LEGAL FRAMEWORK FOR MANGROVE-FRIENDLY AQUACULTURE: VIETNAM EXPERIENCE

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I. Status of Mangroves in Vietnam

In 1943, there was about 400,000 ha of mangroves in Vietnam with two large forest areas in: Ca Mau peninsula (200,000 ha, among which 150,000 ha was virgin forests) and Rung Sat (Bien Hoa and Ho Chi Minh City) with 40,000 ha. Due to many reasons, the mangrove areas have decreased considerably and in 1983, only 252,000 ha of mangroves was recorded.

With different geographical and climatic conditions, the mangrove areas in the long coastline of Vietnam can be divided into four zones, namely, Northeast Coastal Area, Bac Bo Delta Coast, Central Coast, and South Coast (Fig. 1).

Zone I: Northeast Coastal Area from Ngoc Cape to Do Son Cape

The division of the Northeast Coastal Area is complex and creates many off-shore gulfs and estuaries with many protected islands which help reduce the effects of winds and storms. The main rivers usually very steep and with powerful flow carrying all the alluvia to the sea. Muddy substrata with sand and clay are deposited and formed, which are suitable to the growth of mangrove species. The annual rainfall is high (over 2500 mm) and the rainy season is from April to October with some rains in the dry season (20-25% of the annual precipitation). Mangroves in this area also benefit from an even and abundant source of freshwater.

This area has mountains which are near the sea. Population density is quite low, and coal is available so that the need for firewood is not critical. This is one of the reasons for the less destruction of the forests until 1970. In recent years however, mangrove forests were partly converted into agriculture lands and shrimp ponds, where more than 5000 ha of forests have been destroyed to produce rice, but the yield has been very low due to lack of freshwater. Thus, the program on increased rice production failed in many localities in the area. Farmers were then encouraged to have their land areas converted into shrimp ponds. The lack of suitable technology and investment, however, resulted in very low the economic efficiency of the shrimp ponds.

Zone II: Bac Bo Delta Coastal Area from Do Son Cape to north Lach Truong Cape

This zone is situated in the sedimentation area of Thai Binh River and Red River and their tributary systems. The sediments are abundant and rich in nutrients, forming large accretions both in the estuary and along the coast.

However, the area is not protected because of the absence of mountains or islands. Hence, many mangrove species do not grow very well except some brackishwater species which grow in sanctuary area.

Moreover, strong human impacts such as building dikes to create new lands on the sea and destruction of forests for shrimp culture, resulting in the reduction of the mangrove forest areas. In addition, erosion and typhoons have broken down many sea-dikes, causing severe damage and considerably diminishing the quantity of marine organisms (adults as well as larva) in the mangrove ecosystem.

In recent years, a program on the planting of buffer trees to protect dikes had attracted the people's attention. As a result, in the coastal areas of Thanh Hoa, Nam Ha, and Thai Binh provinces, more than 2000 ha of mangroves have been replanted. Records showed that there had been a significant increase in population of marine organisms, particularly molluscs, on the tidal flats with abundant mangrove trees.

Zone III: Central Coast, from Lach Truong to Vung Tau Cape

This is a narrow strip of land, and except for the northern part from Dien Chau (Nge An) northwards, the coastal area runs parallel with the Truong Son Ridge. The rivers are short and the slopes have minimum alluvium quite inadequate to form coastal swamps. On the other hand, the coastal area is also sloping and cannot retain the scanty deposit of alluvia, and this zone is within the typhoon path and is strongly influenced by monsoons.

From Hai Van pass southward, the climate becomes favorable due to the absence of a cold monsoon. In this area, the mangroves improve in species diversity. However, over-exploitation of the mangroves for firewood, timber and shrimp ponds, has also destroyed the resources.

Zone IV: South Coast, from Vung Tau Cape to Ha Tien

This zone is situated in the sedimentation area of Me Kong River and Dong Nai River systems. The topography is flat, low with an intricate net of rivers and channels with much alluvium, rich in nutrients, and plenty of freshwater supply during the rainy season. The dry season lasts for six months while saline water intrudes deep inland because of the high tidal amplitude and strong winds. The average annual temperature is high with small fluctuation amplitude and the area is not within the typhoon path.

The southwest monsoon and sea current from the Indian Ocean and Eastern Sea bring in seeds from the equatorial countries, facilitating the growth and extensive distribution of mangroves. The trees are of the largest size and the tree communities are also the richest. Marine resources are abundant in the area, among these are many valuable species of crabs, oysters, penaeid shrimps, etc.

II. Reasons for the Decreasing of Mangrove Areas

A. *The Chemical War of the American Army*

It has been recorded that the Chemical War in Vietnam from 1962 to 1971, destroyed 104, 939 ha of mangrove areas, of which 52% was in Ca Mau Cape, 41% in Rung Sat, and the remaining in some western provinces of the South. Ca Mau Cape used to have the largest mangrove forest areas in the country before the said Chemical War.

B. *Conversion to agricultural areas*

After the war, population growth was rapid and due to lack of food, people in many localities cleared the mangrove areas in order to build dikes to encroach the sea for agricultural use. Large amount of money and effort were spent, but the idea was a failure because there was not enough freshwater. The yield from agriculture was too low or in many cases, nothing could be harvested from the inputs.

C. *Over-exploitation for timber, firewood and charcoal*

After the war, coastal people also returned to their native places. Together with the mass migration from other provinces to the mangrove areas in the South, the demand for building timber, firewood, and charcoal had greatly increased. The increasing exploitation of the Forestry Agencies while the resources continued to decrease, also exhausted the forest resources.

At one point, the people in the communes of Vien An Dong and Dat Mui, Ngoc Hien district built family kilns to produce charcoal for sale to the other provinces. This effort destroyed many valuable forests including the mangrove forests that were newly-planted after the war.

D. *Conversion to residential areas*

In recent years, the conversion of mangrove areas into towns, industrial zones, and ports also contributed to the narrowing of the mangrove forest areas. Nam Can Town in Minh Hai province is a typical example. After 10 years of establishing it into a mangrove area, the town's population had increased 10 times, resulting in many houses and establishments gradually replacing the areas which once supported dense mangrove forests. In Quang Ninh province, the development of Ha Long City also destroyed all the mangrove forests at Coc 3, Coc 5, and Coc 8.

In the economic development of the coastal areas, infrastructures such as dams and roads were constructed in some localities such as the Cam river, the road joining Dinh Vu and Phu Long islands in Hai Phong, and the road to Hoang Tan island in Yen Hung, Quang Nin. Although these structures facilitate land and water transportation, they caused adverse effects on the environment especially the mangrove ecosystem.

E. *Conversion to shrimp ponds*

The prospect of a big benefit from shrimp export while the marine catch yield continued to decrease, had encouraged the government and many local authorities to promote shrimp farming through out the country. Thus, the natives and state bodies cleared vast mangrove forests (at Thai Binh, Nam Ha, Ninh Binh) and converted these into natural extensive shrimp ponds. In some provinces such as Minh Hai, forest clearance for shrimp farming was carried out not only by the natives but also by people migrating either legally or illegally from the other parts of the country. Since 1991, thousands of people from Ca Mau town built embankments on the new accretion southwest of Ca Mau tip in order to build shrimp ponds and houses intended for long-term residence.

According to some statistical data, the extent of brackishwater shrimp ponds, which was 50,000 ha in 1981, increased to 120,000 ha in 1987. Ca Mau and Bas Lieu provinces which have the largest areas of mangroves, were the most affected places with most forests destroyed in order to construct ponds to culture shrimp. Shrimp farming in 1980 and 1981 made use of only 4000 ha, but this was increased 20 times in 1992 to 80,000 ha. Every year, Ngoc Hien district loses an average of 5000 ha mangrove forests to shrimp aquaculture.

From 1982 to 1986, the Thai Thuy District (Thai Binh province) converted only 668 ha of planted mangrove forests to shrimp ponds. Generally though, most of the protected forests in Tien Hai district (Thai Binh) and many dike-protecting mangrove forests in Hai Phong, Ninh Binh were also cut down for shrimp ponds.

III. Protection and Development of Mangroves and Fishery Resources

Understanding the importance of protecting forest lands which include mangroves and swamplands, many laws and policies have been promulgated from the 80s up to the present. These include . the Land Law (1993 amended in 1999); the Law on Forest Protection and Development (1992); Decree 327 of the Prime Minister for Regreening of Bare Lands (1992 to 1995); Decree 556 for Protecting Forests and Regreening of Barelands (1996 to 1997); Decree 776 for Providing Infrastructure and Planning support for Allocating Land for Holdings Establishment Adjoining the Coastal Full Protection Zones; the Law on Environmental Protection (1994); the Decree on Fisheries Resources Protection and Development (1989); the Law on Fisheries (will be in effect from the year 2000); and Instruction 01/1998/CT of the Prime Minister dated 2/1/1998 for Banning of Illegal Fishing Instrument Including Use of Toxic Chemical, Electric Impulse, Dynamite. These laws and policies strongly protect mangroves and fishery resources. as well as support the development of mangrove-friendly aquaculture technology.

IV. Governmental Commitment on Conventions and Treaties

The Government of Vietnam is a member of many international conventions and treaties relating to the protection of mangroves and fisheries resources. These include the RAMSAR Convention, Biodiversity Convention, Convention on Climate Changes, CITES Convention, and the United Nations Convention on The Law of the Sea (UNCLOS).

V. Government Strategies

From the 90s, the Government Vietnam has developed strategies for sustainable development and protection of the environment. Some plans and programs directly relating to mangrove-friendly aquaculture, include the National Plan for Environment and Sustainable Development for the Period 1991-2000; the National Biodiversity Action Plan (1995); the Tropical Forest Action Plan (1992); the National Programme Number 327 for Implementation of The Decree 327 for Regreening of Bare Lands and Mangrove-destroyed Areas Development for Aquaculture; the National Programme Number 776 for Providing Infrastructure and Planning Support for Allocating Land for Holdings Establishment Adjoining the Coastal Full Protection Zones; the National Programme for Five Million Hectare Reforestation; and the National Programme on Off-shore Fishing (1997) for Reducing of Coastal Over-fishing.

The National Programme on Exporting Fisheries Products (1999) was also developed in order to improve post-harvest technology, processing technology and to increase the value added fisheries products instead of exporting raw material or semi-products. In addition, the National Programme on Aquaculture (1999) for sustainable development of mariculture, brackishwater water culture and freshwater culture was developed with the objectives of increasing the total production, increasing export, decreasing coastal fishing efforts, protection of the environment, generating more jobs and poverty reduction.

VI. Existing Project on Coastal Wetlands Protection and Development

Vietnam has the experience on coastal wetland protection through the WB/DANIDA Project on Coastal Wetlands Protection and Development in Southern Mekong Delta Province of Ca Mau, Bac Lieu, Soc Trang and Tra Vinh. After three years preparation by the experts from the World Bank, DANIDA, the Ministry of Agriculture and Rural Development, the Ministry of Fisheries and local authorities of four provinces, the completed Project Document was presented in April 1999 to the Prime Minister of Vietnam for appraisal and approval.

The objective of the Project is to re-establish the coastal mangrove wetland ecosystems and protect sustainably their aquatic nurturing and coastal protection functions. The progress of this objective will be measured and monitored based on the minimum land losses to and maximum land gain from the sea through reduced erosion and increased accretion; the decline in barren areas in the protection belt; and the increased coastal and near shore marine productivity.

In order to achieve the above objective, a full protection zone (FPZ) and an adjoining buffer zone (BZ) comprising a 467 km long coastal protection belt will be established in the project area. In the FPZ, mangroves will be reforested, economic activities and settlement will be limited, and inhabitants whose economic activities cause a threat to the sustainability of the mangrove ecosystems will be resettled. In the BZ, the development of diversified and sustainable farming techniques and social support services would be intensified to improve the income and livelihood status, specifically for the poorest segments of the coastal population who exercise the main incursion pressure on the FPZ.

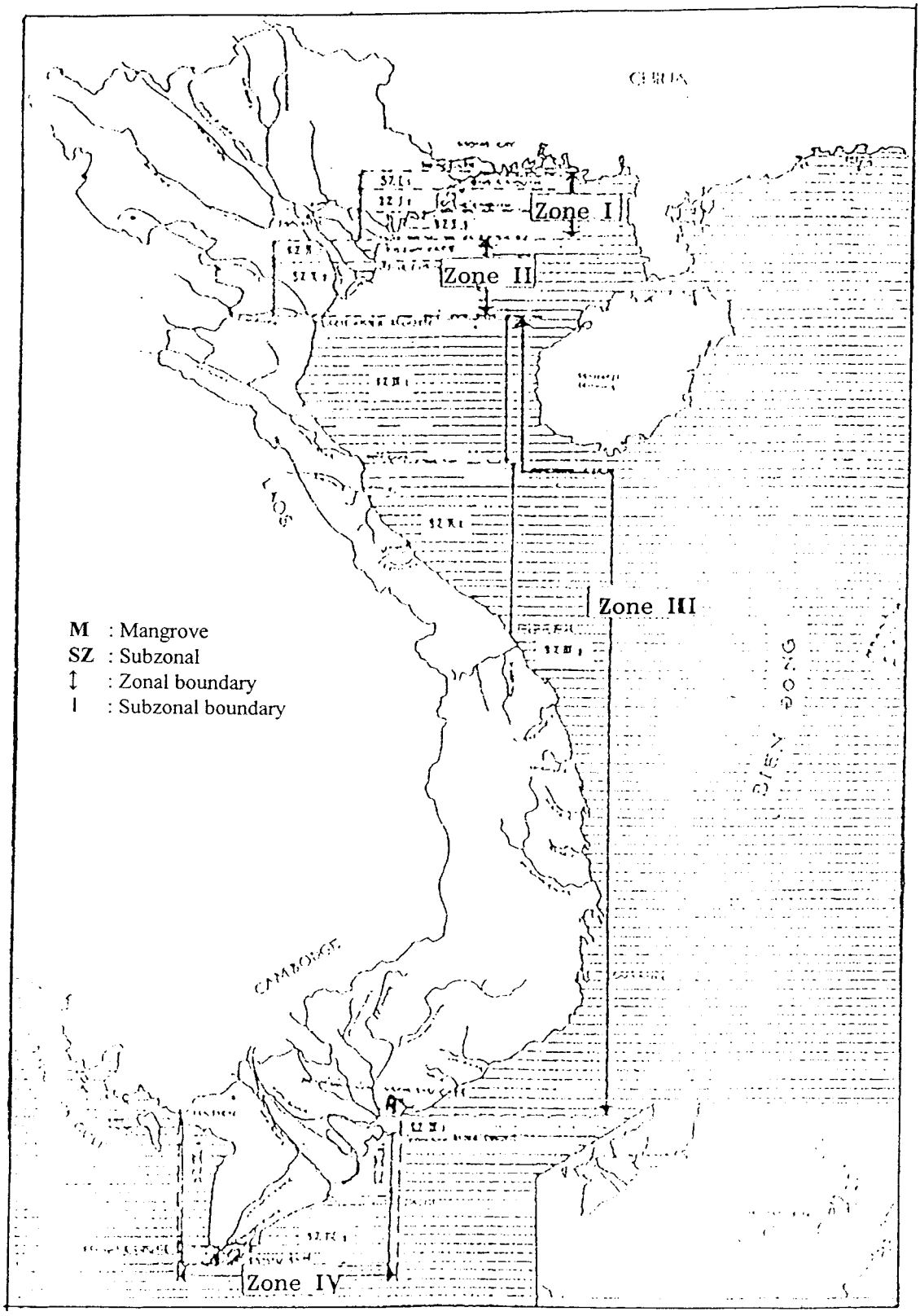

Fig. 1 Geographical distribution of mangroves in Vietnam