Chapter 4
Policy Measures for Regional Green Development

Abstract This chapter reviews the environmental policies and mechanisms in China and ASEAN and identifies most commonly used policy measures taken by the two sides for green development. China and ASEAN's environment governance capacity has been improved constantly as a result of socioeconomic development and international environmental actions, as well as in response to the requirements for environmental protection. They established national agencies to address environmental issues and at the same time made good use of regional cooperation mechanism. With future economic and social development, the emergence of new environmental issues, and the increased public awareness for environment protection, greater potential will be released for further development of national environmental governance system and regional environmental cooperation mechanisms for China and ASEAN Member States. Multilateral environmental agreements are the foundation of the solutions to global and regional issues. China and ASEAN are active in joining many multilateral regional and international environmental agreements pertaining to climate change, biodiversity, water pollution, air pollution, chemicals and wastes, coastal and marine resources, etc. China and ASEAN Member States developed and implemented many country-specific environment laws, action plans, and policy measures. If environmental policies of one country can generate promising economic, social, and environmental benefits, they can serve as reference for others. This chapter then evaluates these policy measures and proves that policy interventions did play a significant role in addressing environmental issues.

4.1 Introduction

This chapter intends to present an overview of environmental policies in China and ASEAN and evaluate policy measures taken by China and ASEAN to promote green development, particularly identified widely used policies, and shortlist the most promising policy measures suitable for further analysis according to policy effects. Policy recommendations in favor of regional sustainable development will

China-ASEAN Environmental Cooperation Center, *China-ASEAN Environment Outlook 1 (CAEO-1)*, DOI 10.1007/978-981-10-6211-7_4

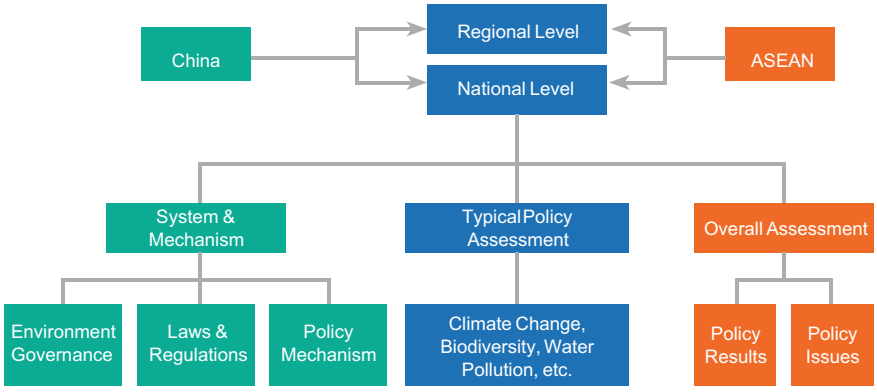

Fig. 4.1 Framework of policy measures for regional green development

be provided, considering the benefits and limitations of policy combinations in different fields.

The work flow of this chapter is shown in Fig. 4.1. First, research reports, statistical data, and other information are collected, followed by the analysis of the policy drafting systems and mechanisms for green development in China and ASEAN, including environmental treatment system, laws and regulations, and policy mechanism, etc. Third, typical policy measures are analyzed taking into account major global and regional environmental issues like climate change, biodiversity, and freshwater resources. And in the end, the overall judgment of the policy measures of the two sides is developed.

4.2 Overview

4.2.1 Environmental Governance System

4.2.1.1 Regional Environmental Governance System

ASEAN has established itself as an institutionalized regional cooperative organization. As early as 1970s, ASEAN incorporated environment consideration into its integration process and shaped the multi-level cooperation framework for environment issues. Currently, there is a fairly full-fledged mechanism framework for ASEAN environment cooperation, including ASEAN Summit, ASEAN Ministerial Meeting on the Environment, ASEAN Senior Officials Meetings, and ASEAN Secretariat.

China-ASEAN cooperative mechanism for environment is established gradually. With the economic and social development of China and ASEAN, environment protection was put on agenda. In 2003, the two sides signed Joint Declaration on ASEAN-China Strategic Partnership for Peace and Prosperity which further highlighted the cooperation on environment protection. The ASEAN-China Strategy on

Environmental Protection Cooperation 2009–2015 adopted in 2009 listed environmentally sound technology, environmental labeling, and cleaner production as well as environmental goods and service as the priority areas for cooperation. In 2011, China and ASEAN drafted ASEAN-China Environmental Cooperation Action Plan (2011–2013) which proposed to conduct the exchanges on environmental industry and technologies and establish ASEAN-China environmental industry cooperation network. In order to further strengthen the dialogue and cooperation between the two sides on environment protection, China and ASEAN jointly launched an annual ASEAN-China Environmental Cooperation Forum in 2011 in Nanning, Guangxi Zhuang Autonomous Region. The forum has become an important platform to conduct dialogue, facilitate exchanges, and promote cooperation on environment between China and ASEAN.

Some ASEAN Member States conducted collective regional environment cooperation with China. In 1992, Asian Development Bank (ADB) held the first Greater Mekong Subregion (GMS) Ministerial Conference in its headquarters in Manila, the Philippines, and kicked off the GMS mechanism officially. Currently, GMS cooperation covers China (Yunnan province and Guangxi Zhuang Autonomous Region), Cambodia, Laos, Myanmar, Thailand, and Vietnam. In the past 20 years, the GMS cooperation has been progressing smoothly with cooperative projects conducted in nine priority areas including environment. It has been active in providing financial support and technical assistance for member countries and carried out many initiatives including Core Environment Program and Biodiversity Conservation Corridors Initiative in the Greater Mekong Subregion.

4.2.1.2 Environment Governance Systems of China and ASEAN Member States

China and the ASEAN Member States have put in place a relatively complete system of environmental governance, and even the late-start countries have established agencies specially to deal with environmental issues. The environmental governance system continues to improve with the emphasis on environmental protection.

State-level environmental management departments have been established in China and the ASEAN Member States. With the growing impact of environment on health and economy, environment has been a worldwide concern, and the establishment of environmental protection agency itself reflects the government's commitment to tackling environmental problems. In China and most ASEAN Member States, independent environmental protection agencies were established in subsidiary departments in the 1980s by integrating new duties and responsibilities with those transferred from existing government agencies. To date, the departments in charge of national environmental affairs are in place, though named differently. As shown in Table 4.1, Indonesia was first to establish the ministry of environmental protection, specifically in 1973, and Myanmar and Laos started late and completed the agencies in 2012.

Table 4.1 Inception of environmental management departments in China and ASEAN

Country	Department	Time of establishment
China	Ministry of Environmental Protection	2008
Brunei	Environment, Parks and Recreation Department	1993
Cambodia	Ministry of Environment	1996
Indonesia	Ministry of Environment	1973
Laos	Ministry of Natural Resources and Environment	2012
Malaysia	Ministry of Natural Resources and Environment	2004
Myanmar	Ministry of Environmental Protection and Forestry	2012
The Philippines	Ministry of Natural Resources and Environment	1987
Singapore	Ministry of Environment and Water Resources	2004
Thailand	Ministry of Natural Resources and Environment	2002
Vietnam	Ministry of Natural Resources and Environment	2002

It should be noted that the establishment of environmental agencies, departments, or ministries in these countries is closely linked to the global developments in environment policies and governance which came out as a result of global conferences on environment and development, as well as their respective environmental problems arising from development.

Global and regional developments in environment and green development policies and governance

Initial stage (1972–1992): In June 1972, the Declaration on the Human Environment was issued and the Action Plan for the Human Environment adopted at the first United Nations Conference on the Human Environment held in Stockholm, Sweden, raising public environmental awareness and triggering the surge of worldwide environmental movement. It was the time when China and some ASEAN Member States kicked off environmental protection: the State Council Leading Group for Environmental Protection of China set up in 1973, the Singapore Ministry of the Environment established in September 1972 (renamed as the Ministry of the Environment and Water Resources in 2004), and the Indonesia Ministry of Environmental Protection established in 1973.

Development stage (1992–2002): In June 1992, the United Nations Conference on Environment and Development took place in Rio de Janeiro, Brazil, proposing a sustainable development strategy that for the first time combines economic development with environmental protection, and stressing strengthened international cooperation to jointly cope with global environmental issues. At this stage, more countries started to pay attention to environmental issues. In 1987, the Department of Environment and Natural Resources was founded in the Philippines, in 1988 the State Environmental Protection Administration in China, and in 1993 Environmental Protection Agency in Brunei. Thailand included environment as

responsibility of the Ministry of Science, Technology and Environment (formerly known as Ministry of Natural Resources and Environment) in 1992.

Adjustment stage (2002–2008): In August 2002, the World Summit on Sustainable Development held in Johannesburg, South Africa, called for economic growth and social progress in harmony with environmental protection and ecological balance. The status of environmental protection departments was further enhanced with the adjustment to their functions. In 2002, the Congress of Vietnam passed a resolution on establishing the Ministry of Natural Resources and Environment, and the Thai Government re-organized the Ministry of Science, Technology and Environment into Ministry of Natural Resources and Environment as a special agency for resource management and environmental protection. In 2008, China upgraded the State Environmental Protection Administration to Ministry of Environmental Protection (MEP) as an integral department of the State Council.

Perfection stage (2008–2012): In June 2012, the United Nations Conference on Sustainable Development held in Rio de Janeiro considered green economy as an important tool available for achieving sustainable development. In the same year, Myanmar formed the Ministry of Environmental Protection and Forestry and Laos set up the Ministry of Natural Resources and Environment. To 2012, environmental management departments were put in place in China and ASEAN Member States, though at different times.

In addition to these four environmental conferences, environmental problems arising from development also pushed forward the establishment of environmental management agencies. For example, Malaysia set up the National Forestry Council in 1971 for the purpose of managing forests in the face of serious deforestation. Singapore's National Water Agency was created in 1979 to address severe water shortage. Brunei found a specialized agency for smog pollution control, as a result of haze pollution caused by Indonesia's forest fires in 1997. In Cambodia, natural reserves have been created early to address biodiversity loss. Environmental issues attract the attention of governments and stimulate the formation of environmental management departments to meet the growing demand for specialized environmental management.

At the regional level, an ASEAN Resolution on Environment and Development was issued in February 1992 in Singapore to intensify cooperation in environmental management and protection in their common pursuit of sustainable development. In this resolution, ASEAN Member States agreed, among others, to: (a) introduce policy measures and promote institutional development that will encourage the integration of environmental factors in all developmental processes; (b) work closely on the inter-related issues of environment and development; (c) cooperate in setting basic environmental quality standards and regulations at national level, work toward harmonized environmental quality standards in the region, and adopt long-term quantitative goals relating to ambient air quality and river water quality; and (d) harmonize policy directions and step up operational and technical cooperation on environmental matters such as transboundary air water pollution, natural disaster, forest fires, oil spills, and the transboundary movements and disposal of

toxic chemicals and hazardous wastes, and undertake joint actions to address the anti-tropical timber campaign.

As can be seen from the course of development, the inception of environmental management departments in China and ASEAN Member States is driven mainly by two factors: international concerns about environmental issues and environmental problems arising from national developments. China and ASEAN Member States have placed enhancing emphasis on environmental issues and improvement of environmental management system.

Institutional characteristics

There is no universal model for the setup of the environmental protection agencies. However, some common features can be summarized as follows.

Environmental protection departments take charge of environmental protection with support from related departments. In China, in addition to MEP, other ministries under the central government also assume responsibility for environmental management. For example, the Ministry of Land and Resources is responsible for the protection of land resources, Ministry of Water Resources for the protection of water resources, Ministry of Agriculture for the protection of agricultural environment and aquatic organisms, and State Forestry Administration for the protection of forest resources and wildlife. Similar to China, the most ASEAN Member States also assign environmental responsibility to other related departments, in order to create synergy. In Indonesia, Ministry of Environment assumes responsibility for administration of the environment and natural resources, while Ministry of Marine Affairs and Fisheries is responsible for improving the quality of marine and coastal environment, islands, and freshwaters, Ministry of Forestry for the protection of forest resources, and Water Authority for safeguarding sustainable development of water resources. In Thailand, similarly, the responsibility of environmental protection is shared by the Ministry of Natural Resources and Environment and other relevant ministries. Specifically, the Ministry of Agriculture and Cooperatives manages key natural resources and flora and fauna habitats; Ministry of Industry is responsible for plant pollution control and management; and Ministry of Transport and Communications implements vehicle emission control programs.[1]

The functions of environmental protection agencies are clearly defined, which are roughly the same with slight differences among countries. Though expressed in different ways, the responsibilities of environmental protection agencies basically cover the following aspects: development of environment-related laws, regulations and policies, supervision and management of environmental pollution control, environmental data collection and management, environmental monitoring and information disclosure, international exchange and cooperation, and environment-related publicity and education. Apart from the similarities, there are differences in specific responsibilities. For example, China provides for supervision and management of nuclear and radiation safety; Cambodia defines the administration of

[1]Asian Development Bank (2006): Country Synthesis Report on Urban Air Quality Development.

national nature reserves; Malaysia includes management training and human resource development into the responsibility for ministry of environmental protection; and Laos rewards environmentally well-performing individuals or organizations.

The divisions of environmental protection agencies vary among countries, covering different ranges of aspects. The organizational structure of China's MEP is similar to that of Cambodia and Brunei. In the Philippines, Malaysia, and Thailand, a wider range of responsibilities are covered and their organizational frameworks are similar, and closer to the so-called super-ministry. In these countries, in addition to divisions for general affairs, the specialized divisions are set according to environmental factors. Mines, forests, and other natural resources fall into responsibility of the environmental authorities.

A top-down hierarchical management system is established. In China, MEP at the central level is supported by environmental protection agencies at the local level, including bureaus in provinces, autonomous regions, and municipalities and offices or specialized agencies of cities, counties, and county-level cities. Local agencies take charge of environmental protection within their jurisdiction, under the leadership of local governments and higher-level environmental agencies. In Cambodia, the environmental management system integrates central and provincial levels, in which the Ministry of Environment under the central government represents the highest level environmental administration. Local agencies include environmental offices of provinces and cities and implementing and/or supervision agencies in districts and communities.

Dedicated agencies and coordinating bodies are established for transboundary environmental management. To address environmental problems free from the restriction of administrative boundaries, such as haze pollution, water pollution, and biodiversity loss, appropriate transboundary or inter-regional environmental management agencies are needed for better coordination. From 2006 onwards, China has set up six environmental supervision centers, respectively, overseeing the south, southwest, northeast, northwest, east, and north areas. The responsibilities of these agencies are to coordinate and handle inter-provincial or inter-regional major environmental disputes and to accept, coordinate, and handle visits and complaints on inter-provincial or inter-regional environmental pollution and ecological damage, which provide strong support for regional environmental regulation. In addition, there are cross-regional river basin commissions established for major rivers. For example, China's Yellow River Conservancy Commission fulfills management duties in the Yellow River Basin, Xinjiang, and Qinghai, and assumes responsibility for rational development, utilization, and protection of water resources in the basin. ASEAN also established several mechanisms for transboundary cooperation, e.g., ASEAN Agreement on Transboundary Haze, ASEAN Center for Biodiversity (ACB), the Greater Mekong Subregion (GMS) framework, and the Heart of Borneo. The Mekong River Commission, as an inter-governmental agency for cooperation among Thailand, Laos, Cambodia, and Vietnam, stresses the sustainable development of the Mekong River Basin and facilitates management of river resources, fisheries, and environmental protection in the basin.

In short, in response to international environmental issues and domestic environmental problems, China and the ASEAN Member States have put in place relatively complete systems of environmental governance and established institutional frameworks that are specific to their national characteristics and conditions. Moreover, the continuous improvement of the environmental system implies that countries take environmental issues more seriously.

4.2.2 Environmental Legal and Policy Framework

4.2.2.1 Environmental Laws

The environmental legal system of China and the ASEAN Member States generally includes the legal basis at two levels, namely basic law at the national level and laws specific to elements of the environment.

Basic law: China and ASEAN Member States have drafted a series of environmental laws, and almost all developed the basic law. As early as in 1968, Singapore enacted a dedicated environmental protection law, and Vietnam, a late-starter of environmental protection, adopted its Environmental Protection Act in 1999. By far, there have not yet been integrated environmental laws in Brunei and Myanmar as the former puts in place special laws on environmental factors and the latter incorporates environmental provisions into other laws and regulations (see Table 4.2).

Separate laws: The separate laws on environmental protection in China and ASEAN can be roughly categorized into pollution prevention and control and environmental resources. In the first category, examples are the Law of China on Air Pollution Prevention and Control, Water Quality Standard and Water Pollution Control Act of Thailand, and Ecological Solid Waste Management Act of the Philippines. In the second category, examples include various water resources acts, mining acts, and wildlife conservation acts in these countries. These different separate environmental laws basically tackle the major environmental problems faced by China and ASEAN Member States, such as air pollution, biodiversity, and water environmental management (see Table 4.3).

4.2.2.2 Environmental Policies

Appropriate environmental policies are also rolled out to cope with emerging environmental issues. According to the World Bank criteria, they can be classified into command-and-control policy, environment-economic policy, and voluntary policy.

The command-and-control policy refers to traditional administration that directly regulates emissions of specific pollutants by managing production processes or product use or regulates the behavior of environment pollution within specific time and region. The regulation of production processes and products is achieved mainly through adoption of technical standards and deadlines for governance. Emphasizing

Table 4.2 Promulgation of environmental laws in China and ASEAN

Country	Basic law	Promulgation and amendment
China	Environmental Protection Law	Adopted at the 11th Session of the 7th NPC Standing Committee on December 26, 1989 and amended at the 8th Session of the 12th NPC Standing Committee on April 24, 2014
Brunei	None	Absence of a comprehensive environmental code
Cambodia	Environmental Protection and Natural Resources Management Act	First law on environmental protection passed by the National Assembly of Cambodia in 1996
Indonesia	Environmental Management Act	Enacted in 1997, replacing the Environmental Basic Law 1982
Laos	Environmental Protection Act	Formally implemented April 26, 1999
Malaysia	Environmental Quality Act	Promulgated by the Malaysian Government in 1974
Myanmar	None	Myanmar currently has not developed detailed environmental management support legal or comprehensive plan of action on environmental regulations are contained in a series of laws and regulations among
The Philippines	Philippine Environmental Policy Philippine Environmental Code	Formally promulgated in 1977
Singapore	Environmental Public Health Act	Enacted in 1968 and amended several times afterward
Thailand	Governance Promotion and Protection Act	Formulated and implemented in 1975 and amended in 1978, 1979, and 1992 respectively
Vietnam	Environmental Protection Act	Enacted in 1993 and put in force on January 1, 1994. The amendment passed by the Congress on November 29, 2005 includes relatively large adjustment and refinement of the act

end-of-pipe pollution control, the policy prohibits or restricts emissions of specific pollutants and defines the spatial and temporal scope of polluting activities. It mainly encompasses emissions standards and permits, pollution control regulations, and environmental supervision and enforcement regulations.

The environment-economic policy guides economic shareholders to acts favorable for environment by way of cost-effectiveness. Typically, it involves payment or money transfer or creation of new markets. According to the principles of environmental economics, a variety of economic levers, including pricing, taxation, credit, investment, microeconomic stimulus, and macroeconomic regulation, are available to adjust or influence environmental behavior of stakeholders. The policy instruments include environmental taxes and charges, environmental fiscals, and green trade.

Table 4.3 Separate environmental laws in China and ASEAN

Country	Main environmental single laws
China	Air Pollution Prevention and Control Law, Water Pollution Prevention and Control Law, Solid Waste Pollution Prevention and Control Law, Wildlife Protection Law, Environmental Noise Pollution Prevention and Control Law, Environmental Impact Assessment Law
Brunei	Oil and Mining Act, Forest Act, Water Supply Act, Urban and Rural Planning Act, Wildlife Act, Land Act
Cambodia	Solid Waste Management Act, Water Resource Management Act, Air Pollution and Noise Management Act
Indonesia	Forest Management Basic Law, Mining Act
Laos	Water and Water Resources Law, Land Law, Mining Law
Malaysia	Land Protection Act, Water Act, Fisheries Act, Wildlife Protection Act, Solid Waste and Public Cleansing Management Act
Myanmar	Wildlife and Natural Resources Protection Act, Forest Law, Groundwater Act, Marine Fisheries Law
The Philippines	Clean Air Act, Ecological Solid Waste Management Act, Wildlife Protection Act, Water Purification Act
Singapore	Wild Animals and Birds Act, Hazardous Waste Act, Endangered Species Act
Thailand	Atmospheric Standards and Air Pollution Control Act, Water Quality Standard and Water Pollution Control Act, Chemicals, Hazardous Waste, and Hazardous Substance Act, Forests Act, Wildlife Act, Mining Act, Environmental Analysis and Assessment Act
Vietnam	Forest Protection and Development Act, Land Act, Oil Act, Water Act, Mining Act

The voluntary policy refers to environmental charters, code of environmental conduct, and environmental management standards initiated voluntarily by international organizations and industry associations to promote improvement of the environmental behavior of polluting enterprises. Not bound by mandatory laws and regulations, this policy serves as standards and rules for voluntary companies to improve their environmental performance. It affects corporate environmental behavior by encouraging public participation and social supervision on the grounds of the public right to know the environment so that enterprises are forced to standardize their environmental behavior and cut more pollutant emissions. The policy covers information disclosure, environmental labeling certification, and International Organization for Standardization (ISO) Management System certification.

The command-and-control policy currently serves as the leading environmental policy in China and ASEAN. The environmental policy in most countries mainly relies on a command-and-control approach, of which administrative order is the most common form of issuance. Currently, the command-and-control policy plays a dominant role, while the environment-economic policy is under progressive development. The voluntary environmental policy is mainly applied in the pilot and remains in the exploratory stage. The command-and-control policy is mainly embodied in pollution control standards, EIA policies, and others (see Table 4.4).

Table 4.4 Typical command-and-control policy in China and ASEAN

Country	Pollution control standards	EIA policies	Others
China	Air Pollutant Emissions Standards, Wastewater Discharge Standards, Cleaner Production Standards	Technical Guidelines for Environmental Impact Assessment, Planning, Environment Impact Assessment Regulations	Nature Reserves Regulations, Environmental Noise Pollution Regulations
Brunei	–	No clearly defined EIA system	"Lead-free" petrol policy
Cambodia	Motor vehicle emissions standards	Administrative regulations related to EIA procedures	Administrative regulations on solid waste management, water pollutant management, air pollutants and noise management
Indonesia	Noise Standards DME48/1996, Air Pollutant Standards DME15/1996, Water Quality Standards	No specific EIA law, but only relevant provisions included in Act 22/1999 and Regulations 25/2000	Water Pollution Control Measures, Toxic and Hazardous Waste Regulations 18/1999
Laos	–	Laos' EIA system to be standardized	–
Malaysia	Motor Vehicle Emissions Standards,	–	Environmental quality regulations, National Forestry Policy
Myanmar	Motor Vehicle Emissions Standards (the only pollution control standard)	Under preparation	Pollution Control and Cleaning Regulations, Public Health Act, National Forestry Policy
Thailand	–	No complete EIA system, but applicable strategic environmental assessment (SEA) principles and methods	–
Vietnam	Auto emissions standards	–	Biodiversity Action Plan, regulations on the control and management of hazardous waste

Note—means no relevant policy established or identified in the country

China and ASEAN are experimenting on the environment-economic policy which is showing positive results. At present, a relatively efficient environment-economic policy is put in place only in some countries, and market-based instruments are yet to extend to all ASEAN Member States. The

majority of ASEAN Member States have just started introducing the environment-economic policy.

The earliest environment-economic policy implementation introduced by China is the pollution charge system which reduces emissions of pollutants by charging emitters. It draws corporate attention to environmental protection and encourages technological transformation for comprehensive utilization of resources so that enterprises can play an active role in environmental protection while developing production. In addition, pollution charges provide strong support for the country's environmental protection by supplying a lot of funds (see Box 4.1).

Box 4.1 China's pollution charge system

China's pollution charge system formally took shape with the issuance of Interim Measures for Pollution Charges in July 1982 and implementing rules introduced in provinces, autonomous regions, and municipalities. In January 2003, the State Council promulgated the Regulations on Collection and Management of Pollution Charges and subsequently issued the Administrative Measures on Pollution Charges Standards and Administrative Measures on Collection and Use of Pollution Charges. After the implementation of the regulations, pollution charges grew from 6.74 to 19.8 billion yuan in 2013. In 2014, the pollution charges were increased dramatically in China. The national requirement is one time higher than the 2003 standard, and the local government can issue even higher pollution charges. For example, the charges in Beijing are 10 times higher than the national level in 2003. Higher pollution charges spurred the enterprises to better control pollution. Due to enterprises' better performance and growth slowdown, in 2015, the total national pollution charges decreased to 17.3 billion yuan which demonstrates an important role of pollution charges to pollution control.

- Legal basis for pollution charges: Air Pollution Prevention and Control Law, Environmental Protection Law, Water Pollution Prevention and Control Law, Solid Waste Pollution Prevention and Control Law, and Environmental Noise Pollution Prevention and Control Law.
- Targets: industrials and privately or individually owned business that directly discharge pollutants into the environment
- Use of pollution charges: subvention or discount loans for the following projects:
- Prevention and control of key source pollution
- Regional pollution prevention and control
- Development, demonstration, and application of new technologies and processes for pollution prevention and control
- Other pollution prevention and control projects under the State Council.

Source: Chinese Ministry of Environmental Protection Web site

Apart from the pollution charge system, desulfurization price subsidies for power plants and urban sewage treatment fees also make outstanding contributions to emissions reduction. For the control of SO_2 emissions, China provides a 0.015 yuan/(kW•h) tariff discount for coal-fired units and raises emissions standards to promote green power generation. This move has played a positive role in the installation and operation for desulfurization devices, which leads to a 3.40% decline of national SO_2 emissions in 2014 over the previous year. In addition, urban sewage treatment fees and improving charging criteria stimulate the construction and operation of sewage treatment plants, and as a result, the COD emissions were effectively reduced by 2.47% in 2014 from 2013 levels.

Singapore's water pricing policy effectively guides consumers to conserve water. While pricing reflects the commercial value and scarcity of water resources, water tax is levied to encourage the public to save water. The per capita daily water consumption in the country was cut to 165 L in 2003 and 156 L in 2008 from 172 L in 1995, according to statistics, and the government aims to, by 2030, reduce the level to 155 L.[2] In addition, subsidies are provided to encourage water-saving behavior. For example, projects that halve water consumption will be given a subsidy equal to half of the total investment in equipment.

Green procurement in Thailand gains a strong momentum in recent years. Under the Program of Thai Green Supply Chain Development, the green procurement Web site that defines "green procurement" and "green products" was created in August 2004. This Web site collects and publishes information related to "green products" and provides "best practice" guideline on green procurement procedures, which contributes to raising consumer awareness of green procurement and green products.

The environment-economic policy, though not yet prevalent, shows an obvious trend of development in ASEAN. For example, in 2005, the Vietnamese government began to impose mining environmental fees at a rate of 2000–50,000 VND/m^3 or 1.500–30,000 VND/t, covering ore mining, sand excavation, coal mining, and natural mineral spring water. Cambodia plans to establish the pollution charge system in an effort to control pollutant emissions by economic means.

The voluntary environmental policy begins to perform in China and some ASEAN Member States. The information disclosure system advances in recent years. With the assistance of the World Bank, China and Indonesia piloted the information disclosure system among enterprises in the 1990s. Since then, the system has been extended to provinces in China, and a series of relevant policies rolled out, including the Measures on Environmental Information Disclosure (Trial) and Measures on Self-Monitoring and Environmental Information Disclosure for Key Enterprises (Trial), in order to encourage enterprises to consciously protect the environment in the production process. In addition, China presses ahead with environmental labeling certification and ISO Environmental Management System certification. Starting in 1994, the environmental labeling work covers

[2]Source: Fourth ASEAN State of the Environment Report (SoER4), P34.

determination of product categories and development and promulgation of certification standards. At the end of 2014, totally 107 technical specifications for environmental labels on products were introduced, guiding and promoting energy conservation in related industries (see Box 4.2).

Box 4.2 China's environmental management system certifications

In May 1997, China Steering Committee for Environmental Management System Certification (CSCEC) was established with the approval of the General Office of the State Council. CSCEC provides guidance on implementation of the ISO environmental management system standards (ISO 14000) in China, of which ISO 14001 specifies environmental management system standards. In 2001, there were 1000 organizations certified under ISO 14001. According to the ISO survey, with a total of 91,590 certificates, China ranked first among large ISO 14001 certification issuers in 2012.[3]

In short, China and ASEAN have relatively complete legal and policy systems. Apart from the basic environmental law, a series of separate environmental laws are introduced to deal with specific problems, and meanwhile, appropriate policy measures play an important role in environmental protection. The current environmental policy mainly relies on regulation. Among them, the environment-economic policy and voluntary policy have been effective in some countries and attracted increasing attention of decision-makers, implying large room for development.

4.2.3 Environmental Planning and Action

4.2.3.1 Environmental Planning

Environmental planning laid out environmental protection targets and measures to guide people to protect the environment, and on this basis, the action plan specifies the program and actions. Whether for general or specific environmental issues, China and ASEAN have developed a series of environmental planning and action plans.

China's environmental planning, which can be dated back to the era of planned economy, refers to the five-year environmental plan renewed once every five years since the 1970s in the era of market economy. The 12th Five-Year Plan for Environmental Protection set down targets to be achieved by 2015: (a) drastic reduction in emissions of major pollutants; (b) effectively safeguarded environment

[3]The ISO Survey of Management System Standard Certifications—2012, http://www.iso.org/iso/iso_survey_executive-summary.pdf.

and greatly improved water quality of urban and rural drinking water sources; (c) effective control of heavy metal pollution and significant prevention and control of POPs, hazardous chemicals, and hazardous wastes; (d) improved levels of urban environmental infrastructure construction and operation; (e) reversion of ecological deterioration trend; (f) markedly improvement in nuclear and radiation safety and the regulation; and (g) perfection of environmental monitoring system. Box 4.3 lists the main content of China's 12th Five-Year Plan for Environmental Protection.

Box 4.3 Main content of China's 12th Five-Year Plan for Environmental Protection

- Reduce emissions of major pollutants

– Intensify structural adjustment
– Focus on the reduction of COD and ammonia nitrogen emissions
– Cut the intensity of SO_2 and NO_x emissions.

- Effectively solve outstanding environmental problems

– Improve water environmental quality
– Implement integrated control of air pollutants
– Enhance soil environmental protection
– Beef up ecological protection and supervision.

- Strengthen environmental risk prevention in key areas

– Press ahead with process-wide environmental risk management
– Enhance nuclear and radiation safety management
– Contain the momentum of heavy metal pollution incidents
– Promote safety disposal of solid waste
– Perfect environmental risk prevention and control system for chemicals.

- Improve the basic public service system of environmental protection

– Promote the equalization of basic public services for environmental protection
– Elevate the level of environmental protection in rural areas
– Beef up the environmental supervision system.

- Carry out major environmental projects

– Optimize policy measures
– Implement the environmental responsibility system
– Improve the integrated decision-making mechanism
– Firm up the legal system
– Better environment-economic policies
– Consolidate scientific and technological support
– Develop environmental protection industries
– Boost investment

- Provide strict law enforcement supervision
- Mobilize the local people's governments
- Promote departmental coordination in environmental protection
- Actively guide public participation
- Strengthen international environmental cooperation.

• Enhance organizational leadership and evaluation

Source: China's 12th Five-Year Plan for Environmental Protection

In addition, a number of action plans are issued to address specific environmental issues. They include the China National Biodiversity Conservation Strategy and Action Plan (2011–2030) unveiled in 2010 to cope with new problems facing biodiversity conservation and the Action Plan for Air Pollution Prevention and Control and Action Plan for Water Pollution Prevention and Control released in 2013 and 2015, respectively, to improve air and water quality. Among the action plans under preparation, the Action Plan for Soil Pollution Prevention and Control was passed at the MEP Executive Meeting in March 2015 and is expected to publish in 2016.

Similarly, Brunei has developed the National Development Plan every five years from 1966 onwards, which fully reflects the government's emphasis on environmental protection. For example, the 5th National Development Plan included the policy of protecting tropical rain forests and biodiversity and the 6th and 7th provided specific action plans for the national environmental protection strategy. Indonesia has taken "national action to improve forest and land" since 2003, intending to build 300,000 ha forests along 29 rivers and in fact realizing 3 million ha of forests along 68 rivers during 2003–2007. Singapore defines "four national taps" (i.e., catchment water, water imported from Malaysia, NEWater, and desalinated water) and develops the long-term plan to, by 2060, triple NEWater supply to meet 50% of water demand and increase at least tenfold desalinated water supply to meet 30% of water demand.

In 1998, ASEAN adopted Hanoi Plan of Action (1999–2004), namely ASEAN Strategic Plan of Action on Environment (1999–2004). It set the overarching objective and specific plans for the future environment protection and sustainable development in ASEAN region. In 2002, the 7th Informal ASEAN Ministerial Meeting on the Environment established the 10 prioritized cooperative areas and agreed to have each country to take the lead for the cooperation in one area. At the ASEAN Environmental Ministerial Meeting in 2007, countries agreed to incorporate sustainable forest management, and sustainable management of natural parks and protection zones into the sustainable management of biodiversity. Currently, the environment cooperation in ASEAN is focusing on the 10 priority areas determined by ASEAN Socio-Cultural Community Blueprint (2009–2015) adopted in 2009, namely addressing global environmental issues, managing and preventing

transboundary environmental pollution, environment education and public participation, environmentally sound technology (EST), urban environment management and governance, harmonizing environmental policies and databases, promoting the sustainable use of coastal and marine environment, promoting sustainable management of natural resources and biodiversity, sustainable freshwater resource management, responding to climate change, etc.

The environmental planning of China and ASEAN Member States have put forward specific and clear targets for the improvement of environmental quality, reflecting the determined environmental governance and laying the basis for environmental work and performance evaluation.

4.2.3.2 Multilateral Agreements

Multilateral environmental agreement refers to agreements on certain environmental issues signed by and among two or more countries and generally led by the United Nations. These agreements contain binding legal provisions covering a wide range of issues and provide an international legal basis for addressing specific environmental issues. In most cases, multilateral agreements are applied to solve regional environmental problems.

Active in international cooperation, China and the ASEAN Member States have signed and ratified a number of multilateral environmental agreements, entered into international conventions on environmental protection, and been fulfilling their obligations through implementation. As shown in Table 4.5, the existing multilateral agreements signed by China and the ASEAN Member States mainly cover biodiversity, water resources, land, chemicals and waste, and air.

The ratification of multilateral agreements reflects the varying degrees of concerns about environmental issues in countries. Because of rich biological resources, the ASEAN Member States have early ratified the Convention on Wetlands of International Importance and the Convention on Biological Diversity, reflecting the high attention paid to biodiversity. In recent years, China and more ASEAN Member States have ratified relevant international conventions on air and chemical wastes, expressing the determination to deal with transboundary wastes and atmospheric problems.

4.3 Typical Policy Measures Analysis

For the purpose of addressing global and regional environmental issues, the policies and programs that have been widely applied in the China and ASEAN are identified, followed by analysis of typical ones.

Table 4.5 Major multilateral agreements participated by China and ASEAN Member States

Biodiversity	Water	Land	Chemicals and waste							Air			
	Convention on Wetlands of International Importance	Convention on Biological Diversity (CBD)	Cartagena Protocol on Biosafety	Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)	United Nations Convention on the Law of the Sea (UNCLOS)	United Nations Convention to Combat Desertification (UNCCD)	Stockholm Convention	Basel Convention	Rotterdam Treaty	Vienna Convention	Montreal Protocol	United Nations Framework Convention on Climate Change (UNFCCC)	Kyoto Protocol
China	1992	1992	2005	1981	1996	1997	2004	1991	2005			1992	2002
Brunei	Not signed	2008		1990	1996	2002			Not signed	1990	2009	2007	2009
Cambodia	1999	1995	2003	1997	1983 (Signed but not ratified)	1997	2006		2013	2001	2007	1995	2002
Indonesia	1992	1994	2004	1978	1982	1998	2009	1993	2013	1992	2006	1994	2004
Laos		1996	2004	2004	1982	1996	2006		2010	1998	2006	1995	2003
Malaysia	1995	1994	2003	1977	1982	1997			2002	1989	2001	1994	2002
Myanmar	2005	1994	2008	1997	1982	1997	2004		Not signed	1993		1994	2003
The Philippines	1994	1994	2004	1981	1982	2000	2004	1993	2006	1991	2006	1994	2003
Singapore		1995		1983	1982	2001	2005		2002	1989		1997	2006
Thailand	1998	2004	2005	1986		1999	2005	1997	2005	1989		1994	2002
Vietnam	1989	1994	2004	1994	1982	1998	2002		2007	1994	1989	1994	2002

Note Blank is due to unavailability of information on whether a multilateral agreement is signed

4.3.1 Policy Measures to Address Climate Change

Climate change is a hot ecological and environmental issue in the world now. Global joint efforts and market-based instruments (MBI) are important pathways to address climate change. Therefore, this section analyzes the typical policy measures of multilateral environmental agreements and national plans, cancellation of the subsidy to fossil fuel, the feed-in-tariff of renewable energy and carbon emission trade.

4.3.1.1 Multilateral Environmental Agreements

China and ASEAN have recognized the importance of addressing climate change issues and entered into international agreement under the principle of common but differentiated responsibilities (see Table 4.6). Signed in 1992, UNFCCC was the first agreement on climate change. China and ASEAN have no obligation emission reduction commitments, as non-Annex I parties to the Kyoto Protocol, a top-down agreement signed in subsequent years.

However, after reaching consensus at the UN Climate Change Conference in 2009, Indonesia, Malaysia, the Philippines, Singapore and China expressed their ambitions on climate change adaptation and mitigation by committing different extra emission reduction targets and goals officially (see Table 4.7).

The Paris Agreement, an outcome of the Paris Climate Change Conference 2015, was signed by 175 countries and regions on April 22, 2016 at the headquarters of the United Nations. China and ASEAN all signed the agreement and determined their own voluntary emission reduction targets. China as the biggest emitter has explicitly committed to, by 2030, cutting CO_2 emissions per unit of GDP by 60–65% from 2005 levels, raising the share of non-fossil energy to around

Table 4.6 Participation in agreements on climate change

Country	UNFCCC	Kyoto protocol	Paris agreement
Brunei	2007	2009	2016
Cambodia	1995	2002	2016
Indonesia	1994	2004	2016
Laos	1995	2003	2016
Malaysia	1994	2002	2016
Myanmar	1994	2003	2016
The Philippines	1994	2003	2016
Singapore	1997	2006	2016
Thailand	1994	2002	2016
Vietnam	1994	2002	2016
China	1992	2002	2016

Source UNFCCC website and SoER4

Table 4.7 Intended nationally determined contributions after the Copenhagen accord and the Paris agreement

Country	Agreement	Target (%)	Remarks
Brunei	Post Paris agreement	63	Energy consumption, 2035 target, BAU
Cambodia	Post Paris agreement	27	2030 target, BAU
Indonesia	Post Copenhagen accord	26	2020 target, BAU
	Post Paris agreement	29	2030 target, BAU
Malaysia	Post Copenhagen accord	40	2005 baseline, 2020 target, energy intensity
	Post Paris agreement	45	2005 baseline, 2020 target, energy intensity
the Philippines	Post Copenhagen accord	20	BAU for national emission growth
	Post Paris agreement	70	2030 target, BAU
Singapore	Post Copenhagen accord	16	2020 target, BAU
	Post Paris agreement	36	2005 baseline, 2030 target, emission intensity
Thailand	Post Paris agreement	20	2030 target, BAU
Vietnam	Post Paris agreement	8	2030 target, BAU
China	Post Copenhagen accord	40–45	2005 baseline, 2020 target, emission intensity
	Post Paris agreement	60–65	2005 baseline, 2030 target, emission intensity

Source ASEAN website, China's Policies and Actions for Addressing Climate Change (2011), UNFCCC

20%, peaking CO_2 emissions from fossil energy consumption around 2030, and increasing the forest stock by 4.5 billion m^3 from 2005 levels.

Regional and national plans

ASEAN has announced a regional plan to safeguard climate change policy implementation. The ASEAN Socio-Cultural Community Blueprint (2009–2015) specifies 11 strategic objectives and corresponding actions to mitigate climate change and its impacts. The Action Plan on Joint Response to Climate Change unveiled in 2012 develops a more specific blueprint for implementation.

At the national level, Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand, Vietnam and China have unveiled their national programs and strategies to address climate change. Brunei, Cambodia, and Myanmar announced specific projects which address climate change. Despite different national conditions, China and ASEAN have started to take a comprehensive policy on the issue of climate change (see Table 4.8).

Table 4.8 Action plans and programs to address climate change

Country	Action plans and programs
Brunei	• Study on national GHG inventories • Energy efficiency improvement • Renewable energy pilot projects • Sustainable forest management • Flood control and poverty reduction programs.
Cambodia	• Development of climate change policies, laws, policies, strategies and plans, including GHG mitigation and adaptation programs • Promotion of policies related to climate change, integration of laws, policies, projects and programs, decision on national position and policy in international negotiations on climate change • Coordination of relevant UNFCCC subsidiary agreements and other international climate change agreements • Promotion of comprehension and dissemination of information on climate change
Indonesia	Develop policies, including the departmental measures on energy, transportation, agriculture, water and coastal management; National Climate Change Action Plan (2007) requires: • Multi-sectoral (energy, transport, forestry and agriculture) coordination to further integrate emission reduction, climate change adaptation and national development goals • Inclusion of climate-related funding decisions into all development plans, especially inclusion of the most promising system synergy into both medium-term and near-term development plan which is based on the principle of "poverty alleviation to support economic growth and environmental protection"
Laos	National Adaptation Program of Action (NAPA); National Strategy and Action Plan Changes to Combat Climate Change (2009) requires: • Improving measures to achieve the sustainable development goals of the Lao People's Democratic Republic, including low-carbon economic growth • Building up capacity of key sectors of the national economy and natural resources to adapt to climate change and its effects • Enhancing cooperation and building strong alliances and partnerships achieving national development objectives for national interests with international partners; • Raising public awareness and understanding of different stakeholders on climate change and vulnerability impact, GHG emission source and relative contribution, as well as on climate change impact on the economy, in order to stimulate the enthusiasm of stakeholders about action
Malaysia	National Climate Change Policy (2009) requires: • Mainstreaming climate change into intelligent resource management and environmental protection improvement, in order to improve economic strength and quality of life; • Integration of national policies, programs and projects, in order to enhance the vitality of development under the potential impact of climate change • Building up the institutional and implementation capacity in order to better take advantage of opportunities to reduce the negative impact of climate change

(continued)

Table 4.8 (continued)

Country	Action plans and programs
Myanmar	• GHG inventories (Asian lowest-cost GHG abatement strategy) • Preparation of national communications programs • Implementation of the Clean Development Mechanism (CDM) in national institutions • Preparation of national adaptation programs (NAPA) • Sustainable forest management • Improvement and promotion of energy efficiency
The Philippines	National Climate Change Action Plan 2011–2028 calls for priority to food security, adequate water supply, ecosystem and environmental stability, human security, climate-smart industries and services, renewable energy, and capacity building as strategic directions for strategic development directions during 2011—2028
Singapore	National Climate Change Strategy 2012 requires: • Public investment and information technology to help achieve a low-carbon transition • Flexible supervision, effective policies and measures, and plans for the future
Thailand	National Strategy to Address Climate Change (2008–2012) and National Plan to Address Climate Change 2011–2050 require: • Integrating all sectors into the response mechanism for adaptation to climate change and reduction of GHG emissions • Stimulating enthusiasm of departments at all levels to developing and implementing plans to tackle climate change according to principles of relevance, appropriateness, effectiveness and specification • Participating actively in international solution to climate change, by enhance sustainable development in the country • Transiting to a sustainable, low-carbon society with economic and prosperity and self-sufficiency • Making constant efforts to achieve effective and coordinated economic, social and environmental development • Achieving by 2050, economic prosperity and GHG emissions without undermining GDP or development capacity and competitiveness
Vietnam	National Climate Change Strategy 2011 requires: • Ensuring food security, energy security, water security, poverty reduction, gender equality, social security and public health, improving living standards, and protecting natural resources in the context of global climate change • Mainstreaming low-carbon economy and green growth into the development • Enhancing the awareness, responsibility and capability to tackle climate change, and taking full advantage of opportunities posed by climate change to promote social and economic development, and developing and extending climate-friendly consumption patterns • Actively participating in international cooperation and enhancing effective actions to address climate change in order to contribute to climate change adaptation and mitigation
China	China's National Climate Change Program 2007 and China's Policies and Actions to Address Climate Change (2011) cover 11 areas and require: • Accelerated transformation of economic development mode under the theme of scientific development

(continued)

Table 4.8 (continued)

Country	Action plans and programs
	• Green low-carbon development, structural adjustment and transformation of economic development mode • New industrialization, reasonable control of aggregate energy consumption. Measures taken include comprehensive optimization of industrial structure and energy mix, energy conservation and improvement of energy efficiency, and carbon sequestration capacity building

Source SoER4, the EEA website, and the Chinese Central Government website

Key policies for addressing climate change

The policies rolled out successively in China and ASEAN mitigate climate change, and the typical policies are categorized according to policy instruments. These successful experiences help to improve the capacity of the entire region in addressing climate change.

China adopts a target decomposition and assessment policy. National emissions reduction targets are decomposed and assigned to the provincial level, and the provincial governments are required to develop economic and social development plan and annual emissions reduction plans that ensure the realization of targets. The target of CO_2 emission intensity will be incorporated into economic and social development evaluation and government performance evaluation. Rewards and punishments will be given according to performance.

Box 4.4 ASEAN actions on climate change

The ASEAN Member States worked out a plan of actions to mitigate climate change, summarized as follows:

- On climate change adaptation and emission reduction, strengthen personal and institutional capacity building, in particular for disadvantaged and marginalized population;
- Promote comprehensive and consistent measures to address the challenge of climate change, including but not limited to the method of multi-stakeholders and multi-departments;
- Guarantee that private sectors and population can leverage on the new accessible and innovative financing mechanisms to address climate change;
- Strengthen the capacity of different departments and local governments in conducting GHG inventory and vulnerability assessment and meeting the needs;
- Reinforce the efforts of government, private sectors and communities in emission reduction from major development activities;
- Major climate change risk management and emission reduction planning by different departments;

- Strengthen global partnership, support the implementation of relevant international agreements and frameworks, e.g. UNFCCC.

Source: ASEAN Socio-Cultural Community Blueprint (2025), and the ASEAN website.

4.3.1.2 Removal of Fossil Fuel Subsidies

China and six ASEAN Member States, i.e. Brunei, Indonesia, Malaysia, Myanmar, Thailand, and Vietnam, develop policy to lift fossil fuel subsidies, while introducing tiered pricing to a variety of energy sources (see Table 4.9) [1, 2].

4.3.1.3 Feed-in Tariffs for Renewable Energy Projects

China, Indonesia, Malaysia, the Philippines, and Thailand implement a feed-in tariff scheme for renewable energy projects. According to the Interim Measures on Fund Management for Feed-in Tariffs for Renewable Energy Sourced Electricity, the Chinese Government invests 4000 yuan/kW-year to support renewable energy projects. Indonesia, Malaysia, the Philippines and Thailand also provide subsidies on renewable energy sourced electricity tariffs, of which Indonesia plans to raise subsidized prices in 2015 to encourage the development of renewable energy.

4.3.1.4 Emissions Trading

CDM is a flexible mechanism under the Kyoto Protocol (IPCC, 2007) that allows the trade of certified emission reductions (CER) units generated by emission reduction projects. China and ASEAN, except for Brunei, have participated to varying degrees in CDM projects, of which noticeably active are China, Malaysia, Thailand and Indonesia. As non-Annex I countries, China and ASEAN can contribute to tackling climate change by developing CDM projects (Table 4.10).

China is actively pressing ahead with the emissions trading pilot. In 2014, the pilot was kicked off in Beijing, Shanghai, Tianjin, Guangdong, Shenzhen, Chongqing, and Hubei, involving about 12 million tons allowances for more than 1900 enterprises. China intends to launch a national emissions trading market in 2017, which will make China the first developing country to embrace a national carbon market. It is predicted that by 2020 China will become the world's largest emissions trading market.

Table 4.9 Removal of fossil fuel subsidies in China and ASEAN

Country	Subsidized products	Measures
Brunei	Gasoline, diesel, liquefied petroleum gas (LPG), and electricity	Increase gasoline and diesel prices in 2008, in order to restrict "fuel tourism" of vehicles from Malaysia, and raise the prices for foreign cars again in 2012
Indonesia	88-octane gasoline (for small businesses and residents), diesel, kerosene; LPG, and electricity	Raise the gasoline price by 44% and diesel price by 22% in June 2013. Promote the use of natural gas in the transportation sector in order to reduce oil subsidies. Continue the successful kerosene-to-LPG plan that began in 2007. Raise the electricity tariff will rise by 15% in 2013 (on a quarterly basis)
Malaysia	95-octane gasoline, diesel, LPG, and electricity	Gradually raised gas and electricity prices in 2011 and planned to cancel subsidies in 2014. Subsidies for gasoline and diesel were cut in September 2013 in order to achieve deficit reduction
Myanmar	Electricity, gas, and kerosene	Link diesel and gasoline prices to the Singapore spot market in 2011. Raise electricity price in January 2012 as a part of the reform of the electricity system
Thailand	LPG price control, price control of diesel and natural gas (for vehicles) in order to reduce the impact of international price volatility, and price control of electricity for poor families	Raise LPG prices on a monthly basis from September 2013 onwards, while ensuring that the lowest burden of electricity consumption on street vendors and consumers. Raise the prices every four month since September 2013
Vietnam	Diesel, gasoline, natural gas, and electricity	Gradually move toward market-oriented oil and gas prices. Plan to launch a road map to remove fossil fuel subsidies
China	Petroleum products, natural gas	Implement tiered pricing system in July 2012. Announce in March 2013 to adjust the prices of petroleum products every 10 days to better reflect changes in the international oil market. Raise the price of non-residential natural gas by 15% in July 2013, accounting for about 80% of natural gas demand

Source the International Energy Agency (IEA) website and the IEA ASEAN Report

Table 4.10 Registered CDM projects (as of May 2014)

Country	Number of projects	Total emission reductions (Metric ton)
Brunei	None	None
Cambodia	10	2,021,187
Indonesia	146	17,823,691
Laos	9	1,303,092
Malaysia	143	8,404,905
Myanmar	1	709 360
The Philippines	72	3,559,240
Singapore	4	179,979
Thailand	145	7,372,252
Vietnam	252	17,876,191
China	3759	596,432,055

Source UNFCCC CDM website

4.3.2 Policy Measures for Biodiversity Conservation

Biodiversity conservation is a key part of ecological and environmental issue. It may involve many policies, but still is dominated by command-and-control policy and market-based instruments as the major policy categories. This section discusses the major policy measures of multilateral environmental agreements and national plan, ecological compensation and habitat management.

4.3.2.1 Multilateral Environmental Agreements

Except that Singapore and Brunei did not participate in the Convention on Wetlands of International Importance and the Cartagena Protocol on Biosafety, China and ASEAN haven entered at different times into all multilateral agreements on biodiversity and ecosystem conservation (see Table 4.11), including the 1971 Convention on Wetlands of International Importance (Ramsar Convention), 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage, CITES 1975, CBD 1992, 2000 Cartagena Protocol on Biosafety, and UNCCD 1994.

Regional and national plans

ASEAN has declared a regional plan to ensure implementation of policies on biodiversity and ecosystem management policies. For example, the ASEAN Socio-Cultural Community Blueprint (2009–2015) listed a number of strategic actions to enhance sustainable management of natural resources and biodiversity.

Table 4.11 Entry into multilateral environmental agreements related to biodiversity

Country	CBD	Ramsar convention	World Heritage convention	CITES	Cartagena protocol on biosafety	UNCCD
Brunei	2008	None	2011	1990	None	2002
Cambodia	1995	1999	1991	1997	2003	1997
Indonesia	1994	1992	1989	1978	2004	1998
Laos	1996	2010	1987	2004	2004	1996
Malaysia	1994	1995	1988	1977	2003	1997
Myanmar	1994	2005	1994	1997	2008	1997
The Philippines	1993	1994	1985	1981	2006	2000
Singapore	1995	None	2012	1986	None	1999
Thailand	2004	1998	1987	1983	2005	2001
Vietnam	1994	1989	1987	1994	2004	1998
China	1993	1992	1985	1981	2005	1997

Box 4.5 ASEAN actions on biodiversity and ecosystem management

- Achieve by 2010, a significant reduction in the current rate of loss of biodiversity through implementing relevant national, regional and international programs of work;
- sharing of genetic and biological resources by 2015;
- Promote further listing and coordinated management of ASEAN Heritage Parks as an effective platform for ecosystem-based protected areas management by 2015;
- Enhance cooperation in the management of transboundary protected areas between neighboring ASEAN Member States (AMS);
- Take appropriate measures to minimize impacts of transboundary movement of living modified organisms in accordance with the Cartagena Protocol on Biosafety by 2015;
- Establish a functional regional network to promote capacity building in developing inventory of the biological resources and biosafety measures of the ASEAN Region by 2015;
- Enhance the role and capacity of the ASEAN Centre for Biodiversity (ACB) to function as an effective regional centre of excellence in promoting biodiversity conservation and management;
- Promote the involvement of local community to maintain biodiversity conservation and forest health by 2015;
- Promote effective management policies and practices to reduce the impact of invasive alien species at the regional and international levels;
- Promote regional cooperation on sustainable management of biodiversity such as sharing research and development experiences, exchange of experts, and training;

- Strengthen efforts to control transboundary trade in wild fauna and flora through the ASEAN Action Plan on Trade in Wild Fauna and Flora 2005–2010 and the ASEAN Wildlife Enforcement Network (ASEAN-WEN) to implement CITES commitments;
- Explore cooperation among AMS to conduct joint survey and monitoring of migratory wildlife;
- Promote cooperation among AMS in combating land degradation for stainable land management in support of sustainable agriculture and environmental protection.

Source: ASEAN Socio-Cultural Community Blueprint (2009–2015), and the ASEAN website.

At the sub-regional level, the Greater Mekong sub-regional cooperation has been carried out for many years. Countries in the GMS cooperation, i.e. China, Myanmar, Laos, Thailand, Cambodia and Vietnam should protect their favorable environment and rich biodiversity in the cooperative development process. Protection forests are needed to control soil erosion in major river basins, including Lancang-Mekong River, Red River, Irrawaddy River and Salween River, and meanwhile, the nature conservation network should be established for protection of rare species and effective control of environmental pollution.

At the national level, China and ASEAN Member States all issued National Biodiversity Strategies and Action Plans (NBSAPs) (see Table 4.12). Indonesia, the Philippines, Thailand, and China have also updated their NBSAPs which basically covered the priority actions and a few define the key principles of ecological protection.

Biodiversity and ecosystem conservation policy

Rich in biological diversity, China and the ASEAN Member States have implemented many policies to enhance biodiversity and ecosystem management. A number of successful policy measures can be identified and extended to other member states to drive improvement in the whole region [3].

4.3.2.2 Ecological Compensation

China and Vietnam adopt the policy of ecological compensation. China identifies ecological compensation as a major national environmental policy aimed at promoting sustainable use of natural resources and more balanced growth among regions. China has implemented many of the world's largest ecosystem service payment programs. For example, the expenditure on reforestation from 1999 onwards has exceeded 15 billion US dollars, which has brought trees and grass to over 9 million ha of slop arable land. In this program, farmers are compensated for

Table 4.12 National Biodiversity Strategies and Action Plans (NBSAPs)

Country	National strategies and action plans				
	NBSAP	Area	Priority action	Priority program	Remarks
Brunei	None				
Cambodia	2002	17	98		Its NBSAP suggests establishment of biodiversity management department
Indonesia	1993 (2003)	5	72		Its NBSAP is targeted at time frame during 2003–2020 and puts emphasis on partnership, decentralized and transparent biodiversity management
Laos	2004	7	27	201	Its NBSAP includes the strategy toward 2020 and action plans toward 2010. It sets seven main objectives, including identification of important biodiversity components and improvement of knowledge base
Malaysia	1998	11	15		The guiding principle of the national policy is "ensuring the role of local communities and reasonable benefit-sharing in the protection, management and use of biological diversity"
Myanmar	2006	5	20	162	A three-tier structural system is identified at the initial stage and the specific institutional structure is to be formed
The Philippines	1997	5	206		The Philippines Biodiversity Conservation Priority Program has identified 206 priority areas for protection
Singapore	1992 (2002) (2009)	5	17		Its NBSAP integrates more detailed biodiversity strategies and efforts of the government, communities and organizations in coming years than the Singapore Green Plan
Thailand	1997 (2002) (2008)	7	26		Its second NBSAP covers efforts in seven thematic areas during 2003–2007
Vietnam	1994 (2007) (2015)	5	16		A new national biodiversity action plan was approved in 2007. It highlighted the legislation for biodiversity. Biological Diversity Act was promulgated in 2008. The legal framework and management system have been completed
China	1994	7	26	18	China's NBSAP was issued in 2010, covering
	(2010)	(10)	(39)	(39)	10 key areas, 30 prioritized action plans and 39 prioritized action programs

() means the updated years

Source SoER4, and the Chinese MEP website

change in use of agricultural land. Similarly, China has allocated nearly 2 billion US dollars for the forest ecosystem compensation fund, and paid families, communities and local governments to protect critical forest areas which to date reaches nearly 44 million ha. Vietnam has successfully implemented the demonstration project on payments for forest environmental services in Lam Dong Province, with assistance of the Regional Development Mission for Asia of the United States

Agency for International Development (USAID). Apart from biodiversity conversation, the project has improved the life of 40,000 rural poor people and reported the design and follow-up of national act associated the program. The Act created the legal framework for integrated ecosystem management in experimental Lam Dong and Son La provinces. The move not only promotes payments for forest management, but also increases the revenue of service-providing communities [4].

Box 4.6 Ecological compensation in Lam Dong Province of Vietnam and Xin'anjiang of China

The project of payments for ecosystem services was implemented in South Vietnam's Lam Dong Province, in which forest service buyers, referring to electricity and water utilities, pay for water diversion and soil conservation and tourism operators bear the landscaping cost. As of December 2012, the charges for protection of 210,000 ha of forests, involving more than 4 million US dollars, have been given to 22 forest administrations and forestry companies and 9870 major ethnic minority families with an annual average of 540–615 US dollars per household. Forest protection patrols supported by the project have halved the occurrence of illegal logging and poaching in protected areas in the province. The dissemination of such compensation practice in Vietnam will exert a major effect by promoting forest habitat preservation and biodiversity conservation, especially when the number of buyers of ecosystem services increases.

In 2012, China kicked off the pilot project for ecological compensation mechanism in Xin'anjiang to have the ecological benefitting communities to compensate those who suffered losses. The pilot compensation plan requires an annual compensation fund of 500 million yuan, with 300 million from central budget and 100 million respectively by Anhui and Zhejiang provinces. The major monitoring indicators for water quality is potassium permanganate, ammonia nitrogen, total nitrogen, total phosphorus and the monitoring evidence is largely from the water body section across the two provinces. Ever since the implementation of the pilot, the local ecological environment has been improved gradually and the industrial structure is also optimized [5].

4.3.2.3 Habitat Management

China and ASEAN implement a protected area policy for habitat administration. ASEAN classifies protected areas into three categories: (a) nature reserves, wilderness areas and national parks; (b) protected natural habitats and terrestrial and marine protected areas for species management; and (c) protected areas for sustainable use of natural resources. For critical areas of biodiversity, ASEAN Heritage

Parks and transboundary protected areas, ASEAN develops biodiversity protection plans and ecosystem management. In China, the protected areas are divided into (a) typical natural geographical areas; (b) natural concentrated distribution areas; (c) areas of rare and endangered wildlife species; (d) areas of particular conservation value (scientific and cultural values); and (e) government-approved protected areas. At present, there are more than 2500 protected areas in China.

Box 4.7 ASEAN Turtle Islands Heritage Protected Area

Turtle Islands Heritage Protected Area (TIHPA) is the first transboundary protected area in the world, and its area of coverage spans Malaysia and the Philippines. It is the major nesting ground of the green sea turtle (Chelonia mydas) and is the only remaining nesting rookery of green sea turtles in the ASEAN region. It is also the eleventh major nesting area of marine turtles in the world. Turtles lay hundreds of thousands of eggs in the TIHPA each year, with approximately more than 2000 nesters. Hawksbill turtle (Eretmochelys imbricata) also nests in the TIHPA.

Biodiversity resources in the TIHPA include 34 avian species, fruit and field bats, and reptiles (snakes, green sea and hawksbill turtles, monitor lizards); 15 principal arborescent species; 24–27 genera of corals; 76–128 fish species; and 62 species of marine flora.

4.3.3 Policy Measures to Protect Freshwater Resources

Freshwater resources are key component of regional ecological and environmental concerns. On both water quantity and quality, command-and-control policy and market-based instruments (MBI) are still major policy categories. This section discusses the typical policy measures water resource regional plan, river basin management planning, tiered water pricing policy, pollution discharge permit, and mandatory environmental protection fee.

4.3.3.1 Water Resource Regional Plan

ASEAN has announced a regional plan to ensure the implementation of policy on freshwater resources. A total of 13 actions to enhance the sustainability of freshwater resources are provided in the ASEAN Socio-Cultural Community Blueprint 2009–2015.

Box 4.8 ASEAN actions on freshwater resources

- Continue implementation of the ASEAN Strategic Plan of Action on Water Resources Management;
- Endeavor to reduce by half the number of people without sustainable access to safe drinking water by 2010;
- Manage water resources efficiently and effectively in order to provide adequate and affordable water services by 2015;
- Promote the implementation of integrated river basin management by 2015;
- Promote public awareness and partnership to enhance integrated water resources management;
- Promote regional cooperation on water conservation measures and program as well as scientific and technological innovations in water quality improvement and supply.

Source: ASEAN Socio-Cultural Community Blueprint 2009–2015, and the ASEAN website.

In the field of water resources management, ASEAN issued in 2005 the ASEAN Strategic Plan of Action on Water Resources Management which marks a landmark achievement of environmental cooperation in the region. The plan introduces the world's best practices in integrated water resource management and capacity building, with the purpose to improve the community's understanding of importance of water resources [6].

4.3.3.2 River Basin Management Planning

China adheres to integrated river basin management and administration under the water resource management system. Malaysia, Cambodia, the Philippines, and Indonesia implement a decentralized management system, which defines the responsibilities of governments and districts at all levels. In Thailand, the river basin agencies play a considerable role in water resource management. A license and authorization system for groundwater development is set up in Thailand, Myanmar, Laos and Vietnam.

4.3.3.3 Tiered Pricing Policy

China, Malaysia, the Philippines and Vietnam introduce water resource fees. Malaysia imposes affordable fees on low-income groups and full water charges on high-income group. In the Philippines and Vietnam, water charges have been

adjusted to reflect the economic value of water resources. China is implementing a progressive water tariff to control water consumption.

4.3.3.4 Pollution Permit System

China implements emission standards and total emission control for the discharge of pollutants. Individuals and organizations that discharge pollutants to the environment shall apply in advance for and obtain the corresponding pollution permit from environmental protection departments. The emissions standards for water pollutants put differentiated caps of pollutant concentration for industries. The emission allowances for aggregate water pollutants are developed and decomposed by the Central Government and made known to enterprises through local governments.

China, the Philippines and Singapore impose taxes/charges on water pollutant emissions. In the Philippines, companies are required to pay a fixed fee based on the amount of wastewater emissions and the type and quantity of water pollutants. In Singapore, conventional water and electricity charges and water consumption tax are joined by water fees. In China, pollution charges will be doubled where emissions are beyond the standards, taking into account of the type and quantity of pollutants.

4.3.3.5 Compulsory Environmental Taxes and Fees

Environmental fees are made mandatory in Vietnam. Ho Chi Minh City imposes a 4% resource tax on water consumption, which equals to 160 VND/m^3 for groundwater and 80 VND/m^3 for surface water, according to prices of 4000 and 2000 VND/m^3 respectively.[4]

4.3.4 Policy Measures for Air Pollution Prevention and Control

Air pollution is an important issue that affects human health and ecosystem and features transboundary movement and thus calls for regional management. This section discusses the typical policy measures of multilateral environmental agreements, air pollution action plan, and air pollution emission cap control.

[4]Source: Economic and Commercial Section of the Consulate General of the People's Republic of China in Ho Chi Minh City, 2007, http://hochiminh.mofcom.gov.cn/aarticle/jmxw/200707/20070704844763.html.

Table 4.13 Participation in multilateral environmental agreements on air pollution

Country	Montreal protocol	Vienna convention
Brunei	1993	1990
Cambodia	2001	2001
Indonesia	1992	1992
Laos	1998	1998
Malaysia	1989	1989
Myanmar	1993	1993
The Philippines	1991	1991
Singapore	1989	1989
Thailand	1989	1989
Vietnam	1994	1994
China	1991	1989

4.3.4.1 Multilateral Environmental Agreements

Recognizing the importance of addressing air pollution, China and ASEAN have entered into the multilateral agreements, including the 1985 Montreal Protocol on Substances that Deplete the Ozone Layer and the 1987 Vienna Convention for the Protection of the Ozone Layer (see Table 4.13).

4.3.4.2 Action Plans

The measures to control air pollution, a common issue facing China and ASEAN, vary among countries (see Table 4.14) [7]. The focus of air pollution control depends on the degree of pollution and level of economic and social development.

The ASEAN Agreement on Transboundary Haze Pollution was signed in 2002 in Kuala Lumpur and entered into force in 2003. The agreement aims to improve management policies and enforcement mechanisms for preventing land and/or forest fires, establish operational mechanisms for monitoring land and/or forest fires, and to strengthen regional capacity and measures to fight land and/or forest fires. All ASEAN Member States ratified the Agreement (see Table 4.15).

4.3.4.3 Control of Aggregate Air Pollutants

China implemented a total emission control system. Based on pollution permit system, enterprises and institutions, especially those tasked with control of total pollutant emissions, shall discharge pollutants as required in permitted conditions. New and expanded thermal power plants and other large- and medium-sized enterprises, are required to install facilities or take other measures for desulphurization and dust removal where the emissions fall short of emissions standards or control requirements.

Table 4.14 Typical regulations and programs on air pollution control

Country	Policy category	Regulations and programs
Indonesia	Others	1996 Blue Sky Program
Malaysia	Oil products	Environmental Quality (Control of Petrol and Diesel Properties) Regulations 2007 and Environmental Quality (Clean Air) Regulations 1978, Environmental Quality (Control of Emission from Petrol Engines) Regulations 1996 and Environmental Quality (Control of Emission from Diesel Engines) Regulations 1996 pending approval. Clean Air Action Plan is also being developed to encourage all sectors to improve air quality
The Philippines	Oil products	Biofuels Act of 2006 approved on November 29, 2006, stipulates a minimum of one percent (1%) blend of biodiesel by volume into all diesel fuel distributed and sold in the country, and a minimum of five percent (5%) bend of bioethanol to all gasoline fuel Provision X in DAO 2000-81 Section 5 and relevant provisions (DAO 2007-22) were adjusted and clarified in the continuous emission monitoring system and agreement guidelines
Thailand	Comprehensive	Air Quality and Noise Management in Thailand Master Plan B.E. (2005–2016) is drafted by Pollution Control Department (PCD). The NO_2 and noise standards under the Ambient Air Quality Standards (2007–2008) were published in order to improve air quality and reduce noise pollution.
Vietnam	Vehicle	The roadmap to application of on-road motor vehicle emission standards was approved in 2005. According to this roadmap, the Euro II standards applied to imported second-hand motor vehicles in July 2006 and all domestic and imported cars in July 2007. By 2025 year-end, Euro V standards will be applied to all vehicles in Viet Nam.
China	Comprehensive	Law of the People's Republic of China on Air Pollution Prevention and Control (2000) Action Plan for Air Pollution Prevention and Control (2013)

Source SoER4

Table 4.15 Ratification of ASEAN Agreement on Transboundary Haze Pollution

Country	Year of ratification
Brunei	2003
Cambodia	2006
Indonesia	2014
Laos	2004
Malaysia	2002
Myanmar	2003
The Philippines	2010
Singapore	2003
Thailand	2003
Vietnam	2003

4.3.5 Policy Measures for Chemicals and Waste Management

The issue of chemicals and waste management emerged with population growth and economic development. The present policy measures are still dominated by command- and-control approach. This section discusses the typical policy measures of national laws, multilateral environment agreement, urban waste treatment management and hazardous chemical registration management.

4.3.5.1 National Laws

China and ASEAN have developed a number of regulations and plans on chemicals and waste management, as shown in Table 4.16.

4.3.5.2 Multilateral Environmental Agreements

China and most ASEAN Member States have entered into the multilateral environmental agreements on chemicals and waste management (except that Brunei does not join the Rotterdam Convention and Myanmar does not join the Basel Convention and Rotterdam Convention) (see Table 4.17). The major multilateral environmental agreements in this field include the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (1989), Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (1998), and Stockholm Convention on Persistent Organic Pollutants (2001).

4.3.5.3 Urban Solid Waste Treatment Management

China implements the urban solid waste charge policy. In line with the polluter pays principle, waste producers are required to pay for urban solid waste treatment, considering treatment costs and national revenue, and the charges shall be used for urban solid waste collection and treatment.

Malaysia and the Philippines reconstruct urban waste landfills. There are both urban waste landfills and open dumps in the two countries. To reduce the impact on environment, a part of open dumps are identified to be rebuilt into municipal waste landfills.

Table 4.16 Typical national regulations and plans on chemicals and waste management

Country	Regulations and plans
Cambodia	Law on Environmental Protection and Natural Resources Management
Indonesia	Act of the Republic of Indonesia Number 18 Year 2008 about Waste Management
Laos	Environmental Protection Law of Lao People's Democratic Republic 1998: (a) Regulation on the Monitoring and Control of Waste Discharge (No. 1122/STENO) 1998; (b) Guidelines for Hospital Waste Management (1997); (c) Regulation on Industrial Wastewater Discharge (No.180/MIH) 1994; (d) policy and program compliance evaluation and monitoring
Malaysia	Environmental Quality (Scheduled Wastes) Regulations 2005 Solid Waste and Public Cleansing Management Act 2007 Solid Waste and Public Cleansing Management Corporation Act 2007
The Philippines	Toxic Substances and Hazardous and Nuclear Waste Control Act (R.A. 6969)
Singapore	Environmental Protection and Management (Air Impurities) Regulations 2001
Thailand	Enhancement and Conservation of National Environmental Quality Act 1992 Public Health Act 1992 Public Cleansing Act 1992 Building Control Act 1992 Factory Act 1992 Hazardous Substances Act 1992 Industrial Estate Authority of Thailand Act 1979
Vietnam	(a) Land Law (completed in 1989, 1993); (b) Forest Protection and Development Law (1991); (c) Human Health Protection Act (1989); (d) Mineral Resources Act (1989); (e) Aquatic Products Act (1988)
China	Law of the People's Republic of China on Solid Waste Pollution Prevention and Control, 2004 Hazardous Chemicals Regulations, 2011 Measures for Municipal Solid Waste Management, 2007

Table 4.17 Participation in multilateral environmental agreements on chemicals and waste management

Country	Basel convention	Rotterdam Convention	Stockholm convention
Brunei	2012	None	2002
Cambodia	2001	2013	2006
Indonesia	1993	2013	2009
Laos	2010	2010	2006
Malaysia	1993	2002	2002
Myanmar	None	None	2004
The Philippines	1993	2006	2004
Singapore	1996	2005	2005
Thailand	1997	2002	2005
Vietnam	1995	2007	2002
China	1991	2005	2004

4.3.5.4 Hazardous Chemicals Registration Management

China's registration measures apply to hazardous chemicals, covering mainly three stages:

Production and storage—According to the law on industrial solid waste registration, producers shall update the industrial solid waste information to local environmental protection departments. According to the hazardous chemicals registration law, producers shall apply for safety production license, and hazardous chemicals shall be labeled. Producers are also required to update the information on inspection and registration of hazardous chemicals.

Use and management—The users of hazardous chemicals are required to apply for safety use license, and hazardous chemicals companies to apply for safety business license. To ensure safety, enterprises are prohibited from hazardous chemicals business without license.

Transportation—The inter-provincial transportation of solid waste shall receive the prior approval of environmental protection department of the source province, otherwise it shall be prohibited. Solid waste that cannot be reused are not allowed to import. In China, dedicated permits are required for the transportation of hazardous chemicals and road transportation of toxic chemicals, and the waterway transportation of toxic chemicals is prohibited.

4.3.6 Policy Measures to Protect Coastal Resources

China and ASEAN Member States enjoy massive costal resources. This section discusses the policies of multilateral environmental agreements, regional plan and comprehensive costal management.

4.3.6.1 Multilateral Environmental Agreements

China and ASEAN except for Cambodia have joined the UNCLOS (see Table 4.18).

4.3.6.2 Regional Plans

ASEAN has declared a regional plan to ensure the implementation of policies on protection of coastal and marine resources. In specific, the ASEAN Socio-Cultural Community Blueprint 2009–2015 lists a number of actions to promote sustainable use of coastal and marine environment.

Table 4.18 Entry into multilateral environmental agreements on coastal resource conservation

Country	UNCLOS
Brunei	1996
Cambodia	None
Indonesia	1986
Laos	1998
Malaysia	1996
Myanmar	1996
The Philippines	1984
Singapore	1994
Thailand	2011
Vietnam	1994
China	1996

Box 4.9 ASEAN actions on coastal and marine environmental protection

- Enhance inter-agency and inter-sectoral coordination at the regional and international levels for achieving sustainable development of ASEAN's coastal and marine environment;
- Build capacities to develop national marine water quality standards by 2015 using the ASEAN Marine Water Quality Criteria as a reference;
- Establish a representative network of protected areas to conserve critical habitats by 2015 through further implementation of the ASEAN Criteria for Marine Heritage Areas and ASEAN Criteria for National Protected Areas;
- Promote conservation and sustainable management of key ecosystems in coastal and marine habitats, such as joint efforts to maintain and protect marine parks in border areas and the "Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security";
- Enhance the capacity and capability of, as well as economic benefits for the fishery and other coastal community to encourage their active participation in promoting environmental sustainability;
- Promote the sustainable use of coastal and marine environment through public awareness campaign to highlight the global importance of coastal and marine environment in addressing food security, maintaining ecosystem services, as well as protecting marine environment;
- Promote collaboration among ASEAN Member States in responding to transboundary pollution due to the oil spill incidents;
- Promote cooperation in addressing pollution of coastal and marine environment from land-based sources.

Source: ASEAN Socio-Cultural Community Blueprint 2009–2015, the ASEAN website.

4.3.6.3 Integrated Coastal Zone Management

China and ASEAN create marine protected areas (MPAs). In China, MPAs are classified into four categories: (a) typical marine natural geographical areas, (b) representative natural ecological areas with highly rich marine species or naturally concentrated rare and endangered marine species, (c) sea area, sea coast, islands, coastal wetlands, estuaries and bays of particular conservation value, and (d) locations of marine natural heritage of great scientific and cultural value. For better MPA management, ASEAN Member States have carried out policy improvement and legislative reform, including MPA planning and management to achieve integrated coastal zone management framework and enhanced mechanisms that enable managers and institutions to continue adaptive management for adequate representation while overcoming the differences in understanding of biogeographic area establishment, and to improve joint research and cooperative management.

4.3.7 Policy Measures to Address Soil Degradation and Soil Erosion

The governance policies of China and ASEAN on soil are largely command-and-control policies. This section discusses the policies on comprehensive management of agriculture, and water and soil erosion.

4.3.7.1 Comprehensive Management of Agriculture

China takes comprehensive measures to control agricultural non-point source pollution. The measures include regulation of chemical fertilizers, pesticides and plant growth hormone, recycling of agricultural film, disposal of poultry manure, and treatment of wastewater and other waste.

Malaysia and Indonesia adopt a sustainable palm oil policy. The policy emphasizes the importance of environmental protection and rests on credible international standards and principles while taking into account the well-being of local communities and plantation workers.

4.3.7.2 Soil and Water Erosion Policy

China's National Soil and Water Conservation Plan (2015–2030) sets 23 state-level key areas of water and soil erosion prevention which are categorized into important river source areas, important water source areas, and water-wind erosion crisscross areas and 17 key areas of water and soil loss control including northeast rolling hill

areas. Focusing on areas in most urgent need of protection and treatment, a number of key prevention and treatment projects are designed. In state-level key areas of water and soil erosion prevention, construction projects and production activities are strictly controlled, and overgrazing, disorderly mining, deforestation and grassland reclamation are prohibited, in order to prevent soil and water loss and ecological damage from the source. Where there is water and soil erosion, comprehensive treatment is carried out according to local conditions. Efforts also include clean small watershed construction in important water source areas and special treatment of sloping cultivated land and ditch intensive areas.

4.4 Policy Evaluation

The benefits of certain policy/policies are reviewed in a number of evaluation reports despite the absence of elaboration on policy effects in China and ASEAN. Therefore, this section will not systematically expound the benefits of policy options, but only provide a general analysis.

4.4.1 Economic Benefits

The policy measures taken by China and ASEAN have generated two major results: businesses are mobilized to treat pollution; while the industrial structure is optimized, so that the resources are more effectively allocated to eco-friendly business. Preferential taxes and subsidies for energy efficient and pollution control products and acts also guide businesses and consumers to pollution prevention and control. By driving the development of advanced control technologies and environmental protection industries, these measures favor rational resource allocation and industrial structure, encourage business transformation, and expand employment opportunities. Enterprises that cause environmental pollution and damage are faced with pollution charges and fees and environmental taxes which will be used for pollution control and environmental protection. This move not only internalize the external costs of enterprises and rationalize profit levels, but also reduce the tax burden on businesses in compliance with environmental requirements, which better embodies the principle of fairness conducive to fair competition among enterprises of all kinds.

4.4.2 Social Benefits

The social impact of policy measures covers access to information, stakeholders, law enforcement, and gender equality, as well as environmental justice, equality and benefit-sharing, all of which will facilitate the transition to sustainable development. The compensation for the poor, such as ecological compensation to encourage poor areas to reforest, can reduce the number of population in poverty while protecting the environment, and therefore can be seen as a component of effective policy portfolio. The main obstacles to policy measures include unequal rights, conflicting social and personal values, and prevailing non-green consumption. The internalization of environmental costs incurred in the production and consumption process easily leads to rise of family costs and undermines employment in polluting sunset industries.

4.4.3 Environmental Benefits

In order to reduce poverty, China and ASEAN are committed to economic development in recent years by accelerating the pace of urbanization. A lot of environmental problems have arisen in this process, but the ecological environment in the region does not suffer noticeable impact owning to a series of policy measures. Policy interventions have produced significant environmental benefits. Environmental Performance Index (EPI) quantifies and numerically marks the

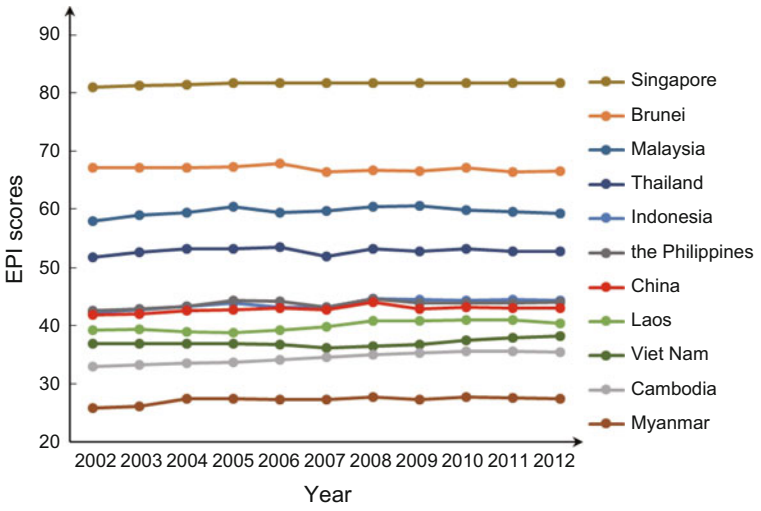

Fig. 4.2 EPI scores of China and the ASEAN countries *Source* Yale University, http://www.epi.yale.edu/

environmental performance of a state's policies and reflects the overall progress of a country or region in the field of resource and environment. According to the EPI serial data released by Yale University every two years since 2004, the EPI rankings of China and the ASEAN Member States spanned from 4 to 164 in 2012, implying large disparity in environmental performance. Yet, the EPI scores were relatively stable during 2002–2012 (see Fig. 4.2), which would have been impossible if without such policy interventions, and regional environmental problems could have been more serious.

4.4.4 Policy Limitations and New Policy Demands

Although the environment intervention policies of China and ASEAN have achieved very good economic, social and environmental benefits, due to economic development level, traditional management concept and the understanding toward the issue of environment, the policy interventions are still restricted by the following aspects:

First, policy design. Environmental problems accompany economic development and attract more attention as they become serious. In the face of a number of environmental problems arising from economic and social development, China and ASEAN can learn from the experience of other countries. However, a specific policy, if not appropriately designed in the dissemination process to accommodate specific context, may fail due to different national conditions. It is therefore

necessary to carefully carry out policy design during flexible and adaptive management while drawing on the experience.

Second, policy implementation. A policy can be deemed effective only when it is well implemented and generate good results. There are many factors that will affect the effectiveness of policy implementation in different countries. For example, the attitude of companies to policy measures is a key factor. Hence, an appropriate understanding of the basic conditions and scenarios for policy implementation is fundamental to ensuring that policies are well performed.

Third, institutional barrier which is a general factor which may cause the invalidity of the supporting policies. China and ASEAN have all set up environment departments, but the environment issue is under the management of many a departments. This kind of institutional design is bad for handling the environment issue.

Fourth, lack of resources. It refers to the personnel resources for policy drafting and implementation, facilities and equipment and capital. The environment departments of ASEAN countries encounter the shortage of all these resources.

On the new demand for policies, on one hand, it is necessary to handle new challenges. When time passes by, there will emerge new environmental issues and the prioritized areas will also change accordingly. Therefore, the policy shall also be adjusted, rather than just be restricted to specific time frame. The implementation of Sustainable Development Goals will provide opportunities for policy upgrade and better resource allocation to address the new challenge in a systematic way.

On the other hand, more scientific and feasible policies are needed, which shall include but not limited to environment institutional reform, stronger enforcement, promoting MBI and wider public participation. All of these shall be a critical part of establishing an effective environment policy framework.

References

1. IEA.: Southeast Asia Energy Outlook 2013. IEA website (2013)
2. IEA.: Southeast Asia Energy Outlook 2015. IEA website (2015)
3. ASEAN Centre for Biodiversity.: ASEAN Biodiversity Outlook. Dolmar Press (2010)
4. Chazhong, G., Xu, K.: Innovative ecological compensation practice in Viet Nam: payments for forest environmental services. Environ. Prot. **16**, 70–71 (2010)
5. Wu, S., Yang, W., Zhao, Y., et. al.: Innovation and practice of aqua ecological compensation in Xin'anjiang river watershed. Environ. Prot. **42**(5) (2014).
6. Secretariat, A.: ASEAN Strategic Plan of Action on Water Resources Management. ASEAN Secretariat (2005)
7. Secretariat, A.: Fourth ASEAN state of the environment report. UNEP, ASEAN Secretariat (2009)
8. Resosudarmo, B.P.: Indonesia's clean air program. Bull. Indonesian Econ. Stud. **38**(3), 343–365 (2002)
9. UNEP.: Global Environment Outlook 4(GEO4): Environment for Development. United Nations Environment Programme. Progress Press Ltd, 2007.

10. UNEP.: Global Environmental Outlook 5 (GEO5)—Environment for the Future We Want. United Nations Environment Programme. Progress Press Ltd, (2012)
11. UNEP.: Global Environmental Outlook 6 (GEO6)—Asia-Pacific Outlook. United Nations Environment Programme. Progress Press Ltd, (2016)
12. Center, China-ASEAN Environmental Cooperation: ASEAN Environmental Review. China Environmental Science Press, Beijing (2011)