



## Critical Appreciation of Restoration and Conservation of Degraded Mangroves in Thailand

**JUNAID ALAM MEMON**

*Asian Institute of Technology, Thailand*

*Email: memon@gmx.us*

**AWAIS ANWAR CHANDIO**

*Asian Institute of Technology, Thailand*

Received 19 December 2010

Accepted 4 February 2011

**Abstract** This paper provides critical appreciation of the experience of Thailand in restoration and conservation of degraded mangroves. Through literature survey, the constraints that hinder the successful restoration and conservation of mangroves, and opportunities that lead towards achieving such goal were assessed. Results revealed that since the second half of the twentieth century, Thailand lost more than half of its mangrove cover due to shrimp farming and charcoal production. This has raised concerns that led to enhanced efforts to restore and conserve the mangroves. Since Thailand ratified various relevant international agreements, it is obligated to pay serious attention towards the conservation and restoration of these ecosystems. Thus, the government launched various re-plantation projects and established impressive supportive infrastructures to facilitate such efforts. Meanwhile, the Tsunami 2004 also re-sensitized the Thai society to the protective role of mangroves as many communities took *suo motu* initiatives for the conservation of mangroves in their respective areas. However, ‘the success’ in mangroves conservation has remained very limited, which could be attributed to lack of policy integration and coordination among different agencies, narrow focus on the forest component of mangrove ecosystem, inadequate ecological knowledge and restoration skills among the forest land use managers, and halfhearted departmental support for community participation in mangrove restoration. Therefore, Thai policy makers must revisit the issues and opportunities, and devise appropriate policies to address the structural causes of mangroves degradation and achieve successful ecological restoration.

**Keywords** mangrove, mangroves restoration, mangroves conservation, mangroves re-plantation, mangrove ecosystem, mangroves in Thailand

### OVERVIEW OF MANGROVE LOSS IN THAILAND

Of the 76 provinces of Thailand, 23 are endowed with mangroves along the country’s 2,670 km coastline (Aksornkoae & Tokrisna, 2004; NACA, 2005). About 86 percent of the mangroves are found in the southern region (72 and 14 percent on the Andaman Sea coastline and Gulf of Thailand, respectively) while the remaining 14% are found in the eastern and central regions of the country (Aksornkoae & Tokrisna, 2004; FAO, 2007; NACA, 2005). Between 1961 and 1993, Thailand had lost more than 56 percent of its mangroves on account of aquaculture and shrimp ponds development, resettlements, agriculture, urbanization, and ports and road constructions (Aksornkoae & Tokrisna, 2004). Aquaculture and shrimp farming alone is responsible for about 55 to 64 percent of the total mangrove loss until 1986 mostly because in 1980-1986 the industry grew almost unregulated (Ahmed, 1997; Aksornkoae, 2000; Huitric et al., 2002; Macintosh et al., 2002; WRM, 2002). Although afterwards, significant efforts had been diverted towards the restoration and conservation of mangroves but threats like illegal encroachment in mangrove areas still exist that cause Thailand to bear the continued significant loss of mangrove areas each year (NACA, 2005; Sathirathai, 1998). For example, between the period from 2000 to 2004 alone, the country

lost about 8 percent of its mangrove cover (NACA, 2005). The loss of mangroves in terms of area was higher in the southern region since this area contains a huge proportion of the country's mangrove areas, whereas the loss as percentage of regional total was higher in the eastern region of the country (NACA, 2005).

## **MANGROVE RESTORATION AND CONSERVATION INITIATIVES**

Restoration of degraded mangroves in Thailand dates back to the 1960s but the scale and stretch of such initiatives remained considerably low until the 1980s (Havanond, 1997; NACA, 2005; Thampanya et al., 2006). In 1987, the Government of Thailand adopted a zoning policy for the protection and conservation of the country's rapidly dwindling mangrove cover (Aksornkoae, 2000). Under this policy, about 65 percent of the mangrove areas were declared as Conservation Zone where the mangroves were to be maintained in their present condition. The remaining 35 percent were declared under the Development Zone where the mangroves were to be rehabilitated and restored. The task to carry out the restoration was given to the Royal Forest Department (RFD) which identified about 21,200 ha of degraded mangroves and new mudflats as potential afforestation sites (Aksornkoae, 1993; Erfteimeijer & Lewis III, 1999). Later in 1991, the Thai Cabinet passed a resolution which prohibited shrimp farming and tin mining in fertile mangrove areas (Aksornkoae & Tokrisna, 2004; Macintosh et al., 2002). Although degraded mangroves were still available for conversion into shrimp and aquaculture ponds, the positive impact of the policy could be in the intensification of shrimp ponds using smaller areas (Aksornkoae & Tokrisna, 2004).

On the same year, the Thai Cabinet also approved a massive scale mangrove restoration and re-plantation program with an overall financial outlay of US\$ 30 million, aimed at replanting about 40,000 ha of mangrove areas between 1991 and 1996 (Havanond, 1997; Havanond, 1994). Thus, four mangrove seedling production centers were established in Trat, Phangnga, Nakhon Si Thammarat, and Satun Provinces to support the program (NACA, 2005; Havanond, 1997). However, by 1996 the program was able to achieve only 35 percent of its specified targets as most of the sites identified for re-plantation were still under the concessions for charcoal production and shrimp farms (Havanond, 1997). Even in certain areas where the program was able to intervene, the success rate was still very limited. Confronted with the lack of technical knowledge in mangrove plantation and restoration coupled with poor monitoring and overseeing arrangements, the general survival rate of newly replanted mangroves remained mostly below 40 percent while in some areas it was a complete failure (Erfteimeijer & Lewis III, 1999).

Since then, various provincial level mangrove restoration projects supported by national and bilateral agencies were either completed or are still ongoing. For example, most of the mangroves in the Ranong Biosphere Reserve along the Andaman Sea coastline are the outcome of the rehabilitation of former charcoal concession blocks, abandoned tin mining and shrimp pond sites (Macintosh et al., 2002). Various local nongovernmental organizations are also actively participating in the government initiatives for the restoration of degraded mangroves by introducing various medium- and small-scale mangrove re-plantation projects. The five year 'Green Carpet' project supported by Japan Fund for Environment and Keidanren Nature Conservation Fund (KNCF) which is implemented by the Thai Union for Mangrove Rehabilitation and Conservation is one such project, which aimed to plant mangroves in about 1000 ha abandoned shrimp pond areas in Nakhon Si Thammarat Province (Amarasinghe et al., 2009). Another example is the mangrove restoration project assisted by the Organization for Industrial, Spiritual and Cultural Advancement-International which replanted 280,000 seedlings of mangroves in a 150 ha area in Chanthaburi Province (OISCA-Int., 2000). However, despite all the efforts undertaken in 1970-1998, the extent of planted mangrove areas remained below 5 percent of the natural mangrove areas in Thailand (Field, 1999).

Moreover, Thailand has been a signatory to various international declarations like the Ramsar Convention (1971); World Cultural and Natural Heritage Convention (WHS), Paris (1972); United Nations Convention on the Law of the Sea (UNCLOS), Montego Bay, 1982; Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); and Convention on

Biological Diversity (CBD), Rio de Janeiro, 1992. These declarations had made it obligatory for Thailand to pay serious attention towards the rapid degradation of the country's mangroves. The need for restoration and conservation of mangroves was further reinforced after the Tsunami 2004 when the protective role of the mangroves was realized and appreciated in the tsunami affected areas of Thailand. Recently, 21 sites covering an area of 5,810 km<sup>2</sup> which contain significant patches of the mangroves are declared as Marine National Parks (MNP) and Protected Areas. These areas include for example: the Ao Phang-nga National Park, Phang-nga Bay, and other areas along with Tarutao, Surin, Similan and Ao Phangnga MNP which are declared as Ramsar sites. Moreover, the Ranong mangrove areas are also placed under the UNESCO-MAB bio-reserve (NACA, 2005; FAO, 2007).

Similarly, the Thai society also seems to be well sensitized to the importance as well as the degradation of mangroves. Between 1996 and 2000, the Thai Cabinet passed a number of resolutions to abolish and revoke all mangrove concessions (NACA, 2005; Samabhdhi, 2003). The country's National Economic and Social Development Plan 1997-2001 clearly urged all concerned to exert efforts towards maintaining the healthy mangrove cover of not less than 160,000 ha (Havanond, 1997). As a result, a separate mangrove conservation office was established with the Department of Marine and Coastal Resources under the new umbrella of the Ministry of Natural Resources and Environment (Aksornkoae & Tokrisna, 2004). Historically, significant degree of interest had also been expressed by local communities to replant and conserve the mangroves that has been further revitalized after the 2004 Tsunami (Barbier, 2008; Barbier, 2006;). Similarly, the private sector also did not lag behind in re-planting mangroves (Choudhury, 1997). Furthermore, the Government of Thailand has established an international level mangrove research center in Ranong Province while an extensive network of mangrove research and conservation stations exists in all important coastal areas of the country to carry out scientific research on mangroves (NACA, 2005).

## **ISSUES AND CHALLENGES IN MANGROVE RESTORATION AND CONSERVATION**

Despite the commitment and support structure, efforts for the restoration and conservation of mangroves in Thailand had not been very promising. Firstly, the country is confronted with various issues and challenges at both policy and operational fronts which act as major impediments in the successful restoration and conservation of mangroves. One very crucial challenge is on the fact that shrimp farming activities require clearing of mangrove areas. Since the shrimp industry in Thailand is a lucrative enterprise that puts the country as the global leader in shrimp production, the foremost challenge of the country is to make a hard choice between mangrove conservation and mangrove area conversion into shrimp farms (Ahmed, 1997; Goss et al., 2000; WRM, 2002). Supported by various types of direct and indirect subsidies coupled with pathetic regulations on the establishment of shrimp farms, the country's aquaculture industry has maintained an illusion of profitability (Huitric et al., 2002). In general, the productivity of an intensified shrimp farm hardly goes beyond a decadal span (Claridge, 1996; Dierberg & Kiattisimkul, 1996 both cited in M. Huitric et al., 2002). However, due to lack of data on farm abandonment, the industry successfully masks the losses and easily relocates itself in other mangrove rich regions, leaving behind the ruins of the once rich mangrove ecosystems (Huitric et al., 2002; WRM, 2002).

Serious policy flaws and lack of coordination among government agencies had also in many cases reversed all previous efforts and attempts that had been made for the restoration and conservation of the mangroves (NACA, 2005). From 1966 and onwards, about 23 policy statements were declared for the protection of mangroves, but at the same time, aquaculture policies continued to support the expansion of the Thai shrimp industry through various subsidies including subsidized mangrove concessions (Durongdej, 2001). Before the existence of the current ministerial setup, Huitric et al., (2002) observed that even under a single ministry in 1997, the Ministry of Forest proclaimed massive programs for mangrove plantation but also during such time the Department of Fisheries of the Ministry of Agriculture and Cooperatives was offering mangrove leases for aquaculture use. This was a clear violation of all the cabinet resolutions related

to mangrove conservation. As observed by WRM (2002) and Goss et al. (2000), giant shrimp companies operate at higher levels of political hierarchy in the country. Under such set up the industry could often demand for extraordinary favors from the national level policy, on the pretext of the need to maintain the country's global lead in aquaculture. Subsequently, government's favor for the aquaculture like the one endowed by former Prime Minister Thaksin were the *de facto* cancellation of all previous checks to control the industry (Huitric et al., 2002).

While undertaking programs on the restoration and conservation of mangroves, another challenge that confronted Thailand was the hesitation of government machinery to devolve their centralized powers in favor of the local communities (Huitric et al., 2002). Suwannodom, et al. (1998) reported that mangrove restoration programs implemented in the southern region from 1991 to 1996 had achieved certain level of success especially in the areas where the community-based approach was adopted. Various other studies for example those done by Sathirathai and Barbier (2001), Barbier (2008) providing legal support for such endeavors, Sukwong (undated), and Soontornwong (2006) also indicated that local communities living nearby mangroves were relatively more efficient in the restoration and conservation of mangroves than the officially designated government agencies. Although community-based mangrove management has remained a highly controversial issue in Thai policy dialogue for long, it was only in 2007 that the Thai Cabinet approved the Community Forest Bill (CFB) providing legal support for such endeavors. Even much before that, Johnson and Forsyth (2002) noted that many communities were successful in bringing favorable court decrees to stop further encroachment of the aquaculture industry in mangrove areas, by referring to the CFB draft. However in general, the enforcement of CFB had largely remained weak since many officials from the RFD and Land Development Department, and many local elites had strong ties with the actors in the shrimp industry.

Last but not the least, like many other Asian countries, the complex mangrove ecosystem in Thailand is also managed merely as one type of forest. As a result, most of the mangrove restoration initiatives are planned by typical foresters who are mostly armed with naïve principles of ecological engineering and therefore often fail to distinguish between the significance of mangrove plantation and ecological restoration. Ellison (2000) in his global review, while referring to two mangrove restoration projects of Thailand noted that only one species from the available twenty five species had been selected for the re-plantation. Similar observations were made by Field (1999) and Aksornkoae (2000) who found that the main objective of mangrove rehabilitation programs in Thailand had remained to gear towards the production of timber and charcoal with the objective of ecosystem rehabilitation taking the back seat. Such studies further reached similar observation as that of Ellison (2000) which concluded that the main focus for plantation was only on two commercially important mangrove species. Lewis and Marshall (1997) called this type of restoration effort as a "gardening" approach (Lewis III, 2001). Many so-called 'successful' plantations are nothing but the mono-genus and economically valuable stands of selected species. At present, ample literature is available on the principles of ecological restoration, but unfortunately Thailand has yet to learn from such experiences as the country seems to still perceive that mono species plantation is synonymous with the ecological restoration of mangrove areas. Following the conventional forestry approach and under a mixture of objectives aimed at both ecological restoration and commercial exploitation, the country's ambitious plans like planting 1600 to 2000 ha per year with selected mangrove species are still unabated (Aksornkoae, 2000).

## CONCLUSION

In order to respond to the various national and international obligations, Thailand has showcased its significant efforts in the restoration and conservation of mangroves. However, the success of those efforts has been largely constrained by various unattended structural causes leading to the degradation of mangroves. First and the foremost cause was the lack of policy integration and coordination among the concerned agencies where on the one hand attempts were being made to restore mangroves while on the other hand aquaculture expansion was subsidized through the concessions of mangroves areas. Success was also equally constrained by the forestry biased view

of the rich ecosystem that was essentially an outcome of the lack of ecological knowledge and restoration skills among forest land use managers. These shortcomings resulted in undermining huge effort that Thailand has made in the plantation of mangroves that better qualifies successful establishment of mono species woodlot than the successful ecological restoration. Finally, the hesitation of RFD bureaucracy to promote community participation despite the fact that community intervened attempts of the restoration of mangrove were more successful than those carried out by RFD itself. Nevertheless, the glass was also half full and significant potentials could be seen. Thai communities had a positive attitude towards mangroves especially after the 2004 Tsunami and that was an opportunity that could be availed to ensure the societal ownership of mangrove restoration initiatives. Furthermore, the half century experiences of the successes and failures in the country's mangrove restoration efforts, a good network of mangrove research institutions were a few of the plus points that Thailand could utilize for the successful ecological restoration of their mangroves.

Based on the above review, the following broader policy implications emerge. Firstly, it is obvious that the desired goal of successful mangrove restoration and management could not be achieved unless Thai policy makers carry out a painstaking analysis of the political economy of mangrove loss and devise policies which can prioritize among short terms gains from coastal aquaculture and the long term benefits associated with the intact mangrove cover. Further policies must integrate the sectoral objectives and engaged multiple agencies in preparation of restoration projects in order to ensure that no previous effort goes as a waste of scarce resources. Secondly, the traditional foresters must be trained and retrained in the area of ecological engineering as it is also one of the most important factors in the successful planning and implementation of mangrove restoration programs. Thirdly, during the appraisal of various mangrove restoration projects, it must be ensured that sufficient analytical process has been conducted and completed, and that all options for ecological restoration are adequately evaluated.

## REFERENCES

- Ahmed, F. (1997) In defence of land and livelihood. Sierra Club, Canada.
- Aksornkoe, S. (1993) Ecology and management of mangroves. IUCN, Thailand.
- Aksornkoe, S. (2000) Sustainable use and conservation of mangrove forest resources with emphasis on policy and management practices in Thailand. Int. Workshop Asia- Pacific Cooperation Research for Conservation of Mangroves, Japan.
- Aksornkoe, S. and Tokrisna, R. (2004) Overview of shrimp farming and mangrove loss in Thailand. In B.E. Barbier, and Sathirathai, S. Shrimp farming and mangrove loss in Thailand. Edward Elgar Pub. Ltd.
- Amarasinghe, M.D., Dulyapark, V., Taparhudee, W., Yoonpundh, R. and Jumnongsong, S. (2009) Mangroves of Nakhon Si Thammarat Province in southern Thailand: Species diversity, community structure and current status. *Aquaculture Asia*, 14-2, 20-22.
- Barbier, E.B. (2006) Natural barriers to natural disasters: replanting mangroves after the tsunami. *Front Ecol Environ*, 4-3, 124-131.
- Barbier, E.B. (2008) In the wake of tsunami: Lessons learned from the household decision to replant mangroves in Thailand. *Resource and Energy Economics*, 30, 229-249.
- Choudhury, J.K. (1997) Sustainable management of coastal mangrove forest development and social needs. World Forestry Congress, Turkey.
- Durongdej, S. (2001) Land use changes in coastal areas of Thailand. APN/SURVAS/LOICZ Joint Conf. on Coastal Impacts of Climate Change and Adaptation in the Asia - Pacific Region, Japan.
- Ellison, A.M. (2000) Mangrove restoration: do we know enough? *Restoration Ecology*, 8-3, 219-229.
- Ertfemeijer, P.L. and Lewis III, R.R. (1999) Planting mangroves on intertidal mudflats: Habitat restoration or habitat conversion. ECOTONE-VIII Seminar on Enhancing coastal ecosystem restoration for the 21st Century. Ranong & Pukhet.
- FAO (2007) The world's mangroves 1980-2005. Forestry working paper. Food & Agriculture Organization, 153, Rome.

- Field, C.D. (1999) Rehabilitation of mangrove ecosystems: an overview. *Marine Pollution Bulletin*, 37, 8-12, 383-392.
- Goss, J., Burch, D. and Rickson, R.E. (2000) Agri-food restructuring and Third World transnationals: Thailand, the CP Group and the global shrimp industry. *World Development*, 28-3, 513-530.
- Havanond, S. (1994) Charcoal production in farm mangroves in Thailand. JAM/NMCT. Workshop on ITTO Project. 18-20th April, 1994, Thailand.
- Havanond, S. (1997) Mangrove forest conservation in Thailand - Meeting Report. *Biol. Bull NTNU*, 32-2, 97-102.
- Huitric, M., Folke, C. and Kautsky, N. (2002) Development and government policies of the shrimp farming industry in Thailand in relation to mangrove ecosystems. *Ecological Economics*, 40, 441-455.
- Johnson, C. and Forsyth, T. (2002) In eyes of the State: Negotiating a 'right-based approach' to forest coservation in Thailand. *World Development*, 1591-1605.
- Lewis III, R.R. (2001) Mangrove restoration - costs and benefits of successful ecological restoration. Mangrove Valuation Workshop, Universiti Sains Malaysia. Penang: Beijer International Institute of Ecological Economics, Sweden.
- Macintosh, D.J., Ashton, E.C. and Havanon, S. (2002) Mangrove rehabilitation and intertidal biodiversity: a study in the Ranong mangrove ecosystem, Thailand. *Estuar Coast Shelf S*, 55, 331-345.
- NACA (2005) Mangrove ecosystems, communities and conflict, Thailand. <http://library.enaca.org/mangrove/inception/thailand-overview.pdf>.
- OISCA-International (2000) Mangrove afforestation project at the Chanthaburi Province in Thailand. <http://www.gispri.or.jp/english/newsletter/cpdf/OISCA-project.pdf>.
- Samabddhi, K. (2003) Expert question report over mangrove forests: Increase in forest cover doubted. Bangkok Post, Thailand.
- Sathirathai, S. (1998) Economic valuation of mangroves and the roles of local communities in the conservation of the resources: case study of Surat Thani, South of Thailand. Singapore: Economy and Environment Program for Southeast Asia.
- Sathirathai, S. and Barbier, E.W. (2001) Valuing mangrove conservation in Southern Thailand. *Contemporary Economic Policy*, 19-2, 109-122.
- Soontornwong, S. (2006) Improving rural livelihood through CBNRM: a case of self-organization in community mangrove management in Thailand. In Mahanty et al. (ed) *Hanging in the balance: equity in community-based natural resource management in Asia*. East-West Center, Hawaii.
- Sukwong, S. (undated) Forest restoration and community participation: case studies in Thailand. Kasetsart University, Regional Community Forestry Training Center (RECOFTC), Thailand.
- Suwannodom, S., Siriboon, S. and Paphavasit, N. (1998) An approach to rehabilitate mangroves forests in Thailand. 5<sup>th</sup> Int. Conf. on Remote Sensing for Marine and Coastal Env. II, USA.
- Thampanya, U., Vermaat, J.E., Sinsakul, S. and Panapitukkul, N. (2006) Coastal erosion and mangrove progradation of Southern Thailand. *Estuar Coast Shelf S*, 68, 75-85.
- WRM (2002) Mangroves local livelihoods vs. corporate profits. World Rainforest Movement, Uruguay.