoirs, and small water bodies are significantly exploited as fishing areas. Unfortunately, country development together with destructive fishing practices led to the deterioration of these aquatic habitats and fishery resources. Production from advance aquaculture technologies can support the steady increase demand for fishery resources to some extent. Natural fishery resources, however, still maintain its crucial role in providing cheap protein particularly for the rural poor in remote areas. The Department of Fisheries (DoF), the national fisheries competent authority of Thailand, manages to maintain/enhance fisheries production through number of strategies including law enforcement, habitat rehabilitation and stocking programs. Stocking has been widely implemented due to its simplicity and proven to be the most successful technique for fisheries management. Over thousand millions fingerlings of fishes, frogs and giant freshwater prawn have been stocked annually by DoF through a number of fisheries development projects, *i.e.* Village Fisheries Project, School Fisheries Project, Bamrung Phan Pla Pracha-arsa Project (Participatory Voluntary Fish Stock Enhancement Project), Small Water Bodies Rehabilitation for Fisheries Project, Large Water Bodies Fisheries Development Project, and Seed Production for Stocking. Post-stock assessment since 1985 revealed that the recapture rate of the giant freshwater prawn is around 3% with rate of investment return which is more than 6 folds. The recapture rate of fishes is in the range of 5-10% with total production of 20,000 metric tons and valued at about 30 million USD. Stock enhancement could be achieved through a number of strategies depending on the conditions of particular water bodies. Law enforcement on illegal fishing is an important lesson learnt at the Yom river basin, where stocking large numbers of giant freshwater prawn had been successful at Pak Mun reservoir while community-based fisheries management had been effective at Ubol Ratana reservoir. The rate of achievement of stock enhancement, however, depends on participation of local communities the most essential element for fisheries management. Inland capture production varies depending on the challenges including habitat alteration, overfishing, genetic alteration, fisheries regulations, and climate change. Alterations of inland capture fisheries production would definitely have adverse impacts on livelihoods of rural poor who entirely rely on the natural aquatic resource. Stock enhancement through the various strategies would be effective only when all challenges concerned are taken into account and properly managed.

Introduction

Thailand is overwhelming with water sources and abundance of fishery resources. People utilize water in their daily life activities and exploit fisheries resources for food since the ancient times. Human settlement is always associated with water sources. Aquatic animal is one of the natural resources closely related with people livelihood, tradition and culture. These Thai proverbs “ในน้ำมีปลาในนามีข้าว” means “in the waters are fish and in the field is rice” or “กินข้าวกินปลา” means “eat fish eat rice” just reflect the fact that rice and fish are staple food for Thais since long

time ago. The abundance of fishery resources in the past adequately supported the demand of low population. However, country development has negatively impacted on natural habitats and resources. In addition, increased population from 25 million to 65 million during the last couple of decades inevitably resulted in increasing demand for fishery resources. Inland fisheries play a crucial role in providing food and nutrition particularly for the rural poor who has less or no opportunity for improving their living conditions.

Most rural poor rely on the fishery resources as cheap protein source. Inland fishery resources generally characterize the significance of food security, nutrition, livelihood, local knowledge, and income earnings. River basins of the country comprised 25 main basins and 254 sub-river basins. According to geomorphology and aquatic ecology, water sources within these river basins can be classified into 4 categories, namely: rivers and canals, swamps and lakes, large reservoirs, and small water bodies. These waters are fisheries productive areas. Unlike production from marine capture fisheries that steadily

Activities

Inland fisheries production is largely influenced by a complex interaction of physical, chemical and biological conditions and fishing practices. Therefore it needed proper management to sustain/enhance the production. Three approaches, however, are generally used for fisheries management; a) fisheries law is commonly applied to regulate fishing including gear and size restrictions, seasonal closures, limitation on entry, taxes levies and property rights; b) habitat rehabilitation aims to increase or recover available habitat and/or access to key habitat for at least some life stages of a target species. Such an approach may range from increased connectivity along a river e.g. fish passage, through reconstruction of the habitat to the installation of artificial habitats; and c) stock enhancement referred to as the manipulation of the fish stocks by addition of material, usually of a desired species to improve the fishery productivity or diversity conservation. Stocking is widely popular due to its perceived simplicity. Pawaphutanon (1988) reported that stocking has been proven to be the most successful technique for fisheries management. Aquatic animal stocking generally associated with traditional and religious ceremonies such as making merit on birthday, on new-year celebration and many other special occasions. Aquatic animal stocking is practiced more widely and intensively when fish hatcheries able to produce massive seed production of various species.

Aquatic animal stocking, fish stocking in particular has been practiced by many agencies with different purposes, but two commons are production enhancement and species conservation. Over thousand millions fingerlings of fishes, frog and freshwater giant prawn have been stocked annually by DoF through number of fisheries development projects; 1) Village Fisheries Project, 2) School Fisheries Project, 3) Bamrung Phan Pla Pracha-arsa Project

declines, inland capture fisheries production has been maintained well about 200,000 metric tons since 1994. Such stability of production reflects the achievement of effective fisheries management. Inland fisheries production comprises fish as the mainstay component coupled with very minute production of shrimps and other aquatic animals. The Department of Fisheries (DoF) is the national competent authority, responsible for maintaining/enhancing fisheries production for self sufficiency as well as to export the surplus for income earning.

(Participatory Voluntary Fish Stock Enhancement Project), 4) Small Water Bodies Rehabilitation for Fisheries Project, 5) Large Water Bodies Fisheries Development Project, and 6) Seed Production for Stocking. For example, DoF stocked more than 1,333 million fingerlings of 59 aquatic animal species in natural waters in 2013. Out of the total 59 stocking species, 53 species are freshwater fishes, 6 species of frogs and freshwater giant prawn. In addition to DoF, Tambon (Local) Administration Organization (TAO), Provincial Governors, Electricity Generating Authority of Thailand (EGAT), and other private and government organizations also involved in stocking.

Village fisheries project was initiated by DoF in 1983 with objective to alleviate shortage of fish protein of rural people. The projects functioned effectively and were expanded to implement throughout the country by emphasizing on remote areas. However, these projects were transferred to be overseen by Tambol Administration Organization (TAO) according to decentralization policy of the new constitution in 1997. Unfortunately, a survey by DoF in 2010 revealed that those projects transferred to be managed by TAO more than 50% was no longer function.

Alongside with stocking program, DoF has also been also conducting post stock assessment since 1985, where positive impact was apparently found with the stocking of the giant freshwater prawn. Success in stocking however depends on the number of factors including hydrology, fertility of the water, number and size of the stocked seeds, quality of seeds and growth period. Recapture of the giant freshwater prawn is observed to be about 3% with rate of investment return which is more than 6 folds. Meanwhile, recapture rate of stocked fish in general, is found to be 5-10%.

Stock Enhancement Lessons Learnt

Giant freshwater prawn stocking in Pak Mun

Pak Mun dam in Ubon Ratchathani Province was constructed to impound the Lower Mun River stretch in 1994. The dam is located about 4-5 km away from the confluence of the Mun and the Mekong Rivers. Apparent decrease in fish abundance was due to the obstruction of dam on fish migration from the Mekong River to the Mun River. Even if fish ladder was provided to facilitate fish migration, the design seems to be inefficiently functioning. For years, local fishers and the Poor Association encountering the negative impacts from dam post-impoundment demanded the then government to find solutions that would address the decreasing fishery resources. The Thai cabinet announced in 2003 a compromised resolution by regulating the dam operations, *i.e.* closing it for 8 months to generate

Control of illegal fishing Yom River Basin

Yom River originates from the mountain range in the north of the country and river flows through agriculture and communities' plain areas in the lower north. The Yom River is a main origin of the Chao Phraya River and is the only main river which has no dam impoundment. Flood is always happening at the lower part of the basin during the monsoonal season. The flood plain covers an area of 500,000-600,000 rai (80,000-96,000 hectare) and is a significant spawning and nursing ground for various aquatic animals. The number of illegal fishing gears such as large stationary bag net, small stationary bag net, push net and giant lift net has been increasing in the River, where destructive fishing gear operations result in alteration of fish abundance and unfair resources exploitation.

DoF has managed to reduce the number and effectiveness of these destructive fishing gears in the Lower Yom River Basin in 2009-2011. Stock enhancement project was initiated on the first year of the project which was operated by involving government agencies and enhancing the participation of local administration agencies, communities and fishers. The project aims to reduce fishing effort while research was conducted to assess stock of fishery resources and catch production of different types of fishing gear in the river basin. Results of the research activity indicated the operations of 248 units of

electricity and opening for 4 months during fish migration period to allow the migratory entry fish from the Mekong River. In addition, the cabinet had assigned EGAT in collaboration with DoF to enhance fisheries production at the lower Mun River stretch by stocking 50 millions fingerlings or juveniles of aquatic species annually for 5 years during 2003-2007. DoF stocked 40 millions of giant freshwater prawn and other 10 million of economic freshwater fishes annually during the particular period. Post stock assessment revealed an apparent production increase, especially the production of giant freshwater prawn. Recapture rate was found at 2.4%. Prawn production accounted for 98 metric tons during the 8-month culture period, valued at 35 million Baht with rate of investment return of about 5.84 folds.

illegal fishing gears. These included 123 units of large stationary bag net, small stationary bag net, 40 units of push net, 30 units of giant lift net and 25 pieces of bamboo fence, 22 units of small stationary bag net and 8 electro-fishing.

In 2008, the project operation focused on reduction of fishing effort based on agreement with fishers to reduce large stationary bag net use by 25% of during 3-12 December 2008. The results showed that the fisheries production increased by 84,000 kg or equivalent to 12.20 million individuals survived from 25% reduction of fishing effort of large stationary bag net. The value of the increment is about 2.55 million Baht at conservative level while the maximum value could reach up to 12 million Baht.

In 2009-2011, the project tried to reduce the number of illegal fishing gears by employing many strategies, such as: 1) training fishers to gain knowledge on participatory fisheries management, 2) development of collaborative fisheries management plan with participation of government agencies and fisheries communities, 3) strict law enforcement and punishment, 4) buy back of large stationary bag net, 5) support by providing fingerlings and cage culture facilities to those who volunteer to stop using large stationary bag net, 6) development of fish habitat for fish broodstock conservation.

Community-based fisheries management in Ubol Ratana Reservoir

Annual fish production in Ubol Ratana Reservoir showed a declining trend over the past 40 years. The annual catch production decreased after 12 years of impoundment. The CPUE (kg/boat/day) in the wet season is smaller than during the dry season. Closed season (16 May -15 September) and mesh size limitation (not less than 2.5 cm) are two measures employed for fisheries management. Trend of the catch, however, continuously keep on declining year by year. In 2009, the catch was about 21.4 kg/ha/yr but with very high fishing effort. It is estimated that there are more than 5,000 fishing households in 101 villages located around the Reservoir. The DoF introduced a Community Fisheries Based Management project in the Ubol Ratana Reservoir since 2009 to improve fish habitats with the involvement of local communities and government agencies.

Recommendations and Way Forward

Wild capture fisheries could tremendously impact on the livelihood of major population basin-wide especially the rural poor in remote areas. Basin-wide fisheries management strategies should take into account the issues on fisheries stock enhancement as the first priority. Basin-wide fisheries management is related to water management and many other related developmental sectors. Data and information together with knowledge on hydrology, aquatic ecology and fish biology associated with each type of water are crucial in undertaking appropriate planning and implementing such plans under the integrated water resources management (IWRM) approach and stock enhancement. Therefore, personal and institutional capacity building is necessary particularly the enhancing the capability of stakeholders in planning and implementing basin-wide fisheries management. Fisheries law and regulations to control illegal fishing is necessary but law enforcement alone does not

The activity intended to encourage relevant stakeholders to participate in the fisheries management such as the Tambol Administration Organization (TAOs), resource users and government agencies and to co-manage the Reservoir's fishery resources. The 3 year-project (2009-2011) commenced by organizing a stakeholders' meeting for the development of the project management plan, with fisheries resources enhancement as the ultimate goal of the plan. During 2010–2011, DoF established 30 Fish Conservation Zones (1 habitat/village) in the reservoir to increase the fish sanctuary area for broodstock enhancement. Alongside with fish habitats building, stocking is another strategy introduced to enhance fish production. Since then, fish production had markedly increased in 2010 and 2011 as results of the new fisheries management strategies introduced.

function completely due to limitation of budget and number of officials. Therefore, fisheries co-management with participation of local communities in fishery resources management is a promising strategy, which has shown effectiveness in many pilot areas. Contemporary law for effective enforcement is essential for stock enhancement.

Both fish habitat and species diversity of aquatic animal, the essential basic elements for fisheries production have been deteriorated by a number of influential factors including basin development projects and natural phenomenon like climate change. Holistic approach of basin development or IWRM is a promising strategy for basin development to maintain the production of all water related activities and attain their maximum potentials. Aquatic animal stocking will continue its crucial role in stock enhancement but indigenous species are recommended.

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