

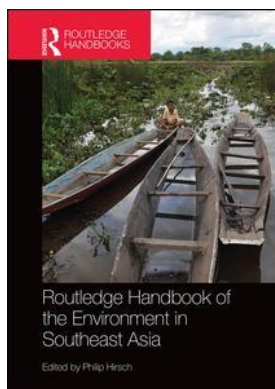
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VIETNAM

Governmental and societal response to emergent environmental issues in the Mekong Delta

Le Anh Tuan

Introduction

This chapter outlines the tremendous environmental challenges faced by Vietnam. It does so with a focus on the Mekong Delta, which is one of the environmental hotspots of the country as well as a fundamental source of Vietnam's food security and a target of its rural development drive.

The discussion begins with an overview of environmental conditions and emerging problems in the country as a whole and the Mekong Delta in particular. It explores key environmental problems in several main sectors, showing how they are related to resource use and livelihoods. Environmental conditions are thus seen to be closely tied to social and economic well-being. The legislative and regulatory response is described, showing that although the country has enacted significant laws and established institutional means at a bureaucratic level to deal with the challenges, implementation remains weak and uncoordinated. The concluding section of the chapter suggests that without grassroots involvement at the community and civil society level, the environmental future of the Mekong Delta and the country as a whole is bleak and poses risks to Vietnam's society and economy.

A brief overview of environmental conditions in Vietnam

Vietnam is located in the eastern part of the Indochina Peninsula in the Southeast Asian region. The country has an elongated S shape, looking towards the South China Sea (referred to as the East Sea in this chapter, based on its Vietnamese name *Biển Đông*) and the Pacific Ocean. Vietnam covers a surface area of 329,566 square kilometres (equivalent to 128,527 square miles) and is topographically diverse. More than three-quarters of the northern and western provinces of Vietnam are comprised of mountains and hills covered by tropical forests, while the eastern provinces are lower lying and bounded on their littoral by long beaches and coastal mangrove areas, with a total coastline of 3,260 kilometres. Vietnam is rich in ecosystems, including rivers, forest wetlands, lagoons, mangroves, coral reefs and seagrass beds, as well as well-known fertile alluvial deltas in two extensive low-lying regions – the Red River Delta in the north and the Mekong River Delta in south.

Although lying entirely within the tropical monsoon zone, Vietnam has complex climatic variation and local weather patterns dependent on its diverse range of latitude, altitude and seasonal characteristics. The northern part of Vietnam has four distinct seasons: a mild and cool spring, a hot and dry summer, a wet and humid autumn and a very cold and humid winter. In the central coastal areas and parts of the central highlands, the weather is subject to extremes. From June to December, the central provinces receive torrential rainfall, heavy thunderstorms and strong winds due to frequent tropical low-pressure systems and storms moving in from the East Sea. From February to May, central areas tend to be very dry and sunny, with high temperatures. In the southern part of Vietnam, there are only two basic seasons, as is typical in a tropical monsoon region: the rainy season and the dry season. The rainy season in the south, which begins in May and ends in October, is also experienced as the flooding season. Annual rainfall is abundant almost everywhere, in the range of 1,600–2,200 millimetres, and is highest in those provinces facing the sea and on islands. The dry season prevails for the remainder of the year, when the weather is very hot, dry and sunny, with little rain.

The population in Vietnam was last recorded in 2011 at 87.8 million people (GSO, 2012), ranking as the 13th-largest population in the world and third in Southeast Asia after Indonesia and the Philippines. Population distribution is uneven throughout Vietnam: urban areas and cities make up nearly 30 per cent of total population, while the number of people living in rural and remote areas is 70 per cent of the whole. However, there is a major change in the national population structure due to the rapid urbanization associated with industrialization and infrastructure development, leading to extensive labour migration into major cities including Ha Noi, Hai Phong, Da Nang, Ho Chi Minh City and Can Tho.

Vietnam is undergoing a period of great economic change. It has achieved rapid economic growth and a decline in the poverty rate, which has more than halved in a single generation. Since the mid-1980s, when there were still serious food shortages, the country has become an important agricultural and aquaculture exporter to the world. However, Vietnam's transition to a market-based economy has direct and indirect impacts on natural resource use and on environmental quality (Sikor and O'Rourke, 1996). Environmental problems have increased significantly in recent decades, due to economic growth and population growth (Vi and Rambo, 2003). A strong economic development drive under deteriorating social and environmental conditions – including increasing population and uncontrolled migration – presents a real challenge for the nation in the near future. Climate change threatens to impact Vietnam disproportionately as a result of its concentration of population in low-lying deltas and its subjection to tropical storms, while transboundary water issues have emerged as a major potential threat to environmental sustainability, as about two-thirds of Vietnam's water resources originate from outside the country's borders.

The Mekong River Delta as an environmental hotspot

The Mekong River Delta in Vietnam (hitherto referred to simply as the Delta) is the most downstream part of the Mekong River Basin (Figure 30.1). Other than direct rainfall, the Delta receives all its water from upstream countries before it discharges into both the East Sea and the Gulf of Thailand. The Delta is very low and flat, with an average land elevation of about 1–1.5 metres above mean sea level. The Delta is 4 million hectares in size and hosts around 18 million inhabitants. Currently, more than 2.4 million hectares are used for agriculture and aquaculture production. The Delta, as the largest and most productive agriculture and aquaculture region of Vietnam, plays an important role in food security – not only for the nation, but also for the world through exports. This is thanks to abundant water resources rich in silt that replenishes, and also to the

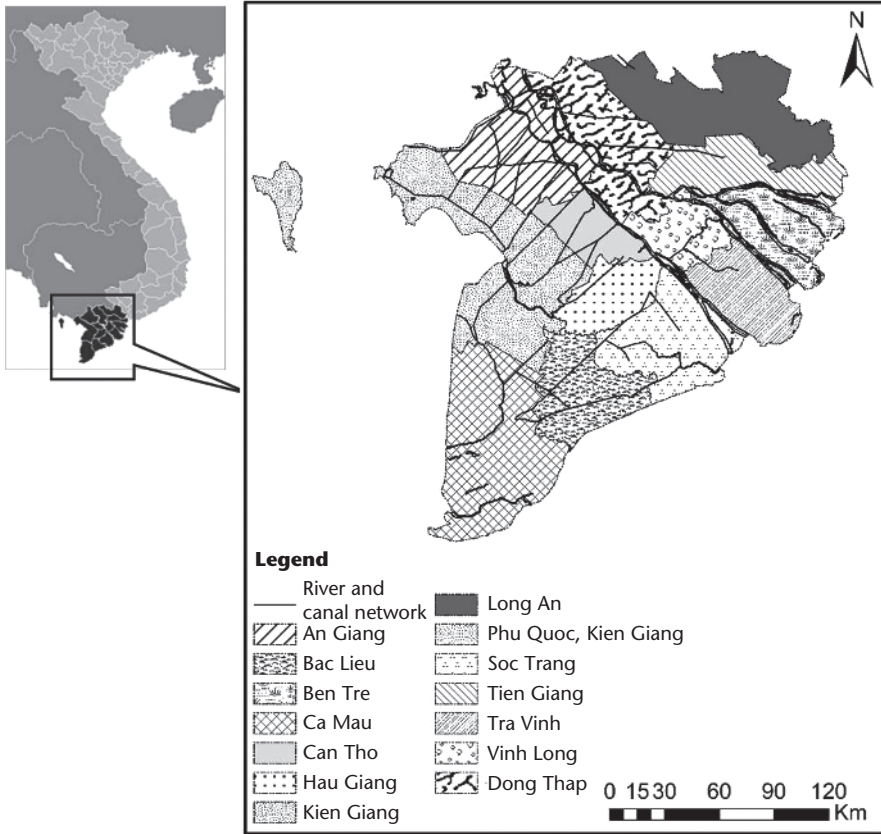


Figure 30.1 Maps of Vietnam and the Mekong Delta

Source: Can Tho University.

complex irrigation canal systems of the Mekong River’s distributaries (Trieu *et al.*, 2006). Each year, the Delta supplies more than 50 per cent of the nation’s staple rice and other crop-based food, 80 per cent of the total fish production and 75 per cent of tree fruits for domestic consumption and export.

During each rainy season, the flood flows from the main river channels and overland from Cambodia across the border into the Vietnamese section of the Delta. Especially in September and October, the extension of the flood occupies large areas of the Long Xuyen quadrangle, the Plain of Reeds, the lands between Tien River and the Hau River and the numerous streams and canal systems that take floodwater to flow laterally over to the low-lying areas. The flooded area ranges from 1.2 to 1.4 million hectares in years of low and medium flooding to around 1.9 million hectares in years of high flooding. Although high floods in the Mekong Delta cause loss of life and destruction, many farmers and scientists do not consider floods in the Delta as a natural disaster in and of themselves. Annual flooding is one of the significant components for the sustainability of the Delta’s ecological systems.

Presently, water abstractions from the Mekong River are mainly used to irrigate rice and upland crops, curb salinity intrusion and leave pyrite soil layers with sufficient wetness to avoid excessive acid sulphate problems. In the dry season and early rainy period, polluted water and

saline intrusion seriously impacts cultivation and domestic water supply. In general, human life and livelihoods, agriculture and aquaculture production and domestic water supplies in the Delta depend closely on the river water regime. The Mekong River provides more than 80 per cent of fresh water to the Delta, making the area susceptible to impacts from diversion or degradation of water resources if the river is controlled by decisions of the upstream countries. Since most Vietnamese farmers in the Delta use water from the rivers and canals for their daily drinking, irrigation, domestic and other uses, the quality of the aquatic environment is crucial to human life. Conversely, human activities' impacts on the aquatic environment require close consideration to ensure the sustainable development of the Delta (Trieu *et al.*, 2007).

Environmental issues in the Mekong Delta

Aquatic environmental concerns

Overall, Vietnam receives abundant water resources when measured across the whole year, including all sources of rainwater, surface water and underground water. However, the seasonally uneven distribution across Vietnam, together with inadequate capacity for effective water management, results in serious shortages of water – especially during the prolonged dry seasons, when the rivers are provided only 15 to 30 per cent of their total annual flow. A combined insufficiency of water sources and high water demand for industrial and agricultural production and domestic utilities results in declining water quality as well as quantity. Much of the wastewater released from industrial production and residential zones is not treated and flows directly into the rivers and then on to the coastal zone.

Historically, and for practical reasons, Vietnamese people have preferred to settle densely along the river and canal banks or in coastal areas, resulting in a high concentration of human pollutants in the water bodies.

In the Delta, there are five main water-related environmental problems (Tuan and Wyseure, 2007a) that are the principal limiting factors of agricultural production and human health. These are: (i) salinity intrusion in the coastal areas; (ii) the effect of acid sulphate soils; (iii) polluted water from human activities; (iv) a fresh water shortage in the dry season; and (v) excessive flooding in the rainy season. In rural areas of the Delta, farmers access water directly from rivers, canals, ponds or shallow wells. It is easy to identify that the sources of water pollution are generally related to the increased use of fertilizers and pesticides in agriculture, nutrient-rich effluents (phosphorus and nitrogen) from aquaculture and animal husbandry and wastewater from growing industrial plants and human populations (Tuan *et al.*, 2004). These problems of poor water quality, lack of safe drinking water and inadequate sanitation conditions appear to be a locally generated problem in the rural areas of the Delta, frequently causing diarrhoea, dengue fever and eye and skin diseases among local villagers.

Surface-water quality problems may be classified according to natural characteristic conditions due to the topography and geology and seasonal hydrology of the region. Although the quality of mainstream river waters is generally acceptable, studies of the smaller streams and branches reveal poor water quality. Most of the lakes and canals in urban areas are fast becoming sewage sinks, especially in the dry season. Concentrations of pollutants in surface water in urban areas are very high – in some areas, such as Hanoi and Ho Chi Minh City, 10–20 times higher than acceptable limits. The state of many water bodies at present is at hypertrophic level; in addition, the excessive and improper use of fertilizers, pesticides, fungicides, insecticides and other agro-chemicals is not being controlled. Rapid urbanization in some rural areas leads to the direct discharge of domestic wastes into canal systems without any treatment. This and

other sources of eutrophication cause oxygen deficiency in water bodies, in turn causing harm to aquatic life and the wider ecosystem.

Located at the most downstream part of the Mekong River basin, the Delta is subject to multiple impacts from upstream activities. The development of hydropower dams on the Mekong mainstream and its tributaries, extended industrial zones, intensive irrigation, water transfers, mining exploitation and other developments in upstream countries at present and in the future cause changes in the quantity (seasonal flow regimes) and/or quality (sediment, acidity, salinity) of water in the downstream section of the river basin. In parallel with the current and future transboundary water problems, the Mekong River Basin is facing many challenges due to the risks associated with climate change and sea-level rise. This could lead to changes in seasonal water resource's regimes and cause negative impacts on livelihoods, agro-aquaculture production and ecosystem stability for the entire Delta and its people (Figure 30.2). Future climate projections from regional climate models indicate that the Mekong River Delta region will tend to be warmer in the future, with longer dry seasons. Seasonal patterns are likely to be altered under the influence of global warming. The phenomena of increasing temperature, abnormal rainfall, exacerbated floods, droughts, tropical storms and sea-level rise will create vulnerabilities in all sectors. Characteristic Delta ecosystem values will be destroyed even more quickly than under the degradation pressures outlined above. Climate change will create a crisis of water resources in the Delta that negatively impacts on food security and affects the livelihoods of many vulnerable rural groups.

In the Delta coastal areas, local people have tried to abstract groundwater mainly for domestic use and aquaculture production. Currently, the over-exploitation of groundwater, combined

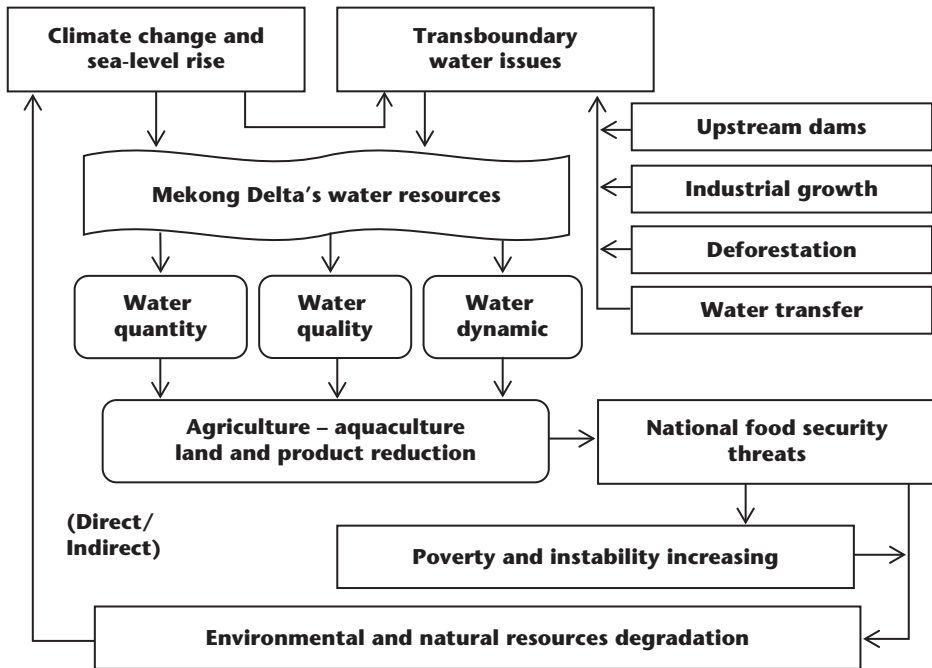


Figure 30.2 Impacts of combined climate change and transboundary project effects on the Mekong River Delta's water and food

with building development, has resulted in the water table dropping, bringing about damage through land subsidence and underground salinity intrusion. Research on the potential impacts on groundwater associated with climate change in the Delta is still limited at this time, and sub-surface water dynamics are less well understood than those of surface river water. In some wells in An Giang and Dong Thap, arsenic-contaminated groundwater was found (Sunbaek *et al.*, 2008; Ly, 2012). A study by Berg *et al.* (2006) found that the groundwater arsenic pollution in the Delta was severe. Arsenic concentration ranges were 1–1,610 micrograms per litre in Cambodia (average 217 micrograms per litre) and 1–845 micrograms per litre in southern Vietnam (average 39 micrograms per litre). The same study also evaluated the situation in the Red River Delta, where groundwater arsenic concentrations vary from 1 to 3,050 micrograms per litre (average 159 micrograms per litre).

Solid waste

According to the results of research carried out in 2009 by the Vietnam Environment Administration, the amount of solid waste generated in the country was about 28 million tons per year, of which about 6.88 million tons is common industrial solid waste, 19 million tons domestic solid waste and 2.12 million tons medical solid waste (MONRE, 2011). There is not currently an efficient management system in place for facilities such as storage, collection, transfer, transportation and disposal of municipal solid waste in Vietnam (Thanh and Matsui, 2011).

It is estimated that in 2015, Vietnam generated 44 million tons of solid waste. This figure is expected to increase to 68 million tons in 2020 and to 91 million tons in 2025, reaching two to three times higher than the current volume (MONRE, 2011). Most solid waste volumes are rising in the urban and industrial areas. These data correspond to a person living in an average city eliminating around 1.2, 1.4 and 1.6 kilograms of domestic solid waste per day in the years of 2015, 2020 and 2025, respectively.

Most total solid waste amounts (about 70 per cent) are collected in urban areas and mainly treated by uncontrolled burying and burning at waste disposal sites. In the urban areas of the Delta, only 50–70 per cent of the total quantity of solid waste generated is collected and deposited at open dumps, while the rest is illegally disposed of into unused land, ponds, rivers and canals. This creates many environmental problems. Most waste dumps fail to meet Vietnam's technical regulations and environmental hygienic standards. A very small amount of solid waste is recycled, because waste is not yet commonly sorted at source.

MONRE (2011) has stated that the National Strategy on integrated management of solid waste stipulates that solid waste treatment technology in Vietnam will be developed with an orientation towards minimizing the volume of landfill waste and increasing the rate of recycled and reused waste. Each province has proposed to build one or two solid waste and other hazardous waste treatment plants as a measure to improve the environment in seriously polluted areas as part of the national targets. In the Delta, there will be one inter-provincial hazardous solid waste treatment area and four provincial solid waste treatment areas, in An Giang, Kien Giang, Ca Mau and Can Tho.

Air quality

The most common air pollutants in Vietnam's cities and peri-urban areas are dust, noise and fossil fuel smoke emissions from industrial facilities and mobile transportation sources. Based on the Environmental Performance Index, Vietnam ranks among the ten worst nations in the world for air quality. It is forecast that if there is no improvement in environmental quality, air

pollution will continue to worsen in the near future and Vietnam may fall to 125th of 132 countries surveyed in terms of air quality (Emerson *et al.*, 2012).

The industrial production creating serious air pollution includes cement factories, coal sorting plants, brick enterprises, thermo-power plants and iron and steel metallurgy factories. The main source of air pollution in large cities such as Hanoi, Hai Phong, Ho Chi Minh City, Da Nang and Bien Hoa and their surrounding areas is exhaust emissions from motorbikes and other vehicles. Transportation also creates noise and dust pollution. Smoke discharged into the air contains carbon dioxide, carbon monoxide, nitrogen dioxide, sulphur dioxide and lead dioxide. During peak times or at traffic jam points, the pollutant concentration in the air may be six to seven times the allowed limits. Air quality in urban areas is worsening, with the increasing trends of urbanization and industrialization leading to large migration flows from rural areas to urban and peri-urban areas. Urban residents frequently face chronic pneumonia and other respiratory diseases.

Air quality monitoring in the Delta has only recently begun, and data are limited. The dust pollution results of the total suspended particles of four-year monitoring (2006–2009) of some of the Delta's major cities remain at a high level, in some cases higher than the permitted technical regulations. Noise intensity near towns and cities has increased over recent years. However, it is still within the permitted limit of Vietnamese standards and lower than the noise levels near traffic routes.

Forestry conservation

In the early twentieth century, Vietnam was still considered a rich country in tropical evergreen forestry resources. In 1930, it had 14.3 million hectares of forests (Guibert, 1941); in 1943 the country still had 13.5 million hectares of forests (Maurand, 1943), with 43 per cent forest cover. Due to the prolonged Vietnamese war and increasing population pressure and economic recovery after the war, combined with unsustainable management, the forest area and forest quality decreased steadily until 1995. In the first two decades following unification of the country in 1976, forest loss was estimated to be about 200,000 hectares per year, of which about 50,000 hectares was lost by land clearing for agriculture and another 20,000–50,000 hectares was lost due to forest fires. The remaining loss was due to the relentless collection of timber and firewood. Forest loss was the main cause of flash flooding and mudslides, increasingly serious natural disasters in the northern and central mountainous areas of Vietnam.

From 1995 to the present, thanks to the afforestation and rehabilitation of natural forest programmes, the forest area in the whole country has increased, albeit gradually (Figure 30.3). At present, forestry contributes about 1 per cent of GDP in Vietnam (World Bank, 2011a). Vietnam has launched a programme of forest resources inventory and monitoring every five years. Based on the official inventory up to 31 December 2010, the total national forest area was more than 13.38 million hectares (forest cover of 39.5 per cent), including 10.3 million hectares of natural forest and 3.08 million hectares of plantation forest (MARD, 2011). According to the Vietnam Forestry Development Strategy, approved by the Prime Minister in 2007, it is expected that forest cover for the whole country will be increased to 47 per cent by 2020.

Although the total forest area is increasing in general, the quality and biodiversity of the natural forests in many locations have nevertheless been continuously reduced due to internal or external impacts (Prime Minister, 2007). The planted forest area recorded an average annual growth from 1990 to 2009 at a rate 13 times higher than that of growth in natural forest area (MONRE, 2010). Most natural forests are now of poor quality, with wood reserves of less than 100 cubic metres per hectare, while sapling forests are recovering unevenly. The area of natural forests of high biodiversity has declined considerably. Only about half a million hectares of

Vietnam

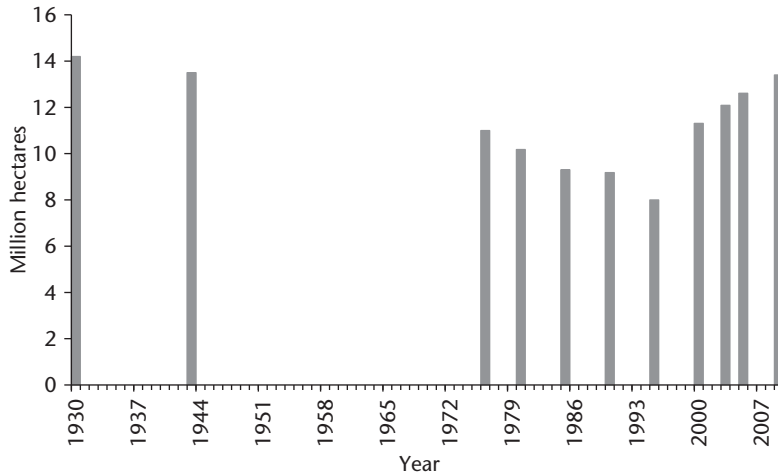


Figure 30.3 Change of the forest areas in Vietnam from 1930 to 2008

Source: Graphic developed from combined data of Hong and San, 1993; FAO, 2005; 2010; Phuc *et al.*, 2013.

primary forests remain – scattered in the Central Highlands, the south-eastern region, and northern Central Vietnam – and primary mangrove forests have almost vanished (World Bank, 2011b).

In the Mekong River Delta, forest covers only 7.9 per cent of the whole area – the lowest ranking if compared with other regions in Vietnam. Meanwhile, population density is the second highest, after the Red River Delta. The forest wetlands in the Delta, at a total of 280,000 hectares, can be considered as Vietnam's largest and richest ecosystems due to their development in an environment of very low topography, high humidity and temperature, interlacing rivers and canals and abundant alluvium (Tuan and Wyseure, 2007b). Using the Food and Agriculture Organization (FAO, 1994) guidelines, there are two typical eco-forest wetlands that can be distinguished in the Delta: (i) the inland *Melaleuca* forest wetlands and other grasslands in predominantly freshwater sites; and (ii) the coastal mangrove forest wetlands developed under predominantly saltwater conditions.

Under pressure from rapid and unregulated expansion of shrimp farming and other aquaculture production in sensitive coastal environments along the coastal fringe of the Delta, mangrove forest areas have been destroyed from Ba Ria–Vung Tau to the Ca Mau Cape and Kien Giang Gulf. Additionally, reduction in sediment delivery, sea-level rise and sea current change phenomena have already contributed to considerable loss of mangrove forest and marine habitat environments, resulting in decreased biodiversity of the coast and river mouths. The biggest losers in the uncontrolled expansion of coastal shrimp industries and their boom-and-bust cycle are the fishing families and coastal poor who depend on mangrove forests and their associated fish and forest products (AIMS *et al.*, 1999).

Environmental law and regulations

Since the early 1990s, several environmental and natural resource management laws and regulations have been issued at the national level: the Ordinance of Vegetation Protection and Quarantine (1993), the Law on Land Use (1993, 2003 and 2013), the Law on Oil and

Petrol (1993); the Law on Mineral Resources (1996), the Law on Water Resources (1998), the Decree of Natural Resource Tax (1998), the Law on Forest Protection and Development (2004) and the Decree of Crop Plant Variety and Decree of Livestock Variety (2004). A law on the protection of Natural Resources and Environment of the Sea and Islands of Vietnam is in the drafting process. In addition, a number of documents relating to environmental laws are being amended and supplemented in line with the Law on Environmental Protection.

The Law on Water Resources (Law No. 8/1998/QH10), approved in 1998, was an important legal basis for Vietnam in implementing a major step towards integrated water resources management. The Water Law provides for the management, protection, exploitation and use of water resources. Subsequently, the amended Law on Water Resources, which became effective on 1 January 2013, emphasizes effective water resources protection and exploitation.

In 2001, the Ministry of Agriculture and Rural Development formulated the Vietnam Forestry Development Strategy for 2001–2010. Approved on 3 December 2004, the Law on Forest Development and Protection (Law No. 29/2004/QH11) regulates the protection and management of wild species. It categorizes three kinds of forests – production, protection and special-use forests – and regulates agencies to take responsibility for planning, managing, protecting and monitoring special-use forests. In 2007, the government approved the National Forest Development Strategy 2006–2020 to facilitate forests' recovery in terms of both quality and quantity.

In 2003, the Law on Fishery Protection (Law No. 17/2003/QH11) aimed to facilitate sustainable fisheries and aquaculture development, requiring the development of master plans for aquaculture-sector protection. The law also regulates the exploitation and utilization of aquatic resources, encourages favourable conditions for organizations and individuals to rationally exploit resources and supports the rehabilitation of fisheries resources. It also covers international relations, state management and sectoral inspection of aquatic resources.

In 2005, the Law on Environmental Protection (Law No. 52/2005/QH11) was passed to provide for the regulation of environmental protection, including formulating and applying environmental standards; strategic environmental assessment, environmental impact assessment and environmental protection commitment; the conservation and use of water resources; the environmental protection responsibilities in production, business and service activities; environmental protection in urban and residential areas; the protection of marine, river and other water source environments; waste management; the prevention of, response to and remedy of environmental pollution; environmental rehabilitation; the rehabilitation and improvement of environmental quality; environment monitoring and information; resources for environmental protection; international cooperation in environmental protection; responsibilities of government agencies; and inspection, violations, complaints and compensation relating to environmental damage.

In 2008, the Law on Biodiversity (Law No. 20/2008/QH12) was approved, providing for biodiversity conservation planning at the national and provincial level in Vietnam, including the sustainable development of natural ecosystems and the protection of rare species. On 31 July 2013, the Prime Minister approved Decision No. 1250/QĐ-TTg on the National Biodiversity Strategy to 2010, vision to 2030 (NBSAP), which identifies a number of priority programmes and projects aimed at preserving the biodiversity of Vietnam (MONRE, 2014).

The emergence of strategies for environmental management in the Mekong Delta

Despite the raft of legislation outlined above, environmental pollution due to urbanization, industrialization and the use of agrochemicals has continued to pose a threat to the sustainable socio-economic development of Vietnam. The country needs an emergency national strategy

on environmental protection, including regional environmental management systems. The Mekong Delta's master plan on water, environment and local communities involves such environmental controls.

The Delta needs to prioritize sustainable development due to its extreme environmental sensitivity. Sustainable development – defined by the Brundtland Commission (1987) as ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ – is required in all development strategies in the Delta according to its specific economic, social, cultural and educational needs. The conceptual relationship of the environment and the management of natural resources for the Delta is introduced and summarized in Figure 30.4. A database of existing natural resources and basic social needs is required for conducting scientific planning and environmental management. This is also needed to accompany practical activities and related projects, such as environmental education and legal and institutional strengthening to all levels of government and civil society organizations. Because the environmental quality in the Delta varies with the seasons, it is necessary to maintain a water quality monitoring network. This network should include national monitoring stations, experimental sites and local environmental laboratories. Data from this network will be analysed or modelled for many cost-effective management systems; the prevention of negative effects of human activities by a set of threshold biological, physical and chemical environmental quality criteria for users; and the education of communities about environmental protection and food safety (Tuan *et al.*, 2004).

The Law on Environmental Protection and other related laws are important legal and regulatory frameworks for strengthening integrated environmental and natural resources management

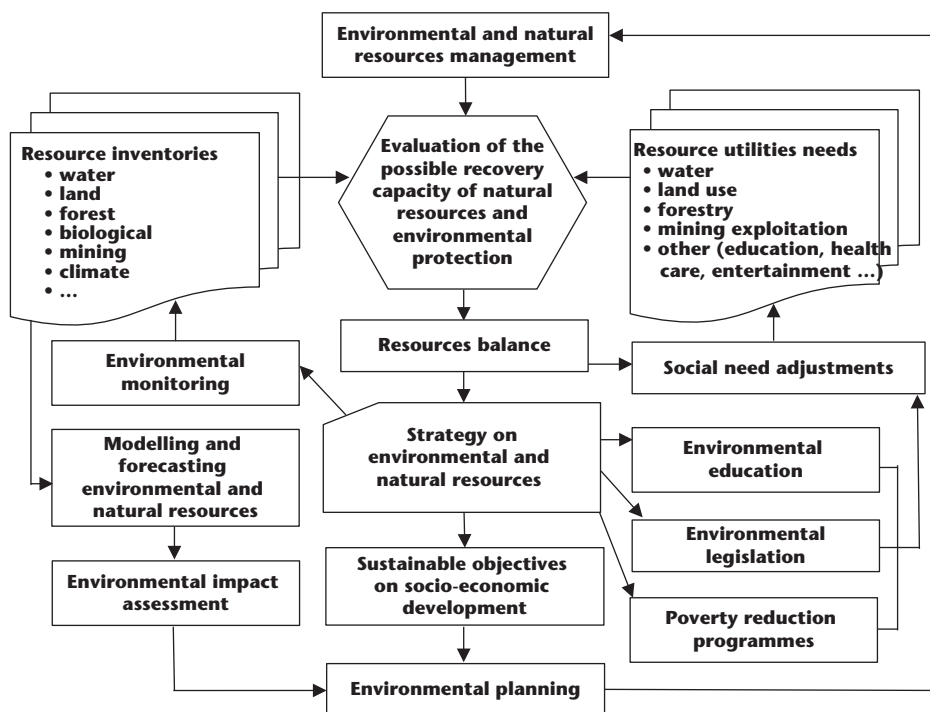


Figure 30.4 Conceptual relationship on environmental and natural resources management

Source: The author.

policy at the national, regional and local levels. However, assignment of the functional and managerial duties of different agencies and ministries remains overlapping and unclear. Additionally, given rapid socio-economic development, some articles of law have had shortcomings exposed. For this reason, a programme to collect a wide range of ideas and options concerning the draft amendment of the Law on Environmental Protection was adopted in 2013. The amended law was approved by the Vietnam National Assembly in 2014. Implementation of the amended law must place attention on strictly overcoming adverse impacts on the environment, managing environmental incidents, preventing pollution and restoring the environment, key habitats and associated ecosystems. Measures must also be taken to address issues related to climate change adaptation and to encourage a green-economy-based development.

The national and local scales of investment required to solve Vietnam's environmental problems are currently beyond the country's means. In parallel, the community's role in environmental protection has not been brought into full play. Community-level environmental protection activities are not sustainable and are not strong enough, and still far from expectations (MONRE, 2010). Additionally, financial investment for environmental management from national budgets and social contributions should be given more attention. Public media and civil society initiatives are also necessary to broaden participation and encourage deeper societal involvement in all procedures of environmental protection and management. Civil society can help build the political will for a new approach to development that integrates environmental and social goals (Gemmill and Bamidele-Izu, 2002). In some districts in Central Vietnam and in the Delta, village regulations on environmental protection have been seen as a good model.

Conclusion

Environmental and natural resource degradation problems, together with related legal enforcement and governance in Vietnam, are multidimensional issues and have a complex cause-and-effect relationship. It is difficult to prioritize categorically which are the most serious environmental problems. Increasing population density, resulting in the rapid expansion of intensified agriculture and urbanization, and the negative impacts of climate change, natural disasters and transboundary water issues have caused much pressure on the environment in Vietnam in general and the Delta in particular. With accelerating urbanization in a country not well equipped with pollution treatment plants and other means of waste disposal, many big cities in Vietnam are facing serious environmental problems. As a result of the growing population and migration, natural resources such as forest, land, water, wildlife and natural minerals will continue to be encroached upon, over-exploited and damaged. This ultimately results in shrinkage of the area covered with key habitats and associated ecosystems. Local people's livelihood conditions are very sensitive to such degradation and are threatened by the changing climate and hydrological cycle.

Over the past two decades, a swathe of environment-related legislation has been passed by the Vietnam National Assembly, marking strategic orientation efforts for the country's environmental protection. But governmental agencies' environmental management processes remain rather slow in dealing with the environmental degradation agents and ecosystem destroyers. The strategies and detailed action plans for each province in implementing many of the legislative objectives have not yet been fully developed. Environmental management in Vietnam needs coordination among many related governmental and civil society organizations at different levels in support of national legislation, as well as for improved regional and provincial environmental planning.

Although some efforts in environmental education and pollution control have been made by government and civil society, a lack of public awareness and ineffective environmental regulation have resulted in poor environmental management. Environmental problems and sustainable development cannot be solved effectively unless the knowledge, understanding, attitudes and behaviour of local people and civil society are integral to the planning and action.

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