4.3 Environmental framework

The 1982 Constitution establishes: i) in its Article 9, that the *State must ensure the rational use of natural resources and protect rare animals and plants*, and that the appropriation of or damage to natural resources is prohibited; nd ii) in its Article 26, that the *State must protect and improve the living environment and the ecological environment*, must prevent and control pollution and other hazards, and must institutionalise and encourage afforestation and the protection of forests.

The *Environmental Protection Law* of China (1979, amended 1989) sets forth the basis of national policy and defines national government and territorial responsibilities for environmental protection. This law has been formulated for "the purpose of protecting and improving people's environment and the ecological environment, preventing and controlling pollution and other public hazards, safeguarding human health and facilitating the development of socialist modernisation".[7] The law requires the State to adopt economic and technological policies and measures for environmental protection so as to co-ordinate the work of environmental protection with economic construction and social development.[8] The State must also encourage the development of education in the science of environmental protection.[9] In addition, China has a range of more specific environmental laws or environmentally-related laws (Table 2.5).

China's *10th Five-Year Plan (FYP) (2001-05) for National Economic and Social Development* was approved in 2001. It defined objectives, guiding principles and strategies for China's economic and social development, including the planned allocation of 1.2% of the country's GDP to environmental protection (an increase from the 0.93% of the 9th FYP). Under the heading "Co-ordinating Economic Development with Social Development", the 10th FYP stresses that "the State needs to pay close attention to and solve issues of population, resources and the ecological environment, take further steps to implement the strategy of sustainable development, and stimulate co-ordinated economic and social development" (Chapter 7).

Table 2.5 **Selected environment related legislation**

1979	Environmental Protection Law (amended 1989 and 2001)
1982	Marine Environmental Protection Law (amended 1999)
1984	Forest Law (amended 1998)
1984	Law on Prevention and Control of Water Pollution (amended 1996, implemented 2000)
1985	Grassland Law
1986	Fisheries Law
1986	Mineral Resources Law
1986	Law on Land Administration (amended 1998)
1987	Law on Prevention and Control of Air Pollution
1988	Water Law (amended 2002)
1988	Wildlife Protection Law
1989	City Planning Law
1991	Law on Animal and Plant Quarantine
1991	Law on Water and Soil Conservation
1993	Agricultural Law
1994	Regulations on Protected Areas
1995	Law on Prevention and Control of Environmental Pollution by Solid Waste (amended 2004)
1995	Law on Prevention and Control of Air Pollution (amended 2000 and 2002)
1996	Law on Prevention and Control of Pollution from Environmental Noise
1996	Law on Coal Industry
1997	Law on Protecting Against and Mitigating Earthquake Disasters
1997	Law on Energy Conservation
1997	Construction Law
1997	Flood Control Law
1998	Fire Control Law
1998	Law on Promotion of Cleaner Production (amended 2003)
1999	Administrative Reconsideration Law
1999	Meteorology Law
2001	Law on Prevention and Control of Desertification
2001	Law on Administration of Sea Areas
2002	Law on Popularization of Scientific Technology
2002	Law on Safety Production
2002	Law on Environmental Impact Assessment
2003	Law on Radioactive Pollution Prevention and Control
2003	Law on Administrative Permission
2005	Law on Renewable Energy

Source: SEPA.

The *11th Five-Year Plan (FYP) (2006-10) for National Economic and Social Development* was approved in 2005. In this new plan, priority should be given to achieving a better balance between economic, social and environmental development, by building a "harmonious society" with a narrower gap between rich and poor, and by curbing widespread environmental degradation. During the period of the 11th plan, a total of CNY 1 300 billion (on the order of 1.2% of China's GDP) is expected to be spent for environmental protection throughout the country (Chapter 7).

4.4 Environmental institutions

The Environmental and Resources Protection Committee (ERPC) of the NPC is responsible for developing, reviewing and enacting environmental laws (OECD, 2005b).

Under the State Council, the *State Environmental Protection Administration*, (SEPA), the highest administrative body for environmental protection, is responsible for developing environmental policies and programmes. SEPA deals with:

- policy and regulatory matters;
- enforcement and supervision of pollution prevention and control laws and regulations;
- cross-cutting and regional coordination issues;
- standards for environmental quality and discharges;
- environmental management and environmental impact assessment;
- research and development (R&D), certification and environmental industry;
- environmental monitoring and information disclosure;
- global environmental issues and international conventions;
- nuclear safety.

SEPA supervises *Environmental Protection Bureaus* (EPBs) at the provincial, prefectoral and county levels. EPBs are part of the provincial administration (Governor's Office). They implement national and provincial environmental protection laws and are involved in monitoring pollution.

A variety of *sub-national administrative units* also play a role in environmental protection:

- *Mayors' offices* (e.g. of the four centrally-administered municipalities) take decisions on large investment projects involving industrial development and environmental protection;

– *Planning commissions* (at the county level and above) are responsible for reviewing the environmental protection plans of EPBs and for integrating them into local economic and social development plans;

– *Industrial bureaus* play a significant role in day-to-day industrial pollution abatement;

– *Finance bureaus* manage city revenues and expenditures and play important roles in the pollution discharge fee system;

– *Urban construction bureaus* oversee the construction and operation of waste water treatment plants.

Table 2.6 **Environmental-related administrations**

Responsibilities	Entities
Macro-coordination and control	National Development and Reform Commission (NDRC) Ministry of Finance (MOF) Ministry of Foreign Affairs (MOFA)
Pollution Control	State Environmental Protection Administration (SEPA) Ministry of Construction (MOC) Ministry of Railways (MOR) Ministry of Communications (MOCO) Ministry of Water Resources (MOWR) Ministry of Health (MOH)
Ecosystem protection	State Environmental Protection Administration (SEPA) Ministry of Agriculture (MOA) State Forestry Administration (SFA) Ministry of Land and Resources (MOLR)
Natural resource management	State Environmental Protection Administration (SEPA) Ministry of Land and Resources (MOLR) Ministry of Water Resources (MOWR) Ministry of Agriculture (MOA) State Forestry Administration
Others	Ministry of Science and Technology (MOST) Ministry of Education (MOE) State Oceanic Administration (SOA) National Audit Office General Administration of Civil Aviation General Administration of Customs State Administration of Taxation

Source: Changhua Wu; "Governance in China", OECD.

A number of *ministries and agencies* under the State Council are involved in environmental management (Table 2.6). In particular, the Ministry of Communications, Ministry of Railways, Ministry of Water Resources, Ministry of Agriculture and the General Administration of Civil Aviation play a role in environmental protection associated to infrastructure construction (including environmental impact assessment) and management, water and soil conservation, natural resources protection, pollution prevention and control, environmental monitoring and implementing international agreements.

2.3 Use of economic instruments

User charges for urban waste water treatment

Meeting the FYP targets to increase urban waste water treatment will *require large investments*, estimated (in the 11th FYP) at CNY 83 billion (USD 10 billion) over the period 2007-12. Chinese cities have been investing in domestic waste water treatment, initially with assistance from international funding institutions but now mostly from local government funds, and increasingly by utilising local and international private finance (Box 4.2).

Most urban users are billed for water use based on metered consumption (i.e. *volumetric pricing*). Some 60% of individual apartments are metered in urban areas, a high proportion by OECD standards. The remaining 40% usually share evenly the building's water bill. Domestic water prices consist of: i) a fixed charge (typically CNY 0.13 per m^3), payable to the Ministry of Water Resources' Water Affairs Bureau; ii) a user charge for public water supply, payable to the water supply company; and iii) a user charge for waste water services, payable to the waste water treatment company. All charges are collected through a combined bill issued by the water supply company. However, the revenues often pass to the local finance bureau before being reallocated to the water company.

Box 4.2 **Private sector participation in water supply and waste water services**

Private sector participation in public *water supply* has developed rapidly since 2000 and now accounts for 15% of urban water supply (serving 83 million people). International companies own 44% of the supply (in terms of population served), followed by local Chinese companies (37%) and expatriate Chinese companies (19%). Though the local Chinese firms may not have access to as large technical and financial resources as the international investors, they are willing to take a longer-term view to their investments, to operate with much lower margins and to build closer relationships with local officials; they are thus rapidly gaining market share. Few contracts (with terms of 15 to 30 years) have involved full ownership of companies or assets, but the situation is changing with the government policy to develop companies' managerial autonomy[a] (under the control of a board of directors). The companies may be a subsidiary of the municipal Water Affairs Bureau[b] or of an urban development and investment corporation.

Waste water treatment has been practiced for a shorter period than public water supply, and the institutional arrangements are not as advanced. In 2000 only 14% of treatment facilities had been constructed using local funds; the rest were financed by bilateral or international donors. The policy is now that independent waste water enterprises should be established. In some cases, waste water is bundled with the water supply company. Most works constructed in recent years use local finance: the proportion of international donor finance has greatly reduced and the proportion of *private finance, both international and domestic*, is taking off. The government strongly encourages this trend and hopes to leverage USD 30 billion in investments by 2010. Contracts for waste water treatment projects are now being tendered almost daily and waste water equipment manufacturers are setting up production lines in China to serve this market.

However, waste water companies, generally do not incorporate *responsibility for sewerage* (though there is a move towards this now). This can lead to contradictions between waste water treatment capacity and the sewerage capacity to deliver flows to the works. The waste water company is also not in control of industrial discharges to sewers, as these remain the responsibility of the Environmental Protection Bureaus. Thus if an industrial discharge is causing problems for treatment processes, a common occurrence, then the waste water treatment plant operator cannot take direct action but must request an investigation by the Environmental Protection Bureaus.

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a) Traditionally water companies billed and collected user charges but the proceeds were bundled with local taxation. Where the water company has been established as a financially independent corporate entity, it is responsible for directly financing its operation by collecting and retaining revenues from tariffs.

b) Public water supply is usually led by the Construction Bureau (under the Ministry of Construction) in cities and the Water Resource Bureau (under the Ministry of Water Resources) in rural areas. In larger municipalities like Beijing and Shanghai, and increasingly in smaller ones, public water supply is assigned to Water Affairs Bureaus, with both Construction and Water Resources as parent ministries. By 2004, more than 1 200 Water Affairs Bureaus had been established.

Before 1999, water prices were very low (typically less than CNY 0.2/m^3), and water supply and waste water treatment (where available) were supported by government subsidy. The 2002 water law introduced a new *policy of cost recovery*, at least with respect to operation and maintenance. Prices have been raised substantially in China's more developed areas, and the process is spreading outwards (Table 4.6). According to the National Development and Reform Commission (NDRC), by the end of 2005 the average water price in China's 36 major large and medium-sized cities was CNY 2.09 (USD 0.26) per cubic metre, including CNY 0.54 (USD 0.068) for treating waste water, an increase of 10% from 2004. Special provisions apply to the registered poor, such as overall price reductions or supply of the first cubic metre per month for free. Any price increase (to achieve cost recovery) must be approved by the local Price Bureau (supervised by NDRC). The merits of the price rise (e.g. better service) are debated in consideration of *affordability*, through a public hearing. Indeed, user charges for public water supply only are typically in the range of 1 to 5% of household income in China, but up to 20% for those on minimum livelihood standard welfare.

Table 4.6 **Water prices for households**, 2004

(CNY/m^3)

City	Province	Fixed and water supply charges	Waste water charge	Total charge
Beijing	Beijing[a]	2.3	0.6	2.9[b]
Jinnan	Shandong	..	..	2.6
Tianjin	Tianjin[a]	..	..	2.6
Changchun	Jilin	..	..	2.5
Harbin	Heilongjiang	1.9	0.5	2.4
Chongqing	Chongqing[a]	2.0	0.4	2.4
Langfang	Hebei	1.7	0.4	2.1
Shijiazhuang	Hebei	1.5	0.5	2.0
Xi'an	Shaanxi	1.6	0.4	2.0
Nanjing	Jiangsu	1.0	1.0	2.0
Guangzhou	Guangdong	0.9	0.7	1.6
Shenyang	Liaoning	1.4	0.2	1.6
Wuhan	Hubei	1.1	0.4	1.5
Wulumuqi	Xinjiang	1.2	0.3	1.5
Yinchuan	Gansu	..	..	1.2
Nanning	Guangxi	..	..	1.1

a) Centrally administered municipality.
b) Beijing water prices are due to rise to CNY 3.9.
Source: MOC.

However, user charges for *waste water services* still do not fully cover all operating and investment costs. More than 100 Chinese cities still have not levied charges on waste water treatment. And where charges are levied, the rate is relatively low, as low as CNY 0.1 (USD 0.0125) per cubic metre in some cities. To increase cost recovery and stimulate investment, it is now common practice to extend the charge to all users, not just those connected to a treatment plant. The charge has also been introduced in some cities with no treatment, to fund sewerage and the future establishment of treatment. NDRC, the Ministry of Construction (MOC) and SEPA have decided that central government funding will not be available for projects with a waste water tariff set at less than CNY 0.8 /m^3.

Pollution charges for industry

The *pollution levy system* (PLS) applies only to industrial sources and covers water discharges as well as air emissions, solid waste, noise and radioactive substances. Sources such as municipalities, hospitals and schools are exempt. From the outset, the PLS, initiated in 1978, was viewed as a means of implementing the polluter-pays principle and providing a (major) source of funding for provincial and local Environmental Protection Bureaus (NCEE, 2004). A key feature of the PLS is that 80% of the funds collected are returned to the enterprises for pollution control investments. Initially imposed on discharges exceeding the effluent standard, since 1993 the pollution charge has been extended to all discharges. The level of the charge was initially based on pollutant concentrations at the point of release, rather than mass or volume. In 1993 volume became a determinant.

While the PLS seems to have been *reasonably effective in reducing pollution*, other factors such as responsibility contracts signed by enterprise managers and local government officials as part of the five-year planning process may have been more important in determining the pollution intensity of industrial activity. The charge rate increase has been much lower than incremental pollution control costs, reducing its influence on polluting behaviour. As a result, the proportion of total charge revenue to the value of industrial output has decreased. The *coverage of the charge* is another issue. Many township and village enterprises are not levied because local Environmental Protection Bureaus do not have the resources to pursue all sources within their jurisdiction or find that the potential revenues from levying smaller sources do not justify the effort. Since such enterprises generally use less advanced technologies, one would expect them to be paying relatively more in pollution levies, not less than average. This suggests the desirability of increasing efforts to impose the pollution levy on a larger proportion of the township and village enterprises. Also, recycling a smaller share (e.g. one-half) of charge revenues for pollution control at the paying facilities should further increase the coverage of pollution control efforts. The

issuance of discharge permits on the basis of both national concentration standards and a total load allowance (calculated taking in consideration the assimilative capacity of the river) opens the way for trading of pollution allowances.

Phasing out farm input subsidies?

Production and distribution of *pesticides and fertilisers are subsidised by the government* as an incentive to achieve grain production targets. Price subsidies for fertilisers, chemicals and other farm inputs are estimated at CNY 10 billion (OECD, 2005). They have decreased from more than CNY 30 billion in 1998, when reference prices for fertilisers replaced administered prices, allowing some adjustment for fluctuations in production costs and market demand. However, the 11th FYP proposes to increase subsidies on fertilisers (and road diesel fuel) to promote higher productivity in agriculture.

Box 4.3 **The south-north water transfer mega-project**

Urban, industrial and agricultural development in the Northern China plain is increasingly restricted by the shortage of water. China is therefore undertaking a vast project to *transfer water from the abundant resources of the Yangtze basin* in Southern China. The project will be built along three routes, with the expectation that transfer flows will increase steadily between 2010 and 2020. Construction of the eastern and central routes commenced in 2003. Costs for the eastern route are estimated at around USD 7.5 billion and for the central route at USD 7 billion, plus as much as USD 3 billion for resettlement costs. The government is exploring domestic and international lending sources to fund the project, but expects to recover costs through increased water use charges.

The *eastern route* will lift water from the lower reaches of the Yangtze, then convey it 1 200 km north (to Tianjin). It will also supply the highly developed regions of Jiangsu and Shandong. By 2010, the scheme should be able to transfer some 9 billion m^3 of water per year, rising to 13 billion m^3 in 2020. Though new canals will be constructed, 90% of the route will be on existing canals (including the 1 500-year-old Grand Canal), on rivers and on lakes, which currently experience severe urban and industrial pollution with many stretches not reaching even the lowest of China's water quality objectives. Unless this issue is addressed, the water transferred will be almost unusable. For this reason, more than half of the investment for this route will be on cleaning up polluted watercourses and constructing 135 waste water treatment plants. The abstraction from the Yangtze will initially be around 400 m^3/s, rising to 700 m^3/s in later phases. This is a relatively small proportion of the annual minimum flows for this part of the Yangtze, which are more than 10 000 m^3/s. Water will also be taken from the Huai basin to produce a total transfer target of around 1000 m^3/s by 2020. Of this, about

400 m^3/s will cross north of the Yellow river and 180m^3/s will reach as far as Tianjin. Also, 75 major pumping stations (740 MW) will be required to lift water to the highest point of 40 metres above sea level at Dongping lake, near the Yellow river crossing. North of the Yellow river, flow will be by gravity.

The *central route* will take water primarily from a greatly enlarged Danjiangkou reservoir (Hubei province), and transfer it along 1 250 km of a new concrete-lined canal (routed to allow flow by gravity) from the canal head (at 147 metres elevation) to its end in Beijing (at 50 metres). A further 142 km of branch canal will transfer the water to Tianjin. Overall, this will mean crossing 219 rivers (including a complicated 7.2 km siphon tunnel under the main Yellow river channel), 44 railways and more than 500 highways. By 2020, *14.6 billion* m^3 of water each year will supply cities, industry and agriculture in Hubei (1.2), Henan (4.8) and Hebei (5.4) provinces, as well as in Beijing (1.6) and Tianjin (1.6).

The *western route* is even more ambitious but is still in the planning stage, with construction not expected to start until 2010 at the earliest. This route will attempt to lift water over the mountain ridges separating the upper tributaries of the Yangtze and on to the headwaters of the Yellow river. The project faces huge engineering challenges to construct 10 metre-diameter tunnels for hundreds of kilometres through the mountains at altitudes of over 4 000 metres. Dams of 250 metres or more are required to provide sufficient head for free flows through the tunnels. A staged high lift pumping station (1 380 MW) will make the final transfer to the Yellow river. The costs will be very high – around USD 37 billion – planned in phases over 20 years or more. This route will eventually provide up to *17 billion* m^3 of water transfer per year.

The construction of the south-north transfer scheme is associated to i) considerable *financial and social costs* (e.g. the relocation of 250 000 people for the expansion of the Danjiangkou reservoir) as well as environmental costs; and ii) to *potential benefits*: enhanced economic growth, reduced environmental pressures on current natural resources (e.g. allowing reductions of groundwater over-abstraction and the maintenance of "ecological flows" of rivers in areas of high abstraction).

3.3 Economic instruments

User charges for public water supply

The user charge for *water supply to households*, though much higher than in the past, still does not fully cover all operating and investment costs (Table 4.6). In Xi'an, for example, water supply is priced at CNY 1.6/m^3, against a full cost (including investments), estimated by the local Water Affairs Bureau, of CNY 5/m^3. Leakage levels in urban areas can be quite high, and leakage management techniques[9] are still underdeveloped. Payment defaults are high where the service is poor and intermittent,[10] forcing people to buy water from water seller's tankers or bottles. As an incentive to reduce water consumption, 17 provinces have begun to introduce an increasing-block schedule (i.e. conservation pricing) in the past five years.

Prices for *industrial supply* are typically higher. In the Langfang industrial development zone, for example, the price is CNY 3.6/m^3. Although construction sites are major water users, they are not charged until the project is completed, by which time the liable party is often no longer on site. Further raising water charges to industry would increase incentives to invest in much-needed modern water-saving and cleaner-production processes.

Around 70% of China's *rural population* have safe and accessible water supplies,[11] up from 60% in 1990. The other 30% have to carry water long distances or only have access to unprotected sources. However, even those with safe sources may lose their water supply during dry seasons. One target of the 11th FYP is for 100 million more rural people to be provided with safe water by 2010. New rural water supply schemes in China use water meters as a basis for charging users a fee – normally CNY 1 to 2/m^3, sometimes with a minimum charge of CNY 3/m^3 per month – payable to the village water committee which operates and maintains the infrastructure.

Abstraction charges and irrigation water pricing

From the 1950s to the 1970s, under collectivised agriculture, major investments were made in surface water-based irrigation systems to boost agricultural production. These *irrigation districts* could cover areas of tens of thousands of hectares. However, following agricultural reform and de-collectivisation in the late 1970s, the smaller, village-level organisations of farmers found it harder to raise the capital and co-ordinate the activities required to take over ownership and then to maintain or extend such systems. As a result, many systems have fallen into disrepair.

In their place, entrepreneurs have established *small companies* in co-ordination with the village governments that raise capital to sink wells, buy pumps and construct

low-pressure underground distribution pipe networks. Farmers then buy water from such an enterprise on a volumetric basis. *Private well supplies* are often more efficiently managed, as the water suppliers have direct incentives to maintain their assets. Farmers often prefer these sources as being more reliable than district irrigation schemes and offering greater control and autonomy. However, the rural electricity required to operate such systems is subsidised in order to protect farmer income.

This situation of rural water supply entrepreneurs has led to a system under which farmers could be directly paying a volumetric fee for their abstractions.[12] However, with a large number of small abstractions, monitoring, reporting and collection of *abstraction charges* are patchy. In fact, these abstraction charges (e.g. CNY 0.02 to 0.25/m^3) often end up being levied on the village as a whole and then recharged to the farmers bundled in with other local service charges many months later and often pro-rated by land area, thereby breaking the link between water use and charge. This introduces a free-rider incentive for both the well operator (who is not responsible for the sustainability of the common aquifer but only for his own infrastructure assets) and the farmer, who can benefit by taking more than his share of the commonly administered water supply to boost yields while sharing out the additional costs. Collection of abstraction charges and the allocation of water rights are currently being reformed, pursuant to the 2002 Water Law.

With the abolition of agricultural taxes in 2005 (Chapter 7), China now has greater flexibility to implement more effective irrigation pricing. In most remaining irrigation districts, fees charged to farmers are much less than the cost of providing the water. Most irrigation supplies are not metered and management systems are vulnerable to abuse of commons, with those who take more than their share benefiting without sanction. *Water user associations* are being established more widely, pursuant to the 2002 Water Law. These take ownership of the assets and are responsible for setting and collecting user charges for irrigation water. Prices for irrigation water are likely to be much higher than past arrangements.

Water rights

China has started to develop a mechanism to allocate water rights in each river basin. *Provincial water quotas* are calculated and a minimum environmental flow is protected. Provinces can subsequently allocate water rights to different areas and water users. In addition, a "water consumption index system" will be established to measure and enhance water saving by irrigation systems and industry. Many pilots of water rights management schemes are being undertaken around China, with notable success by the Yellow River Basin Authority and the Tarim Basin Authority. In the past, over-exploitation of the Yellow river was so extreme that by 1997 it did not flow

to the sea on 226 days out of the year.[13] Water rights management (and water transfer tunnels and storage reservoirs) have resulted in the Yellow river maintaining its flow and not running dry for six years. Similarly, following successful implementation of water quotas (and water-saving agricultural methods), the 363-km lower section of the Tarim river and the Hei river are now flowing again, after 20 years of being dry due to over-abstraction in the upper reaches. Further pilots are being disseminated through the Water Resources Demand Management Assistance Project, led by the Ministry of Water Resources.

However, provincial water quotas do not always take account of the "*governor's grain bag policy*" to maintain high level (95%) of self-sufficiency in grain production at national, provincial and regional levels. This policy, introduced in 1995 and retained under the 2004 regulation on grain marketing, makes it difficult to produce the crops that are best suited to local land and water resource characteristics. It responds to government objectives of food security, national security, social stability and macroeconomic stability rather than sustainable water resource management.

2.4 Expenditure, financing and charges

Overall investment and operational waste management expenditure at all levels were estimated at CNY 30 billion in 2005 (World Bank, 2005), *i.e.* the equivalent of USD 10 per capita or four times that amount in terms of purchasing power parity. Investment in waste treatment facilities programmed in the 9th and 10th FYPs amounted to CNY 50 billion and CNY 90 billion, respectively, representing around 11% and 10% of total environmental investment (Chapter 7). Assuming that operational expenditure reflects the same proportionality, it also is a much smaller share of total pollution abatement and control (PAC) expenditure than is common in the OECD area.[16] No disaggregated figures are available for investment in waste management by private industry or on operational expenditure on waste management in either the public or private sector.

Many provinces and municipalities, notably in the poorer parts of the country, have difficulty *financing* the local share (i.e. 30%) of the required investments, partly because they find it hard to actually collect the waste charges payable by households. In some municipalities, e.g. Beijing, the collection rate is as low as 10%; in others it is much higher, e.g. in Xi'an in Shaanxi province the collection rate is 80%. Increasing fee recovery rates in the longer term will therefore be necessary to at least cover operational costs, but in the meantime investment subsidies from the national

government would be appropriate in order to improve the standard of waste management over a reasonable time frame.

The structure of *waste management charges* for households and industry is quite complex, but the overall level is probably too low to cover the actual cost of proper treatment; for example, in Xi'an and Nanjing (Jiangsu province) the charges amount to CNY 6 (EUR 0.63) and CNY 5, respectively, per household per month. Moreover, in many cases the waste charges are subsumed in the water or gas bill, so that householders have little idea about the cost of waste management. Progressive introduction of a volume-based charge for all waste generators (including households) should aim at both implementing the polluter pays principle and reducing the material intensity of the economy.

SEPA is currently investigating the feasibility of various *deposit-refund systems*, but so far there are only some informal systems in Shanghai. Limited use has been made to date of product charges, but a 5% tax on wooden floor panels and disposable wooden chopsticks went into effect in April 2006 (Box 5.2). The potential of this instrument should be further explored, in particular in relation to packaging and hazardous items (e.g. batteries,[17] used oil, tyres). The Chinese system of pilot testing new policy measures in a limited number of places before nationwide adoption is well suited to developing solutions that fit the Chinese situation.

Box 6.1 **Protecting the giant panda: a success story**

Protection of the giant panda, listed as an *endangered species*, is a successful example of both species and habitat conservation. Giant pandas live in the temperate forests of the Upper Yangtze, at the elevation of 1 200-3 400 metres. Despite having a digestive system more suited to a carnivorous diet (pandas are classified as bears), they subsist primarily on *bamboo* (10 to 40 kg of bamboo a day per adult panda). In the mid-1970s and mid-1980s, hundreds of pandas died during the large and cyclical bamboo die-offs (138 carcasses were found during the earlier period, 250 during the later). Fortunately many pandas were rescued and transferred to appropriate reserves.

While logging and poaching have declined following China's rural exodus and the 1998 ban on logging in natural forests, panda watching has become a major threat. *Tourism is also exerting increasing pressure* on giant pandas' habitat. Habitat loss attributed to tourist visits has sometimes occurred at high rates within protected areas.

China has been *very proactive in establishing nature reserves for pandas*. It is estimated that China has *between 1 600 and 3 000 wild pandas*, mostly in Sichuan, Shaanxi and Gansu provinces. The first four nature reserves were established in 1963, and China now has 56 panda reserves, including the recently designated World Heritage Site in Sichuan: the "Giant Panda Sanctuaries", home to 300 pandas, covers 9 500 km^2, protecting 45% of the habitat and 60% of the panda population in Sichuan. However, an urgent issue is to better protect pandas outside protected areas (e.g. only 20% of the 2 700 km^2 panda habitat in Sichuan's Pingwu county is protected). In particular, there is a need to create more migration corridors to allow pandas to change elevations seasonally to meet their dietary and reproductive needs. *Close co-operation with the World Wide Fund for Nature* (WWF) has been established, including monitoring activities and an agreement between WWF and the Shaanxi Forestry Department to establish 13 new reserves and create the first habitat corridors in the Qinling mountains (2002).

Giant pandas have been *successfully raised in captivity* (e.g. in the Shaanxi Rare Wild Animals Rescuing and Raising Research Centre). China has 184 captive breeding pandas, including 16 babies born in 2006 in the Wolong Giant Panda Reserve Centre, all of which survived. The dramatic decrease in the baby panda mortality rate (from 100% to 0%) is the result of accumulated experience which has led, for example, to replacing dog milk with high-fat milk and sharing twin babies between the mother and human care-takers (as female pandas often abandon one of the twins). In April 2006, a giant panda raised in captivity was released for the first time into the wilderness, by the Wolong Centre.

The *cost of protecting pandas* in nature reserves is much less than that of raising them in captivity; the difference is on the order of USD 10 000 versus USD 600 000 for one animal during its lifespan. Moreover, tourists' willingness to pay to see pandas in nature reserves is much higher than the cost of operating a reserve (USD 57 million *versus* USD 250 000 in the Wolong Panda Reserve). *Innovative funding mechanisms* have been established to help fund conservation projects in China. For instance, zoo operators abroad must pay USD 2 million to *rent a Chinese panda* for a year. People who want to *name a panda* are charged USD 4 900 for a year or USD 37 000 for the panda's life. Raising pandas in captivity would not be possible without private donations, which currently finance half of the expenditure for the 184 captive pandas.

2.3 *Invasive alien species*

Alien species are *widespread throughout China*,[6] and are found in many ecosystems. Examples include ragweed, water hyacinth and Amazon snails (Xie, 2001). They have either been intentionally introduced for commercial purposes or, as is often the case, have become established incidentally through trade and immigration (Liu, 2005). Damage to the Chinese economy (mainly to agriculture) caused by alien species has been estimated at USD 14.6 billion, or 1.3% of GDP (SEPA, 2005). With increasing trade and transportation comes the increased chance for foreign species to spread and cause long-term ecosystem damage. Freshwater fisheries (aquaculture) and the lawn grass sector have been identified as having a high potential for future risk.

Most of China's protected areas, including the national areas, are managed and funded at the provincial, municipal or county level. The central government provides only *limited financial support* for nature conservation. In 2000, public expenditure (both investment and current) for national protected areas was estimated at only USD 1.13/hectare, and at USD 0.53/hectare for other (local) protected areas (Han, 2000). In a few cases, economic incentives have been granted to residents who agree to move out of the protected area with a view to enhancing biodiversity protection (e.g. to protect giant pandas in the Wolong Nature Reserve). But the protected areas designated at the municipal and county level are inadequately funded (Xie, 2004), which often leads the reserve staff to exploit "protected" resources for economic gain. It is estimated that 80% of the agencies that manage China's nature reserves have engaged in profit-oriented activities, with considerable damage to "protected" areas (Jim, 2003).

Protecting natural forests

China launched major forest programmes in the mid-1990s to protect river catchments and, in particular to rehabilitate the forest ecosystems in the Yangtze and Pearl river deltas, along the Liao river valley, and in the middle reaches of the Yellow river (loess plateau). To benefit from the soil and water conservation functions provided by forests, it was decided to ban logging in natural forests and to limit harvesting in severely degraded watersheds. The *Natural Forest Protection Programme* (NFPP), initiated in 1998, introduced a total ban on logging in the upper Yangtze river basin and mid-to-upper Yellow river basin, and reduced logging in state-owned forests.[15] According to an SFA review of the NFPP in 2003, the logging ban was extended to 27 million hectares of collective forests,[16] accounting for 30% of all collective forests in China, with no compensation for economic losses. The NFPP has also funded the reforestation of 14.6 million hectares of forest and grassland since 2000, and has helped pay the pensions of retired employees of state forestry enterprises,[17] for which it has been allocated an annual budget of USD 1.2 billion (80% from state funds, 20% from local funds). NFPP funds have also been used to help resettle 502 000 loggers away from state-owned forests.

Turning marginal cropland into forests

Another key measure that uses the soil and water conservation functions of forests, the "grain for green" or Sloping Land Conversion programme, has promoted farm forestry in hilly agricultural areas (gradient of 25% or above). After a pilot phase in Gansu and Sichuan in 1999, the *programme* was broadened to 20 provinces by 2001. The basic idea is to convert cropland on steep slopes prone to erosion to forestland and grassland, "compensating" farmers annually with 100-150 kilograms of grain and CNY 20 in cash for each mu[18] retired. Compensation is granted for two years for land returned to pasture, for five years for land converted to "economic forests" and for eight years for land converted to "protection forests". The programme's costs are borne mainly by the central government; in 2003 they involved annual budgetary transfers of around CNY 15 billion and comprised 20% of the government's total agricultural support payments to Chinese farmers[19] (OECD, 2005). More than 16 million hectares of cropland have been converted under this programme. While Chinese law prohibits converting (designated) forestland to any other type of land use, measures should be taken to avoid the return of such "farm forests" to cultivation when the payments cease. Such measures could include payments for ecosystem services.

4.3 *Payments for ecosystem services*

While one of the main (publicised) achievements of the six key forestry initiatives has been extensive afforestation,[22] new emphasis has been given to providing economic incentives as "compensation" for local communities to maintain and improve existing forests. In 2000, new regulations under the Forest Law suggested that 30% of forests be "set aside for public benefit", although there was no legal obligation for provinces to comply. A *forest ecosystem compensation programme* (FECP), set up to support the objective,[23] has so far been implemented on 13 million hectares, mostly (64%) collective forestland, spread over 11 provinces, mostly in the east of China.[24] In many other provinces, forestry bureaus have identified areas of "public benefit", jockeying for inclusion in the programme.

However, participation rate in the FECP remains low, particularly in collective forest areas. With an annual budget of USD 121 million, the programme can only provide an *average level of compensation* of USD 9 per hectare, often less than foregone income from forest management (Miao, 2004). More generally, the cost of inaction is much larger than total government outlays for environmental protection. China's total economic loss resulting from conversion of natural ecosystems has been estimated at 2% of GDP and losses due to deforestation at 12% of GDP (Smil, 1998).

The FECP lacks *clear environmental objectives* for soil and water conservation, biodiversity protection, carbon sequestration, recreation, and provision of non-wood products (Sun, 2002). It would be more cost efficient (and probably more environmentally effective) to pay forest owners (or contractors) for the provision of environmental services, thereby applying the beneficiary-pays principle (e.g. water companies could reduce their cost of purifying water by paying forest owners for protecting drinking water sources).

China could, as appropriate, authorise the seeking of economic returns without compromising the provision of ecological services, in the context of (certified) *sustainable forest management*. Reducing the tax burden on forestry would increase the incentives for sustainable forest management, particularly in collective forests. One positive development was the abolition, in January 2006, of the tax (introduced in 1983) on "special agricultural products", which applied to harvested timber[25] (at a rate of 8%). However, forest owners must still contribute to local social welfare funds as well as paying various provincial charges specific to forest management.[26] Such

fees and charges are often determined arbitrarily by local authorities (Tian, 2003), thereby encouraging illegal logging or the selling of (low-value added) fuel wood. Charges and fees should be designed in a transparent way, and rates set to cover the costs of providing services to forest owners (e.g. pest control, fire protection) or as part of social policy.

5.2 Regional level

At the regional level, habitat protection and wildlife conservation issues have been discussed within the framework of the *Tripartite Environment Ministers Meeting*[27] (TEMM) and "10 + 3" forums (also involving the Association of Southeast Asian Nations[28]), and constitute components of the regional seas action plans for China's offshore waters. In 2003 a Senior Ministers meeting within the North-East Asia Sub-regional Programme on Environment Co-operation[29] (NEASPEC) approved new collaborative work in the region on nature conservation (e.g. conservation and recovery of large mammals and threatened species; conservation, monitoring and co-operative research on important migratory species). The initial effort is focussing on development of a sub-regional action plan for the conservation of threatened large feline mammals and migratory birds. Chinese experts are also participating in a new regional initiative involving 15 countries, to maintain wetlands in the Himalayan Tibetan plateau.

China has also joined with *Vietnam, Laos, Cambodia, Myanmar and Thailand* to launch a biodiversity protection corridor programme under the larger programme of environmental co-operation in the Greater Mekong sub-region. China's plans to *erect a series of dams on the upper reaches of the Mekong river* for flood control, electricity and barge traffic could complicate future environmental co-operation. China's downstream neighbours are already expressing concerns about altered water flows, suggesting the need for early consultation, information sharing and negotiation.

The Tumen river forms a boundary for China, Russia and North Korea, with implications for Mongolia and the Republic of Korea. Degradation of the watershed led the three boundary countries to jointly develop the *Tumen river basin environmental preservation project*, implemented as a sub-project of the environmental segment of the UNDP Tumen Area development project, which began in 1995. In 2002 the three governments signed a strategic action plan covering 2002-12, which is being implemented with UNDP funding of USD 5.2 million from the GEF. Since 2003, a GEF-sponsored Yellow sea large scale marine ecosystem project has engaged experts from China and the Republic of Korea in exploring strategies to better protect the Yellow sea's exceptional biodiversity.

Box 7.1 **Environmental impacts of WTO accession: an assessment by the CCICED**

Agriculture. The impact could be positive if increased trade liberalisation shifted production from products requiring high levels of land, water and chemical inputs to more labour-intensive products. This shift should be supported by measures to reduce subsidies for chemical inputs, increase support for advisory services, disseminate information about foreign environmental requirements for agricultural products, and strengthen domestic standards.

Forestry. Timber imports are projected to increase five-fold from 1995 to 2010, in part to support the production of wood products, notably furniture, for export. While this may have a beneficial impact on Chinese forests, particularly if accompanied by improved forest management, it may also contribute to unsustainable forestry practices in supply countries in Asia and beyond. China should consider reducing escalating tariffs on finished wood products, and should strengthen its international co-operation to combat illegal logging and to promote sustainable forestry throughout the entire product chain.

Aquaculture. WTO accession has accompanied a sharp rise in aquaculture exports whose volume currently is roughly equivalent to China's net imports of agricultural products. Environmental problems have been exacerbated by this trend (e.g. nutrient and chemical pollution, substrate eutrophication and red tides). However, these costs could be outweighed by the economic and environmental benefits if appropriate policies are put in place that aim to: ensure high product standards, strengthen control of land-based marine pollution, manage resources effectively to optimise the quality and quantity of products produced, disseminate information, provide technical support, and participate in international activities related to standards for aquaculture.

Automobiles. WTO accession has had a dramatic impact on automobile sales by reducing tariffs and duties and hence price, thereby boosting demand. Despite the potentially adverse environmental impacts, this creates a window of opportunity to enhance the environmental performance of cars by reducing emission levels and increasing fuel efficiency without increasing their aggregate price. A variety of other measures are needed to minimise the environmental impacts associated with the sharply rising numbers of cars, such as promoting the development of cleaner technologies, developing public transport and applying environmental taxes to automobile use.

Energy. Trade liberalisation has further stimulated economic growth and demand for energy. From a trade perspective this has increased demand for oil and increased dependency on foreign imports. This trend has been somewhat off-set by an increase in world energy prices. Nevertheless, integrating environment into energy policy is a major challenge that will require an appropriate mix of regulatory and economic instruments, as well as the application of cleaner technologies.

Textiles. WTO accession, and the intention of WTO members to end quota restrictions on Chinese textiles, would sharply stimulate textile production. While some environmental benefits will derive from technology transfer, the overall environmental impact is expected to be negative unless appropriate policies are put in place. Energy and water consumption in the sector were predicted to double by 2010 and waste water discharge to increase by 60% specifically because of increased trade, assuming quota restrictions ended in 2005. Waste water treatment is the biggest challenge because of the toxic nature of waste products and the large number of dispersed small and medium-sized textile producers.

Source: CCICED (2004).

Sectoral subsidies

Agriculture support in China is relatively low, totalling 7% of gross farm receipts between 2000 and 2003 (OECD, 2005b). This was much lower than the OECD average (31%), and far below support levels in Japan (58%) and in the Republic of Korea (64%). Nevertheless, the cost to the Chinese economy is high as it represented 3.8% of GDP in 2003. This is much higher than the OECD average, and is among the highest for major agricultural producers world-wide. *Support to producers* is mostly provided in the form of market price support and input subsidies, which tend to be the most trade distorting and environmentally damaging forms of agricultural support, as well as providing the lowest income transfer to farmers. VAT is levied on fertilisers and pesticides at the reduced rate of 13% rather than the standard 17%. The prices of these products are also indirectly subsidised by administrative measures and low electricity charges. *Agriculture accounts for more than 70% of water consumption in*

China. Irrigation water is under-priced, which contributes to its inefficient use. Currently only about 45% of the water flowing through China's irrigation systems is effectively used. This compounds China's water scarcity.

Energy prices, notably for products and coal have been increasingly market-based since the deregulation of prices in 1993. By 1996, two-thirds of coal was priced by the market. As a result, coal prices have risen significantly. Annual government-organised coal meetings and fairs bring together suppliers and consumers to agree upon prices, transport and customer allocation. The increase in coal prices has generated conflicts with the electricity sector, where prices are still largely controlled by the NDRC. Ongoing reforms in the energy and power sectors aim to increase efficiency and lower prices by increasing competition among generators.

Oil prices are currently set by the government. Rising international oil prices in 2005 heightened awareness of the country's dependence on oil imports. Nevertheless, domestic oil prices have lagged behind international price rises in the most parts of the country. There are subsidies on oil products. Increases in retail prices were allowed to fall behind increases in crude oil costs to soften the impact of rising oil prices on producers. The gap between the costs for crude oil and receipts for crude products has resulted in losses to oil refineries amounting to CNY 4.19 billion.

Transportation is the fastest growing economic sector in China, generating increasing levels of air pollution and demanding more land. Road construction was prioritised in the review period. China has established a system of road fees, overseen by the Ministry of Construction and local governments, which are used for maintenance and construction. Highways, including new expressways, are generating significant revenues from tolls, and this has created opportunities for the private sector to play an increasingly important role in highway construction. Nevertheless, highway construction has so far largely relied on public spending, which rose to USD 25 billion annually in 1998 and 1999 through a combination of direct government loans and grants to implementing agencies at the provincial level. Road fuel prices and taxes are low by international standards, suggesting there is *scope to internalise environmental externalities* associated with road construction (Figure 7.2).

Environment-related taxes

China has a number environment-related taxes (Table 7.2). In the category of *consumption taxes*, unleaded gasoline is taxed at a lower rate than leaded gasoline, and diesel is taxed at half the rate of unleaded fuel. A registration tax is levied on the sale of motor vehicles, motorcycles and motor cars. Road motor vehicles that meet stipulated low-pollution standards are exempt from 30% of the excise tax. A tax is

Table 7.2 **Environment-related taxes**

Tax	Taxable item	Tax rate (amount per unit)	Revenue 2002[a]
Fuel-related consumption tax	Gasoline		191.87
	unleaded	0.20 CNY/litre	
	leaded	0.28 CNY/litre	
	Diesel	0.1 CNY/litre	
Transport-related consumption tax	Motor vehicle tyres	10%	93.95
	Motorcycles	10%	
	Motor cars	8%, 5%, 3%	
Vehicle and vessel usage tax	Vehicle		28.93
	passenger vehicle	60-320/passenger vehicle	
	cargo vehicle	16-60/tonne	
	motorcycle	32-80/motor cycle	
	non-motorised vehicle	1.2-32/non motorised vehicle	
	Vessel		
	motorised vessel	1.2-5/net tonne	
	non motorised vessel	0.6-1.4/net tonne	
Resource tax	Crude oil	8-30 CNY/tonne	75.08
	Natural gas	2-15 CNY/100 m^3	
	Coal	0.3-5 CNY/tonne	
	Other non-metal resources	0.5-20/tonne or m^3	
	Ferrous metal ores	2-30 CNY/tonne	
	Non-ferrous metal ores	0.4-30 CNY/tonne	
	Salt		
	solid salt	10-60 CNY/tonne	
	liquid salt	2-10 CNY/tonne	
Urban and township land-use tax	Large cities	0.5-10.00/m^2	76.83
	Medium-sized cities	0.4-8.00/m^2	
	Small cities	0.3-6.00/m^2	
	Mining districts	0.2-4.00/m^2	
Farmland occupation tax	1 mu[b] or less of farmland/person	2-10 CNY/m^2	57.33
	1-2 mu[b] farmland/person	1.6-8 CNY/m^2	
	2-3 mu[b] farmland/person	1.3-6.5 CNY/m^2	
	> 3 mu[b] farmland/person	1-5 CNY/m^2	
City maintenance and construction tax	City area	7%	470.82
	Country and township area	5%	
	Other area	1%	
Pollution and water charges[c]	n.a.	n.a.	84.74
Total revenue	n.a.	n.a.	608.73
% of total taxation[d]	n.a.	n.a.	*3.34*

a) In hundreds of millions of CNY.
b) 15 mu = 1 ha.
c) Not a tax per se.
d) Including pollution and water charges.
Source: CCICED, Task Force on Environmental and Natural Resources Pricing and Taxation.

applied to road motor vehicles and vessels. A pro-rata tax is applied to the extraction of oil, gas, coal, metals and salt. Land use taxes are applied in urban and rural areas, as well as a city maintenance and construction tax. These revenues contribute to investments in urban infrastructure.

In March 2006, several *additional environment-related taxes* were introduced. A differentiated tax for motor vehicles was introduced according to engine size. The tax on vehicles with engines larger than 2 litres was increased to between 9 and 20%, while the tax on vehicles with engines smaller than 1.5 litres was reduced to 3%; the tax on vehicles with engines between 1.5 and 2 litres remained at 5%. A 5% consumption tax was introduced for disposable wooden chopsticks and for wood floor panels. The scope for oil products subject to taxation was also broadened (CCICED, 2005).

In the last two decades, China has implemented *fundamental tax reforms*. While there is no pressure to increase taxes for budgetary reasons, the transition to a more market-based economy suggests that further reforms will be needed so that the tax structure causes fewer distortions and is more economically efficient. Adjusting environment-related taxes could support this objective while also helping to achieve environmental objectives. They could be imposed in a revenue-neutral way by off-setting increases in environment-related taxes with decreases in other taxes that cause distortions, such as those related to production.

In OECD countries, transport fuels and motor vehicles often account, respectively, for about two-thirds and one-quarter of revenues generated by environment-related taxes. In China they account for one-third and one-sixth. In addition, environment-related taxes account for about 3% of China's total tax revenues, which is low compared to OECD countries. Moreover, the price of road fuel in China is low by international standards (Figure 7.2). This suggests there is *scope for increasing environment-related taxes in China, particularly on transport fuels*. China might follow the approach used in a number of other countries and establish a "*green tax*" *commission*, i.e. a high-level inter-ministerial group, to analyse options and make recommendations. Such a group would also need to examine the potentially adverse impact of environment-related taxes on poorer parts of the population, particularly in the rural sector.

1.5 Environmental expenditure

PAC investment expenditure

In the period 1996-2000, *environmental investment expenditure* in China averaged 0.8% of GDP, reaching 1.1% in 2000. Between 2001 and 2005 it continued to grow, reaching 1.4% of GDP in 2004 (CNY 191 billion) and surpassing the 1.3%

target set in the 10th FYP.[8] This increase, combined with the increase in the GDP itself, means that environmental investment expenditure in China more than doubled over the period 1999-2005 (Table 7.3).

However, these percentages need to be revised downward in light of the January 2006 adjustment of GDP. So in 2004, environmental investment expenditure in China represented *1.2% of the revised GDP* using the Chinese definition.[9] The pollution abatement and control (PAC) investment expenditure are estimated here to represent in 2004 some *0.6% of the revised GDP*.

In 2004, *investments related to urban environmental infrastructure* accounted for about 60% of environmental investment (using the Chinese definition), or CNY 114 billion. Between 1999 and 2004, investments in urban environmental infrastructure increased by 117% at constant prices (Table 7.3). This mainly reflects investment in waste water treatment and waste management infrastructure, in the context of rapid urbanisation.

Table 7.3 **Environmental investment expenditure,**[a] 1999-2004

(billion CNY)

	1999	2000	2001	2002	2003	2004[d]	2004[e]
Total	83	102	111	137	162	191	191
of which:							
Urban environmental infrastructure[b]	48	52	60	79	107	114	114
Industrial pollution treatment	15	24	17	19	22	31	31
Pollution abatement through "3S" projects[c]	19	26	34	39	33	46	46
Total as % of GDP	*1.0*[d]	*1.1*[d]	*1.1*[d]	*1.3*[d]	*1.4*[d]	*1.4*[d]	*1.2*[e]
Total as % of GFCF	*2.8*	*3.1*	*3.0*	*3.1*	*2.9*	*2.7*	..

a) Using Chinese definition of "environmental investment expenditure". Measured at current prices. Includes (as opposed to OECD PAC expenditure definition) elements such as investment expenditure in energy efficiency, in fuel switching and in urban amenities.
b) Includes activities related to: household sewerage and sewage treatment plants, collection and disposal of household waste, central heating facilities and landscaping.
c) Refers to "3S" investment schemes for industrial pollution control covering new equipment, adaptation and technical improvement measures.
d) Using GDP figures from NBSC, prior to the January 2006 adjustment of GDP.
e) Using GDP figures following the January 2006 adjustment.

Source: SEPA, NBSC.

In 2004, *investments in industrial pollution abatement and control* accounted for 40% of environmental investment (using the Chinese definition), or CNY 77 billion, more than doubling over 1999-2004 at current prices (Table 7.3). National environmental projects (e.g. projects implemented within the framework of the "three simultaneities" programme) represented about 25% of total environmental investment. This largely reflects industrial investment in energy efficiency, air pollution abatement and waste water treatment, in the context of rapid economic growth.

Over the period 2001-05 (corresponding to the 10th FYP), environmental investment expenditure in China was *allocated to air (40%), water (38.5%) and waste (12.9%)*, and was financed by both public funding sources (57%) and private funding sources (43%).

PAC total expenditure

PAC current expenditure represented 0.3% of GDP (i.e. more than CNY 50 billion) in 2004. Over the years, it has grown slowly following the cumulated growth of PAC investment. It seems to vary within the country, as some facilities simply are not operated due to lack of funds for operation and maintenance. Information on environmental expenditure should be collected using international standards; this could encourage more emphasis on efficiency.

PAC total expenditure (i.e. both investment and current expenditure, using the OECD definition) are here estimated at *0.9% of the revised GDP in 2004*. This is low for a country in transition with major pollution challenges.

For the *period 2006-10*, Chinese authorities have announced that CNY 1 400 billion (or USD 175 billion), or about 1.5% of GDP (i.e. of the expected GDP for the period), will be spent for environmental investment (i.e. investment by different levels of government and by the private sector), addressing mainly air and water pollution and waste management. This may not be sufficient to respond to the government's stated environmental objectives.

Financing expenditure

To achieve China's environmental objectives, and capture related economic, health and social benefits, *it will be a challenge to continue to increasing the environmental share of public expenditure at the same rate* (Box 7.2). China will have to diversify its sources of finance for the environment and increase the *efficiency* with which they are used. The use of environmental funds, during a transition period, might be considered for specific environmental priorities.

Diversifying sources will imply a fuller implementation of the polluter and user pays principles. More systematic implementation of environmental policies should induce enterprises to invest more heavily in pollution prevention and control. Consumers in the richer provinces are increasingly willing and able to pay for environment-related infrastructure. Public authorities, however, will have a continued role to play in supporting capital investments and in ensuring that the populations in poorer provinces have adequate access to environment-related services. More equitable arrangements for sharing investment costs between richer downstream and poorer upstream provinces ("eco-compensation") are also needed.[10]

China should also try to obtain increased funding from international sources. International financial assistance provided with environmental expenditure about CNY 4 billion in 2004 (largely but not only for pollution abatement and control) in grants and loans (Chapter 9). This represented less than *2% of PAC total expenditure in China*. This is not high, in light of the potential benefits that could result from environmental investments in China, for both China and the international community. FDI could also add to ODA sources of funding.

Box 7.2 **Financing public infrastructure: co-operation between central and local governments**

Local governments are generally responsible for projects within their boundaries. Full central government financing is not uncommon in the poorer western regions. Local governments are not authorised to incur debt to finance investments, so they have been largely dependent on transfers from central government. However, *sub-national credit* has grown rapidly in recent years, mostly in the form of national bonds and bank loans: the central government has raised revenues for infrastructure construction by issuing national bonds, and allocates them to local governments in the form of grants and loans. Policy banks, such as the China Development Bank, have also played an important role in financing urban environmental infrastructure, particularly in the central and western regions. Commercial banks have played a much smaller role.

Capital spending in China has been growing at the rate of 20% in recent years. Public investment in water (including dams and water transfer infrastructure) and environment accounted for about *25% of government capital spending* in 2003, with much of it concentrated on three rivers (the Hai, Huai and Liao) and three lakes (Dianchi, Chao and Tai).

However, *efficiency in public investment* in infrastructure could be enhanced. Many public infrastructure projects are not completed, not put into operation, or are operated inefficiently, particularly those financed by bonds. Different agencies are responsible for capital and current expenditures. NDRC is responsible for investment expenditure, particularly investment expenditure identified in the FYPs, and the Ministry of Finance is responsible for current expenditure. Co-ordination between these two types of expenditures is not adequate, and the success of projects is further impeded by a third agency having responsibility for allocating personnel. Local governments have incentives to promote high profile projects even if their economic returns are questionable.

In recent years China has experimented with *build-operate-transfer* schemes (Chapter 4). However, the participation of the private sector will not guarantee more efficient public capital spending. Rather, governments, particularly those at local level, should be held accountable for ensuring that projects have an adequate ex ante rate of return and are implemented in a cost-effective fashion. Ultimately there needs to be a better correspondence between expenditure and revenue-raising responsibilities at the local level.

Source: OECD (2006b).

2.4 *Economic instruments*

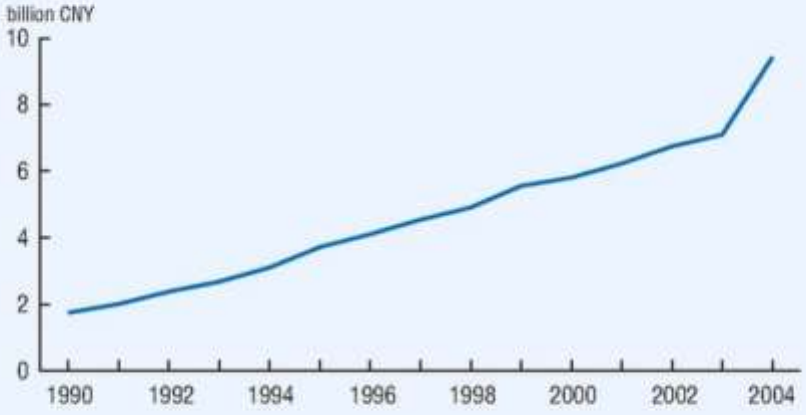
China uses a *range of economic instruments* as part of its environmental policies. Pollution charges have been used for over twenty years and produce significant financial resources. Other instruments such as user charges, tradable permits and deposit-refund systems have also been applied (OECD, 1997). The legal framework fully recognises their importance.

Pollution charges

The legal basis for China's *pollution levy system* was established in the 1989 Environmental Protection Law and in the laws on air, water, waste and noise. Originally, only discharges that exceeded pollution concentration standards were subject to a charge. In 2003, the State Council promulgated an ordinance on collecting and managing the pollution discharge fee, which directed revenues to the Ministry of Finance or the Department of Finance at the sub-national level. The ordinance bases the pollution charge on the concentration and volume of the pollutant, irrespective of national standards. Polluters have a 20-day grace period to pay the monthly or quarterly charge. In addition to paying fees for pollutants exceeding standards, enterprises violating payment requirements may have to pay four other kinds of penalty charges, referred to as "four small pieces".[20]

In 2004, the total revenue from the pollution levy system was CNY 9.42 billion, collected from nearly 740 000 enterprises (Figure 7.4).[21] This is equivalent to 5% of China's total PAC investment expenditure. However, the *full incentive effect* could be enhanced by applying higher rates and some adjustments to the system. Polluters are required to report increased discharges, and rebates are possible when pollution reductions are verified. Although the EPBs issue notices of discharge fees, the amount is usually negotiated rather than calculated using formulas detailed in regulations. The charge can be reduced or even eliminated at the discretion of local regulators after appropriate inspections. The charge may also be postponed if the polluter cannot afford to pay it, although reductions or exemptions are not allowed in such cases. Such discretion introduces considerable variation in regional enforcement practices, which would be more effective if harmonised. Moreover, pollution charges are still significantly *lower than the cost of pollution reduction*, despite recent rate increases. For example, SO_2 rates were increased from CNY 0.21/kg to CNY 0.42/kg

Figure 7.4 **Revenue collected under the pollution levy system,**[a] 1990-2004



a) Based on charges applying to industrial sources and levied on water discharges as well as air emissions,solid waste, noise and radioactive substances.

Source: SEPA.

in 2004 and to CNY 0.63/kg in 2005. A new charge of CNY 0.6/kg of NO_x was introduced in 2005. The fee collection rate is still low, estimated to bring in, on average, 50% of the charges imposed (varying between 10% in Western provinces to 80% in coastal areas).

Of the total *revenue produced by the pollution levy system*, 10% goes to the central government and 90% remains at the local level. Since 2003, the revenue from collected charges has been transferred to the ministry or departments of finance. The resources are still earmarked for environmental improvement, but they are no longer used to defray the running expenses of the inspection agency. Instead, they may be used for general environmental protection, the purchase of monitoring equipment, or new technology. The funds are redistributed (in the form of grants or soft loans) for pollution control projects. SEPA and the Ministry of Finance allocate these funds on the basis of proposals provided by the provinces.

User charges

User charges have been gradually applied on household and industry use of environmental services and natural resources. For environmental services, the charges are usually limited to operating costs and do not cover capital investment.

In Langfang, the *price of water for farmers* using their own wells is CNY 0.30/m^3; in Nanjing it is CNY 0.13/m^3. The *price of water* for industrial production in

Northern China, including treatment and transport, amounts to CNY 5/m^3. The price for water for industrial purposes in Xi'an is CNY 2.4/m^3 and does not include taking water from the reservoirs, transporting it over 80 km and purifying it, which costs an estimated additional CNY 1.5/m^3. The estimates assess the true cost close to CNY 12/m^3. However, there is much opportunity for on-site recycling of water. *Charges for household water use* is around CNY 2/m^3, ranging from CNY 2.1/m^3 in Langfang (which includes CNY 0.40 for sewage disposal) to CNY 1.95/m^3 in Xi'an (of which CNY 0.35 is for waste water treatment). In Langfang, the use of water in all households is metered. Water prices depend on social factors, although the price structure is not progressive as yet. There are public hearings when prices are set.

In China, a *waste water treatment charge* is paid by all customers connected to a centralised water supply system, often irrespective of whether their waste water is being collected and treated. Development planning commissions at the city level play a role in setting tariffs for projects financed by central government transfers. Waste water charges vary from CNY 0.9/m^3 in Beijing and Shanghai, to CNY 0.7/m^3 in Guangzhou, CNY 0.5/m^3 in Xi'an, and as low as CNY 0.12/m^3 in some cities in Sichuan province. Some households are also charged a sewage network fee; this may amount to CNY 0.15/t in Jilin, but in most cases there are no separate sewerage charges, as users' waste water charges are also expected to cover the costs of waste water collection. The enterprise responsible for water supply collects charges for waste water treatment.[22] However, many cities do not levy charges for waste water treatment services, and even if such a charge is in place, the revenues still fall far short of what is needed to cover even basic operation and maintenance of waste water collection and treatment facilities.

The fee structure for *municipal solid waste collection* is complex, but is about CNY 6 per household per month. The municipal government pays the fees for those who cannot afford them. Industry fees are different and depend, for example, on who pays to transport garbage to a landfill. Fee collection rates vary between 10% in the Western provinces to 80% in coastal areas.

Emissions trading

During the 1990s, SEPA conducted a number of studies and pilot projects on *emissions trading*, mostly in connection with SO_2. In 2002, in order to assess the feasibility of a nation-wide emissions trading scheme, SEPA organised pilot applications in seven provinces. This work has helped to identify some of the conditions necessary to establish emissions trading in China. In addition, two power plants in Jiangsu province reached an agreement to trade SO_2 allowances to meet total emission limits. SEPA's work demonstrates the potential for using emissions trading to help reduce SO_2 emissions in a cost-effective way. In addition to designing

appropriate administrative arrangements, it may also be necessary to consider redesigning other instruments for total emission control, in particular emission/ discharge permits, to help achieve emission reductions in the most cost-effective way.

In order to protect environmentally vulnerable areas, especially in Western China, the Chinese authorities established comprehensive *ecological compensation (eco-compensation) systems*. For example, the government implemented a "Grain for Green" programme (also known as "Sloped Land Conversion Programme") in 1999. The purpose was to set aside sloped cropland so as to increase forest cover and prevent soil erosion. Where possible, farmers set aside all or part of certain types of land and plant seedlings; in return, the government provides free seedlings and compensates the farmers with in-kind grain allocations and cash payments. While there is some concern about implementation in the long run, the "Grain for Green" programme has so far had a positive effect on the welfare (net income per capita) of most farmers in the programme areas and has helped to increase the amount of forested areas.

Further plans include setting up *tradable quotas* for protected areas in Guangdong province. Prefectures short of reserves and protected areas will have to "buy" quotas from regions with more than the provincial average (6.78%) of total land area under protection. This is expected to benefit poor, mountainous areas, which tend to have more protected areas and will be able to "sell" quotas to more developed, urban areas, thus generating funds for ecological maintenance. Similar plans exist in relation to water resources, to encourage inter-regional, inter-industrial and upstream-downstream trading. This is expected to increase the flow of funds from heavily populated water-using areas and industries to more remote areas with a water surplus. Pilot projects in Zhejiang, Ningxia and Inner Mongolia have already proved successful and will be replicated in other regions.

Other economic instruments

The deposit and refund system for *packaging* has been applied on an informal basis in Shanghai, and SEPA is currently investigating the feasibility of applying it to packaging and hazardous waste items. In some provinces, *monetary deposits* (performance bonds) were collected during the construction of enterprises to guarantee the application of the "three simultaneities". If the construction satisfied the requirements, the deposit was returned to the investor; if not, it was retained by the administration as a fine. A similar approach has been used in the recovery of *mining sites*. The Law on Mineral Resources required mining enterprises to undertake measures to recover the land from their operations, such as planting trees or grasses. Hebei province, for example, requires a deposit of CNY 500-1 000 per mu (15 mu = 1 ha) to guarantee land recovery.

Box 8.1 **The Great Western Development Strategy**

Developing the West

In 1999, the government launched the "Great Western Development Strategy" (Xibu Da Kaifa) to foster the development of the *less-advanced western areas of China*, which include the provinces of Gansu, Guizhou, Ningxia, Qinghai, Shaanxi, Sichuan, Tibet, Xinjiang and Yunnan, as well as Chongqing municipality and the autonomous regions of Inner Mongolia and Guangxi. Together these represent an area covering more than 70% of the country, a population close to 30%, and a GDP of 17% (Table 2.2). They also include most of the country's minorities. These western areas are rich in minerals, energy (including hydropower), land resources and tourism, but they face a number of obstacles to development (e.g. insufficient infrastructure, limited investment, weak education system). The environment has often been damaged as a result of "third front" industrialisation in the 1960s, and extensive development of small township and village enterprises through the 1990s.

Development objectives

The Strategy aims at a long term development effort to establish a "new western China" by the middle of the 21st century. After the intitial stage (2000-05), it has entered in the development stage (2006-15). During the 11th FYP, the Great Western Development Strategy focuses on: *environmental protection and reforestation*; *investment in infrastructure*; promotion of high tech industries *education* and human resources; regional *economic development*; *framework conditions* (e.g. improving the investment context, strengthening the legal system, reforming the economic system and state-owned enterprises to attract foreign direct investment.

Infrastructure *mega-projects* have been placed at the core of the Strategy, including the south-north water diversion, a west-east natural gas transfer, a west-east power transmission and construction of the Qinghai-Tibet railway.

Implementation and funding

The task of implementing the Strategy has been allocated to the national agencies responsible for identified priorities as well as to provincial and other territorial governments. *National co-ordination* is done by the Leading Group for the Western Region Development, located in the National Development and Reform Commission.

In addition to the support provided by the national government for some national-level projects, a *mix of funding* from public sources (national, provincial and lower levels of government) and private domestic and international sources supports other projects. For instance, provincial and other local authorities are responsible for finding investors for projects that conform to the Strategy objectives. State-owned enterprises were expected to go to the market to raise equity financing. Some projects are funded by bank loans, equity financing, and bonds. The wealthier eastern/coastal

provinces were asked to contribute to develop new markets and bring advanced management and production styles to western enterprises. In the first year of the Strategy, Shanghai had already signed 200 co-operative contracts with a total value of over CNY 10 billion. Foreign investment and World Bank loans were sought to supplement and stimulate domestic funding. Preferential financing was also used via tax exemptions, preferential interest rates or repayment schedules.

While overall *expenditure* statements for the Strategy have not been published, about CNY 500 to 850 billion were spent over five years on major infrastructure development projects, and between CNY 720 billion and CNY 2 380 were provided to minority groups to support priorities identified in the Strategy. Expenditure has been growing at a rate of 21.7% annually, according to the State Ethnic Affairs Commission.

Environment

Projects under the Strategy's first objective are specifically environmental. In addition, projects under the second objective are expected to have an environmental impact assessment (EIA).

China also faces a risk of environmental damage from i) unsustainable exploitation of natural resources and ii) the relocation of polluting factories towards the western areas. Responding to such concerns, in 2000 SEPA issued a "Notice of Prohibition to Move Pollution to Western Areas" to provincial EPBs and Economic and Trade Committees. The notice prohibited the transfer or construction of virtually all outdated installations in terms of pollution and resource use. The notice also prohibited the transfer of hazardous waste to western areas. However, a number of cases of relocation of heavily polluting factories have been recorded.

6. Global Issues: Trade and Investment

China is the world's *second largest trading country*, with export revenues of USD 762 billion and imports reaching USD 660 billion in 2005 (increases of 28% and 18% respectively above 2004 levels). Further, the growth of *foreign direct investment (FDI) has been one of China's major success stories of the past ten years*, as it has become the leader among all developing countries. The *environmental consequences* of this for China, and other countries, are myriad and complex. First and overall, the accelerated economic growth generated by trade and investment expansion will help move China more rapidly *along the historic path of OECD countries*, which have been able to afford increasing levels of expenditure for environmental protection as they became wealthier. Evidence of this happening in China is already being seen.

Secondly, China's membership in the WTO should *contribute significantly to improved environmental performance* (International Institute for Sustainable Development, 2004). The CCICED particularly concluded that:

- the need to meet *stringent health and safety standards* established internationally and in advanced industrialised countries (e.g. for automobile emission levels and agricultural products) will reduce environmental pollution in China;

- expanded foreign investment by OECD countries will introduce *advanced environmental management systems and technologies* to China, and will stimulate domestic industries to follow suit due to the increased competition;
- increased imports of raw materials will *relieve pressures on China's environment* (e.g. on China's limited forest lands); and
- *production shifts will occur* in China toward less-polluting activities in certain sectors (e.g. in agriculture, where there is a move away from crops and systems which use the greatest amount of fertilisers and pesticides).

Thirdly, the *environmental impact of China's liberalised trade and investment policies on the rest of the international community will be large and potentially negative*, particularly given China's demand for raw materials (e.g. oil and gas, logs, pulp and paper, cotton, copper, steel, aluminium, soya). The challenge will be to mitigate such effects through close consultation between China and its trading partners, expanded analysis and information exchange on trade-investment-environment relationships, and sound environmental management policies by China's trading partners (e.g. on sustainable forest and fisheries management, and energy development). *Chinese officials are aware of this*, voicing concern about the "reputational aspects" of China's worldwide demand for resources, and asking its firms to display good "enterprise citizenship" abroad.

Fourthly, China has been *constructively engaging other countries* in ongoing discussion and negotiation of rules and procedures for integrating trade and environment policies, within the framework of the WTO as well as in ASEAN and Asia-Pacific Economic Co-operation (APEC). It has also joined some existing agreements relating to trade and environmental policies. For instance, it became the ninth country to adhere (in 2000) to a UN/ECE agreement on global vehicle regulations designed to establish internationally-recognized safety, energy-efficiency, anti-theft and environmental performance criteria for motor vehicles.

6.1 Free trade agreements (FTA)

The important role that regional trade agreements (RTAs) and free trade agreements (FTAs) play in trade liberalisation and, hence, in promoting economic growth, *has been recognized by APEC Economic Leaders and Ministers*. To strengthen this contribution and ensure high standard agreements, in 2005 trade ministers from China and other APEC member states endorsed a set of "*best practices*" *for RTA/FTAs in APEC*. These voluntary guidelines included recognition that all such agreements should "reflect the interdependent and mutually supportive linkages between the three pillars of sustainable development, economic development, social development and environmental protection, of which trade is an integral component".

At present, however, *none of China's FTAs under negotiation* (e.g. with Chile and New Zealand) *contains explicit environmental references*, nor does the government have a formal policy that would require the introduction of environmental concerns into future agreements. The recent discussions within APEC, and the best practices guidelines, could serve as an impetus *for China to prepare a domestic policy* requiring trade and environment officials to assess jointly the environmental implications of proposed RTAs and FTAs, and to recommend any appropriate modifications. A *systematic review mechanism* could be an important step in helping to ensure that any potentially adverse environmental impacts are eliminated or mitigated, and that environmental benefits are maximized. Such prior assessments in East Asia would follow the pattern which has emerged in Europe and North America over the last decade.

6.2 Foreign direct investment (FDI)

FDI in China *has grown rapidly since 2000, rising 50% to reach USD 60.3 billion in 2005*. It is projected to continue to grow substantially as the country further liberalises in a period of rapid globalisation. While much of the FDI has heretofore originated in developing Asia (some 62% in 2005, and of that, one-half from Hong Kong), a growing amount has been coming from OECD member countries in Europe and North America.

Good prospects thus exist for China to *utilise FDI to support its quest for sound environmental management and sustainable development* by insisting on high environmental standards and best practices by foreign firms in, for example, management of hazardous waste, air and water pollution control, and energy efficiency. At the same time, foreign enterprises can bring with them advanced environmental management skills and clean technology, and can provide environmental training for local employees.

To date, China has *not articulated a specific policy* on the environmental component of FDI, nor does MOFTEC or the Ministry of Commerce have an explicit mandate to pursue this. However, some important first steps have been undertaken. A 2002 guide for foreign investment industries lists industries that are "encouraged", "restricted" or "banned" based on *environmental criteria*, with the latter class reserved for firms that pollute the environment, destroy natural resources, impair human health or occupy large amounts of arable land. "Restricted" firms include those that use dated technology and are wasteful of resources. Further, new regulations on general FDI, adopted in 2002, reference WTO guidelines for attracting FDI through, inter alia, curtailing local protectionism and corruption, improving workplace safety, promoting S&T innovation, and protecting the environment.

6.3 *Overseas investments*

Globalisation and national liberalisation policies have encouraged Chinese firms to increasingly invest abroad to open new markets and to help expand and diversify China's import needs, especially for food and raw materials. Since 2000, major investments have been made in oil and gas exploration (e.g. Indonesia, Algeria), power generation (e.g. Georgia, Algeria, Cambodia, Nigeria), telecommunications (e.g. United States), steel (e.g. Australia), airlines (e.g. Cambodia), and forest products (e.g. Gabon, Malaysia, Indonesia, Russia).

In recent years, Chinese authorities have voiced with increasing frequency the need both to expand overseas investments and to ensure that they remain stable and reliable over the long term, *based, inter alia , on "good behaviour" by Chinese firms abroad*, including being responsible and involved custodians of the local environment. This no doubt is partially reactive to international criticism that many Chinese firms, especially in the natural resources extraction area, are failing to live up to such goals, and that greater efforts are needed to ensure that China's "ecological footprint" abroad is as small and benign as possible.

Currently, however, there are *no explicit policies or regulations* in place to reward or penalize firms based on their environmental performance. While China has put in place an environmental impact assessment (EIA) requirement and procedure, it does not apply to the overseas activities of its enterprises. China has not adhered to the OECD Guidelines on Multinational Enterprises (MNEs), and is therefore not committed to their obligations, notably that of establishing national contact points to promote and monitor guidelines applications. China is, however, committed to following the environmental guidelines of the World Bank and other development institutions when utilizing loan financing for international investment purposes.

A *high-level examination of China's overall policy and strategy* in this area would be timely, and potentially very beneficial, politically, economically, and environmentally.

6.4 *Forest products*

Compared to OECD countries, *China is "forest poor"*, with only 21% of the country in forest land (197 million hectares) in contrast to the OECD average of 34%. Until the mid-1980s, China's policy was to look to domestic forests to fill its requirements for wood and wood products. During most of the 1990s, as China accelerated the liberalisation of its economy and sought to expand its markets for furniture and other finished wood products, the country's forests rapidly degraded. In 1998, devastating floods in the Yangtze river basin, associated in part with

deforestation, triggered an abrupt change in national focus from maximum timber harvest and the opening up of unutilised forest areas to concern about forest conservation and sustainable management. *New policies and regulations were introduced* to promote rehabilitation of deforested and degraded lands, afforestation in areas prone to desertification, and the banning of logging in national forests. Long-range goals were set to increase China's forest cover over the next three decades to 26% of the territory, and to more than double the forest cover to 45% in the upper Yangtze river basin and to 27% in the Yellow river valley.

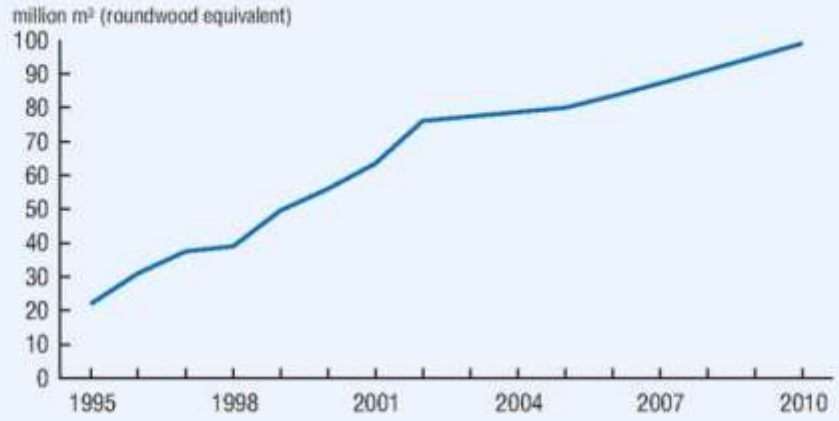
These measures have resulted in a *significant expansion of China's forest cover*, with attendant positive contributions to flood control, anti-desertification programmes, water quality and habitat protection. As China has sought to place its domestic forests under sound management, it has turned to overseas suppliers to meet a rapidly expanding demand for wood and wood products for housing construction, newsprint and other industrial uses, including raw material for an expanding furniture export industry. Consequently, its *imports of timber and other forest products have surged.*

Even before joining the WTO in 2001, China had *made changes in its trade policies* which impacted on the forestry sector. In 1997 it joined ASEAN members in an agreement to pursue trade liberalisation in nine sectors, including forestry. Subsequently, quotas on imports were eliminated or reduced, and by 2002 (apart from a continuing zero tariff policy applied to round logs, sawn wood and wood chip imports), there was an overall reduction which averaged 33.5% for all other forest products (including veneer panels, furniture, wood pulp, resin, and pulp and paper products).

As the result of market liberalisation in combination with its domestic forest conservation policy, China's *annual imports of all wood and wood products*, which amounted to less than 10 million cubic meters of roundwood equivalent (RWE) in 1981 and 20 million RWE in 1995, rose rapidly to reach some 75 million cubic meters RWE by 2003. Projections indicate that this will increase by one-third, to 100 million cubic meters RWE, by 2010 (Figure 9.5). By the latter date, China's forests and plantations will be providing less than half of the country's industrial wood needs, putting greater pressure on foreign sources.

International environmental organisations have expressed *concern in recent years about the environmental impact* that China's demand for wood and wood products is having on the world's forests. This is due, in particular, to the fact that much of China's imports come from developing countries in Asia and Africa with poor records in forest stewardship. Major sources of hardwood and softwood logs and lumber are: Malaysia, Gabon, Papua New Guinea, Indonesia, Thailand and Myanmar, along with New Zealand, Australia, Russia and the United States. Processed timber

Figure 9.5 **Chinese imports of forest products,** 1995-2010



Source: International Institute for Sustainable Development.

products such as wood pulp come mainly from Indonesia, Canada, Russia, Chile and the United States, while paper and paper products are imported principally from Chinese Taiwan, Korea, Indonesia, United States and Japan. China is today the world's biggest importer of waste paper, and the largest supplier of re-exported forest products, mainly furniture.

It is noteworthy that some major suppliers of China's forest products, which have sound forest management in place, are *not experiencing damaging impacts on their forests* (e.g. New Zealand, Germany, Canada and the United States). Extending good management practices more broadly will be key if China's growing demand on the world's forests, particularly in the tropics, is not to trigger a growing international outcry, and particularly if China is to secure reliable import markets over the long term based on purchases and imports from well-managed forests.

The problem of *illegal timber trade* also requires China's attention. Data from the International Tropical Timber Organization (ITTO) indicates a wide gap between what China's customs officials are reporting as import volumes and what many of China's timber *suppliers* are reporting as exports (Chapter 6). In 2000, for example, China's record of the volume of imported logs from Indonesia was 102 times lower than Indonesia's report of exports, and for Myanmar it was 27 times lower (International Institute for Sustainable Development, 2004). The discrepancies[9] exceed possible statistical error, and are indicative of the level of illegal traffic in forest products. While the responsibility and solution lie principally with the

exporting countries, *China can play a significant role* by engaging its suppliers in discussions of the situation, by strengthening its own monitoring of forest product imports, and by working within the international community on certification programmes for wood from sustainably managed forests. China has, in fact, been engaged in discussions on certification with Japan and Korea, and also within the framework of the ITTO and WTO.

6.5 Hazardous waste and toxic substances

International NGOs that *track countries' performance in controlling trade in toxic substances* recently (2005) *ranked China in the "very good" category* for its ratification of three of four key international treaties in this area. These include the 1989 Basel Convention on the transboundary movement of hazardous waste, together with the 1995 Basel Ban Amendment that bans exports of such waste from OECD members and Liechtenstein to all other countries; the 1998 Rotterdam Convention requiring prior informed consent for trade in certain dangerous chemicals; and the 2004 Stockholm Convention which promotes the phase-out of persistent organic compounds. China has yet to ratify the fourth instrument, the 1996 London Dumping Convention protocol on most forms of ocean dumping.

Waste

China *ratified the Basel Convention in December 1991* after having enacted a provisional domestic ban on the import of non-recyclable hazardous waste earlier that year. Following concerns about the amount and character of hazardous waste being shipped to China by industrialised countries, *China was a leading proponent* at the Second Meeting of the Conference of Parties to the Basel Convention, in 1994, *of a total ban on the movement of all such waste between OECD and developing countries* (which led directly to the Basel Ban Amendment one year later).

To provide a *legal basis for controlling the importation of unwanted hazardous waste*, in 1995 China published the "Emergency Announcement on Strictly Controlling Trans-Boundary Movement of Waste to China". The following year, the Law on Prevention and Control of Environmental Pollution by Solid Waste was enacted, followed by a series of regulations on the import and export of hazardous waste which complied with and enforced the Basel Convention (e.g. the Provisional Regulations on Environmental Protection and Management of Waste Importation).

Under current regulations, *exports of hazardous waste* are permitted *only when China has no appropriate disposal/recovery facilities*, and then only when Basel requirements are followed for notification of the receiving country and any transit countries. *Imports* are also required to comply with Basel and its amendments, with

imports of waste that is unusable as raw material prohibited and others with recovery potential restricted. Controls are based on an official list of waste to be banned or restricted which has been updated periodically over the last decade.

China's total *imports and exports in hazardous waste* are not documented or reported to the Basel Convention Secretariat or to the OECD. Regarding *waste imports overall* (hazardous and non-hazardous), in 2004, SEPA, which has administrative responsibility for the environmental management of waste trade, approved 400 enterprises in 29 provinces as designated facilities for the processing and utilisation of imported waste (e.g. waste hardware, old electrical appliances, waste wires and cables, and used electric motors). SEPA also issued a circular on strengthening the approval and management of the import of restricted waste, as a means to further restrict the approved volume of imported waste and related products, and also to intensify on-the-spot inspection of enterprises that treat waste with high environmental risks. In 2004, SEPA, the Ministry of Commerce, the General Administration of Commerce and the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China jointly issued an updated list of "waste as raw materials" to be restricted as imports. The same year, SEPA approved the import of 23.4 million tonnes of restricted waste as raw material, an increase of 63% over 2003, of which 10.5 million tonnes were actually imported. An additional 22.5 million tonnes were imported under automatic permission provisions of the regulations.

A recent concern has been the control of *electronic waste* (e.g. computers, printers and circuit boards) imported to support an e-waste processing industry which emerged in China in the late 1990s to reclaim precious metals, copper, plastic and non-ferrous metals. Chinese authorities cracked down on the industry and the waste traffic that supported it, after international attention was attracted in early 2002 by reports of *health problems associated with e-waste recycling in the town of Guiyu* in Guangdong province. In May 2002, a new list of banned waste imports was issued which included most electronic waste; and in September of that year, Chinese customs officials seized 450 tonnes of junked computers and other e-waste from the United States as a first step toward a proclaimed rigorous enforcement of the ban. The following year, SEPA issued a notification on enhancing environmental management of discarded electronic products and, together with the General Administration of Customs, began a *first-of-its-kind campaign with counterpart institutions in Hong Kong* to crack down on illegal trafficking in e-waste as part of a broader joint anti-smuggling effort (SEPA, 2005a).

Despite these measures, Chinese government officials and international institutions, both public and private, *remain concerned about illegal shipments* of

hazardous waste into China. This is based on the very large amount of cargo which enters China's numerous ports in relation to the limited number of customs agents and inspectors, and continued reports of bribery of importers and local officials.

Chemicals

China has also moved to control trade in *potentially toxic chemicals*. In 1994, the government adopted the first comprehensive set of rules addressing toxic chemicals, the "Regulations on Environmental Management Registration of the First Import and Export of Toxic Chemicals". A detailed regulatory scheme followed, along with the establishment of a State Committee for Evaluation of Toxic Chemicals. The regulations have two major components: an official classification of toxic substances; and requirements for proper notification and registration by both Chinese importers and foreign exporters. In 2003, 89 environmental management registration licences were approved and issued by SEPA, along with 4 200 specific approval notices for toxic chemical imports and 1 200 notices of export (resulting in 500 000 tonnes of imports and 51 000 tonnes of exported chemicals).

China *ratified the Rotterdam Convention* requiring prior informed consent for exports and imports of toxic chemicals in 2005, and followed up with implementing legislation. It also participates in *UNEP's Registry of Potentially Toxic Substances* as well as the *Intergovernmental Forum on Chemical Safety (IFCS)*.

China ratified the *Stockholm Convention on Persistent Organic Pollutants (POPs)* in 2004 and has begun work on a National Implementation Plan (NIP) as the convention requires (Box 9.4). Experts from 11 ministries, under the leadership of SEPA, are preparing the NIP with major support from the Sino-Italian co-operation programme for environmental protection.

China also attaches considerable importance to the *Cartagena Protocol on Biosafety*, under the UN Convention on Biological Diversity, which is engaging SEPA, the Ministry of Agriculture, the Ministry of Commerce and the General Administration of Quality Supervision, Inspection and Quarantine in international co-operative activities in the fields of risk evaluation and management of transgenic organisms, product labelling, compensation for damages, and informed consent for transboundary movements.

Chinese officials and experts from SEPA and the Ministries of Health and Agriculture have been consulting with the OECD on China's possible adherence to the *OECD system on the harmonisation of tools and instruments* used by governments in the registration and notification of chemicals that enter international trade. The goal is to avoid and remove technical barriers to trade in potentially dangerous chemicals, while reducing costs of laboratory testing.

6.6 *Endangered species*

China is a party to the 1973 *Washington Convention on International Trade in Endangered and Threatened Species of Wild Fauna and Flora (CITES)*, and its Bonn and Gaborone Amendments (1979 and 1983), and has established a good record of submitting timely reports to the Convention Secretariat. It has established a National Office of the People's Republic of China on the Management of Import and Export of Endangered Species with 19 branch offices in the provinces, and also a science committee on endangered species. Regulations and circulars are periodically issued to try to enhance the scope and levels of protection afforded to threatened and endangered species through, for example, public education, increased monitoring, incentive programmes for species protection, and stiffer fines and penalties. Some of these are *species specific*, for example, a circular by the State Council forbidding the trade of rhinoceros horns and tiger bones.

China has worked *bilaterally and regionally* to strengthen its ability to promote CITES goals and its domestic laws. Under a long-standing partnership programme with the United States, Chinese law enforcement and customs agents visit US ports of entry to observe operations and discuss control of endangered species trade. In 2002, China and the NGO International Fund for Animal Welfare signed a Memorandum of Co-operation on enhancing public awareness of wildlife protection, enforcing implementation of CITES regulations, and strengthening the investigation of wildlife trade. Assistance for species protection is also being provided from the GEF and under China's environmental co-operation programme with the European Union.

China is a member of the International Whaling Commission and is a *non-whaling country*.

Despite efforts by China to control illegal wildlife trade, reports persist of *major illegal trafficking* by Chinese enterprises and individuals (Table 6.2). There is thus a *critical need for enhanced surveillance* by more and better-trained wildlife officers and customs agents, supported by improved technologies, more stringent penalties for infractions and crimes, coupled with a public education programme. The government has, in fact, been taking steps domestically to upgrade its enforcement capabilities, and also to co-operate internationally. It supported the *establishment within ASEAN, in 2005, of a Wildlife Enforcement Network*, involving national CITES authorities, customs officials and police to help combat transboundary criminal activities of wildlife trafficking and trade, and to otherwise help enforce CITES. This initiative was undertaken due to the fact that the ASEAN region has been a hot spot for illegal wildlife trading involving tigers, elephants, rare orchids, indigenous herbal medicines, rare marine species, endemic reptiles and songbirds. China also intends to participate in a new *international network on environmental compliance and*

enforcement (INECE), formally launched in 2005 by the Asian Development Bank, the US Agency for International Development (USAID) and the Philippines Department of Environment and Natural Resources. The organising meeting, attended by Chinese experts, included environmental officials, judges, lawyers and leaders from civil society from 13 Asian countries; it was followed by a training workshop held by INECE in co-operation with USAID and the OECD on the development of compliance and enforcement indicators.

7. Environment and Development

7.1 Environmental assistance

Environmental assistance to China from *developed countries and international organisations* has played an increasingly important role over the last decade as China has elevated the priority it attaches to the protection and management of environmental values. In 2004, China received a *total ODA* (in the form of commitments for grants, loans and some other official flows) of USD 5 billion, comprised of contributions from Japan (USD 1.3 billion), the ADB (USD 1.3), World Bank (USD 1.2), EU countries (USD 1.0) and the United States (USD 0.043). The environmental share of the total ODA was over 10% (over 20% for Japan). Adding other officials flows commitments (under the Global Environment Facility and the Montreal Fund), this leads to a total environmental assistance to China of some USD 750 million in 2004. Foreign capital for environmental activities consists in large part of international convention implementation funding from the World Bank, ADB, UNDP, UNEP, GEF and the Montreal Protocol Multilateral Fund (Boxes 9.3, 9.6), and bilateral government assistance funds. Grants are used mainly for implementation of international agreements, especially for capacity building, while loan financing is used mainly for construction, technology acquisition and management associated with pollution control projects.

The *World Bank has been the leading external supporter* of China's environmental efforts. For example, it has provided some 70% of all GEF funding in China (over USD 300 million from the GEF trust account since 1991, plus another USD 1.65 billion in "co-financing"). The Bank has also been the largest contributor to China's efforts to phase out ozone-depleting substances by providing grants totalling USD 445 million through its Montreal Protocol programme. The UNDP has been the second largest source of external funding, largely for grant-supported capacity building and technical assistance; while the ADB has steadily increased its environmental funding over the past five years.

Beginning in the early 1990s, the *developed countries began to readjust their foreign assistance* programmes *to place greater emphasis on environmental protection*. This emphasis continues today, even though overall levels of bilateral assistance to China are being reduced by many OECD countries as China's economic status improves. *Japan* has had a long, successful partnership with China in the environmental field, providing more than USD 260 million in environmental ODA in 2004, and more than USD 100 million since 1996 for the construction and operation of the Sino-Japan Friendship Centre for Environmental Protection. *Germany* has had a longstanding co-operation with China concerning environmental policy, environmental protection and the sustainable use of natural resources. Since the mid 1980s to 2005, it has provided some USD 800 million as financial co-operation and USD 135 million as technical co-operation. In 2006, new funding has been provided for environmental co-operation (i.e. USD 142 million in financial co-operation and USD 17 million in technical co-operation). The Sino-Italian co-operation programme for environmental protection has also been providing valuable assistance to China environmental management efforts. Over 2001-05, *Italy*, through its Ministry for the Environment and Territory, funded the programme with some USD 110 million through direct contributions and through Trust Funds established at the World Bank and in other multilateral institutions. Co-funding was provided by Chinese institutions (USD 30 million) and Italian companies (USD 28 million) in addition to contributions from the United Nations Foundation, assorted United Nations agencies (UNEP, UNDP, UNIDO), the GEF, the World Bank, and the Multilateral Fund for the Montreal Protocol (with an aggregate USD 19 million). Since 2000, the European Commission has provided grants of EUR 150 million to China for environmental co-operation programmes covering areas such as energy and environment (energy efficiency, renewable energies), cleaner industrial production, climate change, air pollution, water pollution, natural forest management, and overall environmental management. In 2006, major programmes on biodiversity protection and integrated river basin management were initiated.

It is *vital to the future success of China's environmental agenda* for the external financing to continue. *OECD countries should maintain their support* in this sector in their own long-term interests, as well as China's, as overall bilateral ODA to China shrinks.

As a developing country, *China has historically been a recipient of external assistance* and not an *aid-donor*. That *situation is beginning to change* as China grows wealthier and sees that it is in its interest to support the environmental efforts of other countries. The technical assistance it is now providing to Mongolia for anti-desertification efforts, and its co-operative agreements with African countries that will involve China-led training and technical services, are likely the beginnings of a

growing trend. While no *formal environmental assistance policy and strategy* has been promulgated, it would be timely for the government to prepare one, with emphasis on assisting those developing countries which are China's principal sources of raw materials and food with sustainable natural resource management and rehabilitation.