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# REGIONAL ENVIRONMENTAL PROFILE FOR ASIA

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## PREFACE

This Regional Environmental Profile (REP) for Asia has been written in support of the preparation of an All-Asia Strategy Paper (AASP) and an All-Asia Indicative Programme (AAIP), for the period 2007-2013. The AASP and AAIP, and therefore the REP, cover the 18 Asian countries that are eligible under the ALA regulation, which area (with their ISO abbreviations, which are used in some tables in this report): Afghanistan (AFG), Bangladesh (BGD), Bhutan (BTN), Burma/Myanmar (MMR), Cambodia (KHM), China (CHN), India (IND), Indonesia (IDN), Lao PDR (LAO), Malaysia (MYS), Maldives (MDV), Mongolia (MNG), Nepal (NPL), Pakistan (PAK), Philippines (PHL), Sri Lanka (LKA), Thailand (THA), and Vietnam (VNM). The purpose of the AASP is to provide a framework for programming EC multi-country development assistance for Asia-wide programmes and for programmes addressing specific sub-regions, notably ASEAN (Association of South East Asian Nations) and SAARC (South Asian Association for Regional Cooperation). These multi-country programmes supplement bilateral programmes in areas where support is more effectively provided on a multi-country basis.

The main objective of the REP is to identify and assess environmental issues to be considered during the preparation of the AASP. It aims to provide clear information on the key environmental challenges, the current policy, legislative and institutional framework, and the strategies and programmes designed to address them, at the regional level. Thus, the REP aims to identify those environmental issues that can best or only be addressed through a regional approach, while providing an overview of past and ongoing international regional co-operation in the environment sector. In so doing, however, the authors took into account that activities and lessons learned at the regional level can inform those at the national level, and vice versa. Thus, for example, the EC's successful engagement in 1992-2004 with a national-level project to secure the Leuser Ecosystem in Aceh and North Sumatra, Indonesia, can teach many lessons for regional replication about the importance of multi-year commitments for forest and biodiversity conservation. Comparably, the EC's support for the ASEAN Regional Centre for Biodiversity Conservation and its successor the ASEAN Centre for Biodiversity, shows how a regional intervention can generate knowledge that deeply informs and improves conservation action at the national level.

In attempting this review, which combines enormous and diverse geographical and topic coverage with a rather limited human resource of fewer than 60 person days, the consultants have relied to a large extent upon the Country Environmental Profiles that were prepared in 2005-2006 by European consulting firms for the 18 target countries. Unless otherwise stated, information for named countries is derived from the relevant Country Environmental Profile. These resources were supplemented by review of additional material as listed in the relevant annex and reference list, by comments and corrections offered by EC officials and EC Delegations, by personal contacts and knowledge drawn on the basis that between them the two consultants had worked in almost all of the target countries, and by information gathered during UNEP-sponsored visits by one of the consultants to Sri Lanka, Maldives and Indonesia during June, September and October.

The attention of the reader is drawn to the 9 October 2006 issue of *Time* magazine, the cover article in which is a 30-page review of Asia's environment. This was prepared drawing on the magazine's considerable institutional resources, text inputs by 11 named journalists, and information gleaned from UNEP, the Global International Waters Assessment, the World Wide Fund for Nature, WildAid, the Food and Agriculture Organisation of the United Nations, the World Bank, the Global Coral Reef Monitoring Network, the Australian Institute for Marine Science, the Centre for Science and Environment, the World Resources Institute, the World Health Organisation, the UN Convention to Combat Desertification, the World Conservation Union (IUCN), Asian Development Bank, the US National Aeronautics and Space Administration, the Global Coral Reef Alliance, Singapore Ministry of the Environment and Water Resources, the Clean Air Initiative, the International Centre for Sustainable Cities, and the Yellow River Conservancy Commission. It is a matter of some satisfaction to the authors that the *Time* coverage essentially confirms and popularises the conclusions of the REP, which were largely contained in the August draft.

The August draft prompted numerous comments and suggestions for improvement by stakeholders at the Commission. In addition to minor corrections, these have been addressed in the October draft in the following ways (with the relevant section numbers in the November draft being noted):

- Additional material on 'brown' environmental issues (water and air quality, land degradation, solid wastes, etc.), and health effects, has been added throughout.
- The following new sections have been added:
    - Ecosystems and ecosystem services (2.1.5);
    - Conservation of biodiversity (2.1.6d);
    - The Asian 'Brown Cloud' (2.3);
    - Nuclear waste (2.4);
    - International Centre for Integrated Mountain Development (3.1.1d/4.14.4);
    - UN Economic and Social Commission for Asia and the Pacific (3.1.1e);
    - The Asia Pro Eco Programme (4.4);
    - The Tropical Forests Programme (4.5);
    - The EC-ASEAN Energy Facility (4.7);
    - Inter-provincial reserves (5.1.5b);
    - Conclusions overview (5.1.1);
    - Introduction to the recommendations (5.2.1);
    - Biodiversity Hotspots and Important Bird Areas, in which the natural environment of the ASEAN sub-region is described (Annex 7 IV);
- The following sections have been extensively re-written:
    - Climate change issues (2.5);
    - Likely consequences of environmental trends (2.6);
    - Multilateral environmental agreements (3.1.2);
    - Role of international NGOs (3.2.3);
    - Legal basis for EU co-operation (4.1);
    - The Asia-Europe meeting (ASEM) process (4.3);
    - The Trans-Eurasia Information Network (4.9);
    - The Asia Invest Programme (4.12);
    - The 2007-2013 Co-operation Programme in Asia (4.13);
    - Mainstreaming of environmental concerns (5.1.11);

  - Recommendations (5.2).
  - Regional Strategy Paper – Environmental Annex Summary (6).
- Corresponding changes have been made to the Summary, Reference List, etc.

The October draft prompted some additional comments from the Commission, which were responded to in the following ways in this November revised final draft:

- Wording was corrected in the descriptions of ASEM, ASEF, FLEGT and Asia Invest (1.3 and 4.12);
- Additional wording was added on special vulnerabilities of certain countries to climate change and the possibility of conflict over diminishing resources (2.6);
- The section on ASEM was revised in light of the ASEM 6 Summit (4.3);
- A new section was added on the Environment in Developing Countries Programme (now 4.6, with all subsequent sections in Chapter 4 being renumbered accordingly); and
- The conclusions and recommendations were reviewed for ways to increase congruence with and utility for the AASP and AAIP (it was decided, however, that the key recommendation of the REP, to re-allocate budgets in the 2007-2013 programme in favour of an SCP and 'green' environmental agenda, could not reasonably be addressed in the context of the REP).

# 1. SUMMARY

## 1.1 STATE OF THE ENVIRONMENT

1. **Mining impacts**. Scarring of the landscape as a result of open-cast mining is widespread, as is serious pollution and/or sedimentation of waters from mine spoil, processing and tailing leachates.

2. **Lands & soils**. There is severe land degradation in most countries, variously involving salinisation due to over-irrigation and evaporation, waterlogging due to irrigation and poor drainage, erosion due to farming or logging on steep slopes and fragile soils, over-grazing, and desertification, with land (coal and peat) fires occurring in some areas.

3. **Water shortages & floods**. There are serious, chronic and widespread water shortages in several countries and per-person scarcity levels are being reached in others, while some have seasonal and/or local water shortages. Serious flooding occurs from time to time in most Asian countries.

4. **Ecosystems and ecosystem services**. **Forests**: natural forest cover has been catastrophically reduced in Afghanistan, Bangladesh, China, Pakistan and Philippines, and widely lost, fragmented and/or degraded in all the other countries except Bhutan (though even here change is increasing in pace), with Indonesia and Burma/Myanmar in particular experiencing rapid rates of deforestation. Causes include: logging (often legal at first, then illegal), fuelwood collection, shifting cultivation mangrove-replacement aquaculture, forest fires, development of tree plantations, and aggravating factors such as timber smuggling, hunting and harvesting non-timber forest products and the smuggling of resulting products, alien invasive species, and weak forest governance and law. **Coral reefs**: extensively damaged by destructive fishing, coral mining, pollution and sedimentation (e.g. in Burma/Myanmar, Indonesia, Philippines, and Sri Lanka). **Wetlands**: extensively damaged by drainage, dams, pollution, construction and farming (e.g. in China, and Thailand), or by 'ghost drainage' and fire (e.g. in Indonesia). **Deserts**: degraded by mining, fuelwood collection, overgrazing and conversion of oasis land to agriculture (e.g. in China). **Karst** (limestone) areas: often destroyed by quarrying (e.g. in Indonesia, Lao PDR, Thailand, and Vietnam).

5. **Biodiversity**. **Species richness**: China, India, Indonesia, Malaysia and Philippines all belong to a group of 17 megadiverse countries in which live about 70% of all species on Earth. Most others are also very rich in absolute numbers of species, and Bhutan and Sri Lanka have very large numbers of species per unit area. **Endemism rates**: exceptional endemism rates are found in Bhutan, China, India, Indonesia, Philippines, Sri Lanka, and Vietnam, and high ones in Burma/Myanmar, Cambodia, Lao PDR, Malaysia, Mongolia, and Thailand. **Genetic resources and genetic erosion**: countries where many useful species originated and many varieties still exist, and that hence possess exceptional genetic resources, include Afghanistan, China, India, and Philippines. Serious genetic erosion, the loss of variety among crops and livestock, is occurring in Afghanistan, Bangladesh, China, India, Mongolia, Pakistan, Philippines and Sri Lanka. Since all wild species are potentially useful, species richness and

endemism are now considered to be genetic resources, their loss being genetic erosion which is now widespread and severe in Asia.

6. **Biodiversity conservation**. There are seven Biodiversity Hotspots, occupying 5.7 million $km^2$ in total, each with 1,500 to 15,000 endemic species of higher plants but now 75-95% deforested, with 5-15% of the original habitat under some form of protection. These are: Himalaya, Indo-Burma, Mountains of South-west China, Western Ghats/Sri Lanka, Philippines, Sundaland, and Wallacea. Overlapping with these in many cases are 1,809 Important Bird Areas, 56% partly or fully protected and occupying nearly two million $km^2$ in total. These were identified because of their importance for globally threatened bird species, for restricted-range bird species, for assemblages of bird species restricted to a major regional ecological community, and/or because they hold globally significant congregations of waterbirds, seabirds, migratory raptors or cranes. A key issue is the adequacy of conservation systems, in terms of ecosystem coverage, management capacity, or both. By these measures, serious problems are clearly evident in Afghanistan, Bangladesh, Burma/Myanmar, Cambodia, Indonesia, Maldives, Nepal, and Philippines.

7. **Water quality in human settlements**. A scarcity of safe drinking water prevails throughout Asia, and inadequate water supply and poor sanitation cause more than 500,000 infant deaths a year as well as huge burden of illness and disability in the region. The main causes are contamination by sewage, pesticides, naturally-occurring arsenic, leachates from garbage dumps, seawater intrusion, miscellaneous industrial effluents, and mining effluents.

8. **Solid wastes in human settlements**. Asians generate up to about one kg of solid waste per person per day, and this amount is increasing rapidly. Systems for managing solid wastes are inadequate in ways that include: lack of collection, wild dumping, no separation of hazardous wastes, and use of insecure dump and landfill sites. Significant, and possibly very large, amounts of wastes are imported into countries that include China, Indonesia and Pakistan.

9. **Unexploded landmines and other ordnance**. These deny people safe access to land in Afghanistan, Cambodia, Lao PDR, Vietnam, and some parts of Sri Lanka and Indonesia.

10. **Air quality in human settlements**. There is seriously impaired air quality in urban areas in most Asian countries, mainly as a result of vehicle emissions. Of the 15 cities in the world with the highest levels of particulates, 12 are located in Asia. Six of these cities also have the highest levels of atmospheric sulphur dioxide. Aggravating factors quality include coal burning in power stations and for domestic heating, haze from forest fires and the use of biomass fuels for indoor cooking. The contribution of indoor air pollution from burning solid fuel to the loss of years of healthy life is in the range 4-7.9% in Bangladesh, Burma/Myanmar, Bhutan, India, Nepal and Sri Lanka, and 2-3.9% in Afghanistan, Cambodia, China, Lao PDR, Malaysia, Mongolia, Pakistan, Philippines and Vietnam. In China, an estimated 25 million tonnes of sulphur dioxide were emitted in 2005, mainly from coal burning, and caused acid rain to affect about a third of the country's land area.

11. **The Asian 'Brown Cloud'**. This is a layer of air pollution covering parts of the northern Indian Ocean, India, Pakistan, and parts of South Asia, South-east Asia, and

China. It is composed of black carbon and ash, sulphates, nitrates, and mineral dust, suggesting sources in biomass burning (including forest fires), vehicle emissions and industrial emissions, as well as wind erosion and desertification.

12. **Nuclear waste**. Civilian and/or military nuclear programmes generate waste in China, India and Pakistan, with other radionuclide issues being latent in countries on the periphery of the region, notably North Korea and Iran.

13. **Climate change issues**. Rice fields, 90% of which are in Asia, emit 50-100 million tonnes of methane each year, and widespread deforestation in Asia results in soil oxidation and significant carbon dioxide release, but the 18 Asian countries are relatively low emitters of greenhouse gases on a per-person basis, with carbon emissions close to 1 t/person/year only in (coal-burning) China and Mongolia, and higher levels only in (partly urban-industrial) Malaysia and Thailand. The huge populations of China and India, however, and their rapid economic growth, mean that they make a large and increasing contribution to emissions in absolute terms. Climate change has the potential to cause severe adverse impacts on rainfall patterns, agricultural potential, water resources, and terrestrial, wetland, aquatic and coastal ecosystems, besides increasing the range of disease vectors and rendering coastal areas vulnerable to inundation by the sea. This will especially adversely affect the poor and the marginalized who depend largely on agriculture, forests and marine resources for their livelihoods, or who may become environmentally displaced persons. Countries that are already disaster prone (such as Bangladesh, India, Philippines and Vietnam) anticipate an additional frequency of calamity.

14. **Likely consequences of environmental trends**. In the increasingly populous cities, day-to-day life among the urban poor is expected to become ever more dominated by the scarcity of safe drinking water, by escalating concentrations of sewage, industrial effluent and garbage leachate in what freshwater there is, by mountainous quantities of solid wastes, and by ever filthier air. Nevertheless, greater resources are starting to be committed to pollution control and to the remediation of existing pollution. Investments have also been made in urban infrastructure, particularly in water supply and sanitation systems, and, to a lesser extent, in mass transit systems. In addition, environmental regulatory systems are being strengthened in several countries. There are also various initiatives to use market-based instruments, information disclosure, public participation, cleaner technologies and other policy approaches. Results vary widely from country to country, but enhancements in regulatory activity are yielding some incremental improvements in environmental performance in the region. What these regulatory initiatives have *not* done is to change the basic structural relationship between urban-industrial growth and the environment, and the parallel trend of increased energy and materials use, pollution and resource depletion. The critical challenge in Asia is to reduce substantially the energy, materials, pollution and waste intensity of urban-industrial activity in ways that support continued improvement in socioeconomic welfare. Meanwhile, outside the cities, deforestation, land degradation, pollution and other forms of damage continue to occur over vast areas. As the Asian societies become wealthier, they consume much of what makes their own and each others' countries special. They also become better able to set aside protected areas, but these are becoming increasingly isolated, and it is not clear how many are truly viable. Climate change will upset rainfall patterns, seasons, sea-level, altitudinal zonation, and the intensity of storms and other extreme weather conditions. Into this changing world, the

Asian societies have packed large numbers of additional people, many of them living close to the edge of survival in places that are already marginal ecologically, or in locations vulnerable to storm surges and land slides, and that increasingly lack the buffers offered by intact forested catchments, grasslands, wetlands and coral reefs. Millions of these may find that environmental conditions deteriorate to the point where to survive they must uproot themselves, becoming 'environmentally displaced persons'. All these trends are active and continuing, and the outlook is inevitably coloured by concern for natural ecosystems and wild species, for the quality of urban and rural life, and for the economic and social sustainability of Asian societies.

## 1.2 ENVIRONMENTAL POLICY, LEGISLATION AND INSTITUTIONS

1. **Key regional institutions**. These comprise the South Asian Association for Regional Cooperation (SAARC), and the Association of Southeast Asian Nations (ASEAN). Both have aims that include protecting the environment of their regions, and the ASEAN Secretariat produces a biennial State of the Environment Report. There are also the South Asia Co-operative Environment Programme (SACEP), and the International Centre for Integrated Mountain Development (ICIMOD). All have policy that sustainable use and management of natural resources is essential to the long-term economic well-being of their countries and regions. Since there is some overlap in the programmes and activities among them, there is scope to increase efficiency through greater collaboration amongst them. SAARC has recognised the potential benefits of a regional environmental treaty and has suggested establishing an expert committee to explore the matter. It has also suggested an integrated environment standard for SAARC countries, and a state of environment report. ASEAN has advocated regional efforts on: transboundary pollution, biodiversity conservation, integrated management of coastal zones, and harmonising the environmental databases.

2. **Multilateral environmental agreements**. All the Asian countries are parties to the Convention on Biological Diversity, the UN Framework Convention on Climate Change, and the UN Convention on the Law of the Sea. **Gaps in membership of key MEAs include**: Basel Convention on hazardous wastes (Lao PDR, Burma/Myanmar); Bonn Convention on migratory species (Afghanistan, Bhutan, Burma/Myanmar, Cambodia, China, Indonesia, Lao PDR, Malaysia, Maldives, Nepal, Thailand, Vietnam); UN Convention on desertification (Bhutan, Maldives); Ramsar Convention on wetlands (Afghanistan, Bhutan, Burma/Myanmar, Lao PDR, Maldives); Stockholm Convention on persistent organic pollutants (*no parties except* Mongolia, Nepal, Pakistan, Philippines); International Tropical Timber Agreement (Afghanistan, Bangladesh, Bhutan, Lao PDR, Maldives, Mongolia, Pakistan, Sri Lanka, Vietnam); Vienna Convention on ozone layer protection (Bhutan); Washington Convention on trade in endangered species/CITES (Maldives); World Heritage Convention (*no parties except* Afghanistan, Bangladesh, China, Pakistan, Sri Lanka). Countries vary in their engagement with MEAs and regional conventions, mainly due to resource and capacity constraints.

3. **Regional co-operation on environment**. Highlights include: ASEAN (Hanoi Plan of Action, ASEAN Regional Centre for Biodiversity Conservation/ASEAN Centre for Biodiversity); SAARC (Dhaka Declaration); and diverse programmes organised by SACEP, ICIMOD, UNESCAP, and the Mekong River Commission.

4. **International NGOs**. These play a varied role depending upon the country and the NGO's specific interest. A more regional focus could be promoted through the replication of good NGO programmes and projects. In practice, NGOs are as un-coordinated as countries on a regional scale.

5. **Integration of environmental concerns into the main sectors**. There are generic challenges of institutional capacity, authority of environmental institutions and weak or absent law enforcement. The key driver for this is lack of political will due to vested interests or competing and more lucrative propositions such as new infrastructure and plantation projects. Whilst integration is broadly recognised as important and beneficial, there are few cases of this actually taking place. Mainstreaming of environmental concerns is inhibited by sectoral isolation and other institutional and management constraints, and by a limited capacity to recognise and integrate environmental values in the common currency of decision making, which is largely economic. The problem is perpetuated, for example, by national accounts that do not quantify resource consumption or environmental damage, and by project cost-benefit analyses that do not include an explicit cost for all species extinctions.

### 1.3 EU AND OTHER DONOR CO-OPERATION WITH THE REGION

1. **Legal basis**. The legal basis for EC development assistance to Asia is Council Regulation 443/92, which will be replaced by the Development Cooperation Instrument (DCI) for the financial period 2007-2013 with a broader geographical coverage than the present regulation. The respective new regulation on the DCI is currently under negotiation, with foreseen entry into force in early 2007. The DCI will also incorporate thematic programmes, among them a thematic programme for environment and the sustainable development of natural resources including energy.

2. **Strategic policy environment**. The EC's 2001 Communication on *Europe and Asia* identified six aims for cooperation: peace and security; mutual trade and investment; development of less prosperous countries; human rights, democracy, good governance and the rule of law; global partnerships and alliances; and awareness of Europe in Asia and *vice versa*. The EU Development Policy Statement has the primary aim of eradicating poverty in the context of sustainable development, and the pursuit of the Millennium Development Goals.

3. **The Asia-Europe Meeting (ASEM) process**. The ASEM dialogue between 25 EU and 13 Asian countries is informal, multidimensional, partnership-based, and has the authority of high-level Summit meetings. There are also Ministerial and working-level meetings, activities flowing from them, and occasional ministerial conferences. There have been two ASEM environment ministers meetings, for example, with a third planned for Spring 2007. ASEM has provided a dialogue platform to address international matters such as UN reforms, weapons of mass destruction issues, terrorism and other trans-national crimes, human rights, globalisation and WTO negotiations, and environment and sustainable development topics such as environmental technology, cooperation on forest conservation, water management, and public participation in environmental policies. The Asia-Europe Environment Forum (ASEF; http://euv.asef.org) is an ASEM institution that functions as a platform for dialogue and debate on sustainable development and the environment in Asia and Europe.

4. **The ASEM Oceans Initiative**. This aims to ensure the sustainable use of the seas and ocean, and conservation of marine ecosystems through inter-regional cooperation. It addresses such issues as: climate change; renewable energy; sustainable production and consumption; integrated coastal and ocean management; marine biodiversity and protected areas, species and habitats; hazard forecasting and mitigation; sustainable fisheries management and rebuilding of fish stocks; and issues to do with oil spills, ocean dumping, and the management of noxious and hazardous substances.

5. **The Asia Pro Eco Programme**. This was established in 2002 and supported projects to improve environmental quality in Asia, to promote investment and trade between EU and Asia, to facilitate EU-Asia co-operation amongst institutions, business, and civil society, and to improve mutual awareness and cooperation on environmental issues. An evaluation in 2006 concluded: that the Programme had given rise to a number of excellent and often innovative projects; that arrangements for networking among partners were successful; that around half of a sample of 20 projects had good or very good performance; and that the Programme was successful at drawing lessons from its experience, and using them to achieve adaptive learning. Certain weaknesses were also noted, to do with replicability, quality control, accountability, and a lack of synergy among projects.

6. **The Tropical Forests Programme**. This aimed to contribute to: raising the status of forests in national policies and integrating forest policies based on sustainable forest management in development planning; promoting the production and use of wood and non-wood forest products from sustainably managed resources; contributing to the adequate valuation of forest resources and services; ensuring active participation of forest-dependent people and local communities in the development of national forest policies and in development planning; and improving co-ordination and the flow of information between the Commission and Member State projects so as to put in place coherent actions in that area.

7. **The Environment in Developing Countries Programme**. This has supported actions in developing Asian countries to promote environmental sustainability, through projects aimed at specific conservation targets (e.g. great apes, marine protected areas) capacity building (e.g. in climate change adaptation) and promoting implementation of multilateral environmental agreements (e.g. on management of chemicals).

8. **EC-ASEAN Energy Facility**. This aimed to facilitate joint regional projects in the energy sector, its overall objectives being: to increase the security of energy supply of ASEAN countries and indirectly of Europe; to increase the economic exchanges between European Union and ASEAN countries; to improve the environment at local and global level; and to facilitate the implementation of the ASEAN Plan of Action for Energy Co-operation 2004- 2009.

9. **Partnership with sub-regional institutions**. The political dialogue within Asia is complex and involves sub-regional partners such as SAARC and ASEAN, as well as policy forums such as ASEM and the ASEAN Regional Forum. These and other institutions and programmes, such as SACEP and the ASEAN Centre for Biodiversity (ACB), offer ways for EU support to be delivered at a regional and thematic level.

10. **The Trans-Eurasia Information Network (TEIN)**. This is a large-scale data communications network for the research and education communities in Asia-Pacific, enabling them to engage in joint projects. Offering direct connectivity to GÉANT,

Europe's own network, it allows regional researchers to collaborate with their counterparts in Europe and thus operate on a global scale.

11. **The ECHO disaster preparedness programme (DIPECHO)**. DIPECHO now has projects in South, South-east and Central Asia. It targets vulnerable communities living in the main disaster-prone regions of the developing world, concentrating on reducing the vulnerability of the population, especially through pre-emptive measures.

12. **EU Action Plan on Forest Law Enforcement, Governance and Trade (FLEGT)**. The FLEGT Action Plan was adopted in May 2003, and sets out a new approach to tackling problems of illegal logging, weak governance and associated illegal trade. It uses the incentives and influence of the EU market to help fight against illegal logging. The main elements of the Action Plan are support for improved governance in wood producing countries and a licensing scheme which will reinforce regulatory controls and ensure only legal timber enters the EU. The Commission will develop Voluntary Partnership Agreements (VPAs) with timber-producing countries to support their regulatory and governance reforms, to build capacity and introduce a licensing system to prevent illegally produced timber from entering the EU market. The EU adopted a Regulation to establish voluntary licensing scheme for timber along with the mandate for negotiations in December 2005. The opportunities and challenges of Voluntary Partnerships are now being discussed in a number of countries of the region: discussions are most advanced with Malaysia, which hopes to conclude negotiation of a VPA by the end of 2007. There are also informal preliminary discussions that may lead to a VPA in Indonesia, where there have been signs of interest by government. Building political will in producer countries is an important part of the FLEGT Action Plan. An on-going series of regional FLEGT processes have been designed with this aim and a number of FLEGT support projects are underway with civil society and the private sector to galvanise action on FLEGT. FLEGT related activities are currently underway in Indonesia, Vietnam, Malaysia, China, India, Philippines, Sri Lanka, Cambodia, Papua New Guinea.

13. **The Asia Invest Programme**. Asia Invest activities focus on: helping companies, especially small and medium sized enterprises (SMEs), to internationalise their business; reinforcing private sector and new business development opportunities; developing greener technologies and practices and reducing environmental pollution; promoting exchange of know-how and technologies; and exchanging best practices and experiences of European and Asian intermediaries. Environmental concerns are already and will continue to be integrated into the Asia Invest programme, although the precise mechanism by which it will promote cleaner production (CP) and sustainable consumption and production (SCP) in Asia was yet to be determined at the time of writing. Complementary proposals include those for an SCP Asia programme, and the recently-launched Global Energy Efficiency and Renewable Energy Fund (GEEREF). It is considered important to make progress in this area, as encouraging CP/SCP is essential and will likely have a long-term influence, especially when combined with EU import standards that reject environmentally-damaging products, and with the increased activism of Asian citizens in favour of the same thing.

14. **The 2007-2013 cooperation programme in Asia**. This is guided by the principles that it should add value to interventions at country, sub-regional, and global level, that it should be based upon policy dialogue, and that it should respond to the

agenda of the EU in Asia. The tenth draft regional strategy paper (6 October 2006) envisions that co-operation will focus on only three areas in addition to multi-country programmes on uprooted people and avian influenza: (a) sub-regional integration, in dialogue and cooperation with ASEM, ASEAN and SAARC; (b) incentives for trade, investment and environment, mainly by strengthening private sector co-operation (especially with SMEs), supporting co-operation and dialogue in economic and financial policies, and by enhancing access to markets (especially for the poorest countries); and (c) supporting higher education, with about 20% of the whole budget earmarked for this. Questions have arisen because financing for environment would be cut from 12% of the total budget under the previous financial arrangements to 3% or less, due to the termination of the Asia Pro Eco programme and the Environment and Tropical Forests budget lines managed by AIDCO, the withdrawal of Asia Invest from CP/SCP activities, and the general absence of visible EC-funded environment actions in the Asia region in the strategy paper for 2007-2013. There is also the question of why such a large allocation should be made to higher education, at a time when many Asian countries are able to invest in national higher education, or else to buy European educational services in Europe or in Asian branch campuses of European educational institutions. If reassigned to environment, these higher education funds could provide for both the proposed SCP-ASIA and also for regional actions that respond to 'green' environment priorities.

15. **Non-EU donor cooperation at a regional level**. **ASEAN** has a network of multilateral relationships (ASEAN +3, ASEAN-CER, UNDP, Andean Community, and through the Treaty of Amity and Cooperation in Southeast Asia), as well as numerous bilateral ones. Since 1993, **SAARC** has signed Memoranda of Understanding with ADB, APT, CIDA, EC, ESCAP, ITU, PTB, SACEP, UNAIDS, UNCTAD, UNDCP, UNDP, UNICEF, UNIFEM, WHO and the World Bank. Since 1983, **SACEP** has undertaken projects in partnership with EAP-AP, ESCAP, GEF, GCRMN/CORDIO, IMO, NORAD, SIDA, UNDP, UNEP, WHO, and others.

## 1.4 CONCLUSIONS AND RECOMMENDATIONS

Three key directions need to be integrated and balanced within each strategic intervention: (a) improving public awareness of environmental issues and challenges, which is essential if change is to enjoy sustainable levels of political support; (b) promoting intergovernmental cooperation on shared environmental challenges, which is essential if best practices are to be developed on the integration of environment into other policy fields; and (c) engaging the private sector, which is the primary engine of change, growth and development in all the Asian countries. The following recommendations are formulated with these interlinked priorities in mind, reflect high levels of certainty about the kinds of interventions that are needed, and should be considered as starting points for further discussion between the EC and Asian counterparts:

1. **Promote sustainable consumption and production**, as a way to decouple economic growth from natural resource use and environmental degradation, by leveraging investment and engaging SMEs through a focussed, targetted, transparent and highly visible intervention such as the proposed Sustainable Consumption and Production in Asia programme (SCP-ASIA).

2. **Promote disaster preparedness and risk reduction**, through the dimensions of early warning, environmental education, networking and investment in measures, such as ecosystem restoration, to improve resilience and environmental security.
3. **Promote climate change mitigation and adaptation**, through sharing knowledge, preparing for an increased frequency and intensity of weather-related disasters, and anticipating and mitigating for the main ecological and human impacts.
4. **Control international movement of hazardous materials**, by assessing Asian capacity to handle hazardous and toxic material imported from Europe safely, and monitoring the flow of EU-Asia wastes in dialogue with Asian ministries of environment.
5. **Promote the 'green' environmental agenda**, through: (a) controlling international movement of forest and wildlife products, (b) managing trans-frontier reserves and corridors; (c) protecting migrating species and their habitats; (d) amplifying anti-alien invasion efforts in insular Asia; and (e) mainstreaming biodiversity values in economic assessments by establishing an economic existence value for unknown wild species.
6. **Develop environmental indicators**, by supporting an active goal-oriented research agenda to help develop CBD/EU 2010 biodiversity target indicators on: extent of grassland and dryland ecosystems; Living Planet Index; abundance of selected forest tree species; coverage according to the World Database on Protected Areas; management effectiveness of protected areas; genetic diversity of terrestrial domesticated animals; genetic diversity of domesticated aquatic species; tree genetic resources; area of forestry under sustainable management; area of agricultural ecosystems under sustainable management; proportion of fish stocks in safe biological limits; Ecological Footprint; Nitrogen deposition; Marine Trophic Index; water quality; fragmentation of forest systems; and fragmentation of river systems.

# 2. STATE OF THE ENVIRONMENT

## 2.1 LANDSCAPES, ECOSYSTEMS AND ECOSYSTEM SERVICES

### 2.1.1 Geological risks

In-country seismic and/or volcanic activity poses a significant risk in Afghanistan, China, India, Indonesia, Nepal, Pakistan, and Philippines. In addition, the great tsunami of December 2004, originating in Indonesian waters, caused damage and loss of life in India, Indonesia, Malaysia, Maldives, Sri Lanka, and Thailand.

### 2.1.2 Mining impacts

Scarring of the landscape as a result of open-cast mining (particularly for limestone, coal, gold and copper) is reported from Bhutan, Cambodia, Indonesia, Mongolia, Sri Lanka, and Vietnam. Serious pollution and/or sedimentation of waters from mine spoil, processing (particularly from gold extraction using cyanide and/or mercury) and tailing leachates is reported in Burma/Myanmar, Cambodia, China, Indonesia, Lao PDR, Mongolia, and Philippines.

### 2.1.3 Lands and soils

Severe degradation of agricultural and other land is reported from 16 countries (the exceptions being Malaysia and Maldives), the main features and reasons being:

- **salinisation due to over-irrigation and evaporation**, in Afghanistan, Bangladesh, Burma/Myanmar, India (Rajasthan), Pakistan (Punjab), Philippines, and Vietnam;
- **waterlogging due to irrigation and poor drainage**, in Afghanistan, Bangladesh, Pakistan, and Philippines;
- **erosion due to over-grazing**, in Afghanistan, Bhutan, China, Mongolia, Pakistan;
- **erosion due to farming on steep slopes and fragile soils**, in Burma/Myanmar, Cambodia, China, Indonesia, Lao PDR, Nepal, Philippines, Thailand, and Vietnam;
- **erosion due to forest degradation**, in China, Indonesia, Nepal, Pakistan, Philippines, Sri Lanka, and Vietnam;
- **desertification**, by definition of land in arid, semi-arid and dry locations, is reported in Afghanistan, China, India (Rajasthan and Chhatisgarh), and Mongolia (it is also reported in the more humid countries of Bangladesh and Vietnam); and
- **miscellaneous effects**, including loss of organic matter (in Bangladesh, Vietnam), mining (Mongolia), and land fires consuming coal and peat deposits (Indonesia).

Soil erosion has led to high levels of sediments in the coastal zones of South Asia. Annually, about 1.6 billion tonnes of sediment reach the Indian Ocean from rivers flowing from the Indian sub-continent (http://www.unep.org/geo/pdfs/GEO-3). Population growth and high population density, poor land management practices, and emerging inequities in land and resource access have been the major driving forces for

change over the past 30 years. Intensive agriculture, including overgrazing and heavy fertilizer use, are issues in many areas. Of the 1,997 million hectares (ha) of drylands in Asia, more than half are affected by desertification. The worst affected is Central Asia, with more than 60 per cent suffering desertification. Activities to combat desertification include watershed management, soil and water conservation, sand dune stabilization, reforestation programmes, reclamation of waterlogged and saline lands, forest and rangeland management, and soil fertility restoration.

### 2.1.4 Water shortages and floods

Asia is becoming increasingly water stressed (Monbiot, 2006): in India, some 250 $km^3$ of water are extracted for irrigation each year, 100 $km^3$ more than are replaced by rainfall; in Pakistan, around 90% of all crops are watered by irrigation from the Indus, which now often fails to reach the sea; and in China, 100 million people live on crops grown with groundwater that is not being replenished, while water tables are falling fast all over the north China plain. About half the region's population live with severe water stress (http://www.unep.org/geo/pdfs/GEO-3), and serious, chronic and widespread water shortages are reported in China, Maldives and Mongolia, as well as the Kathmandu valley of Nepal, and they are emerging in Pakistan as the per-person scarcity level is approached. Other countries report seasonal and/or local water shortages, including Afghanistan, Indonesia, Philippines, and Sri Lanka. Serious flooding incidents and risks are reported in Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Lao PDR, Nepal, Pakistan, Thailand, and Vietnam.

### 2.1.5 Ecosystems and ecosystem services

Ecosystems have many attributes, each with a different kind of significance for people. They have physical properties (e.g. biomass, structure, interactions of roots with soil and branches with air and rain), material and energetic dynamism (e.g. productivity, carbon, nutrient, energy and water flows and cycles), diverse material contents which may be used in various ways (e.g. wood for timber and fuel, plant parts for food, medicine and forage, wild animals for meat and hides), and they contain information in the variety of organisms and relationships among them (i.e. biodiversity). These properties are interconnected, making it hard to discuss them separately, but non-biodiversity values can be distinguished because many have established economic roles. Grasslands, for example, offer a form of productivity that can be used by grazing animals, and waters likewise for fish, and up to a point harvesting the biomass of such animals can be matched to the sustainable output of the ecosystem; over-grazing or over-fishing, however, can inflict damage that reduces productivity. In the case of grasslands, these may in the process be rendered vulnerable to erosion and, in dry areas, to irreversible desertification. Forests, meanwhile, offer production in diverse forms, and can be harvested in various ways (e.g. logging, gathering, hunting), again up to a point at which the ecosystem is damaged and becomes less productive, less sustainable, less diverse, or all three. Both grasslands and forests in addition have water catchment functions that depend on their physical integrity, and these ecosystem services (which include the regulation of floods, prevention of erosion and downstream siltation) are economically valuable. Riverine, coastal and connected wetland ecosystems all also contribute economic services that are important to human wellbeing and livelihoods.

Table 1 summarises some key features of ecosystem change in the Asian countries. A potent indicator of the processes that have been underway, and their consequences, is the loss and condition of natural forests. Natural forest cover has been catastrophically reduced in Afghanistan, Bangladesh, China, Pakistan and Philippines, and widely lost, fragmented and/or degraded in all the other countries except Bhutan (though even here change is increasing in pace), with Indonesia and Burma/Myanmar in particular experiencing rapid rates of deforestation. Causes of forest degradation and loss include:

- **logging** (reported as a cause of deforestation in all the countries except Bhutan, India, Maldives, Nepal, and Sri Lanka - logging typically starts legally, then becomes illegal when logging is banned after serious environmental problems emerge, as occurred in Cambodia, China, Lao PDR, Philippines, Sri Lanka, and Thailand; another factor is that logging may be driven by demand in other countries, as with demand in India, China and Thailand affecting the forests of Burma/Myanmar, and in Malaysia and China driving logging in Indonesia);
- **fuelwood collection** (in Afghanistan, Burma/Myanmar, Cambodia, China, India, Mongolia, Nepal and Pakistan);
- **shifting cultivation** (in Bangladesh, Bhutan, Indonesia, Lao PDR, Philippines, Thailand and Vietnam);
- **mangrove-replacement aquaculture** (in Bangladesh, Burma/Myanmar, China, Indonesia, Philippines and Thailand);
- **forest fires** (in Bhutan, India, Indonesia, Malaysia and Mongolia);
- **development of tree plantations** (in Burma/Myanmar, Indonesia, Lao PDR, Malaysia, Thailand, and Vietnam); and
- **aggravating factors**, such as:
    - **timber smuggling** (e.g. from Afghanistan to Pakistan, Burma/Myanmar to China, India and Thailand, and Indonesia to Malaysia and China);
    - **hunting and harvesting non-timber forest products** and the smuggling of resulting products (e.g. from Burma/Myanmar, Lao PDR and Vietnam to China);
    - **alien invasive species** (especially in Bangladesh, Burma/Myanmar, India, Pakistan, Philippines, Sri Lanka, and Thailand), which may include the exotic trees being used to reforest large areas of China and Lao PDR;
    - **forest pests** (in Mongolia); and
    - **weak forest governance and law** (conflicting policies, overlapping jurisdictions, lack of awareness and communication among stakeholders, etc., all widespread).

Other ecosystems have also suffered extensive damage in these countries, including:

- **coral reefs**, extensively damaged by destructive fishing, coral mining, pollution and sedimentation (e.g. in Burma/Myanmar, Indonesia, Philippines, and Sri Lanka);
- **wetlands**, extensively damaged by drainage, dams, pollution, construction and farming (e.g. in China, and Thailand), or by 'ghost drainage' and fire (e.g. in Indonesia);

- **deserts**, degraded by mining, fuelwood collection, overgrazing and conversion of oasis land to agriculture (e.g. in China); and
- **karst** (limestone) areas, destroyed by quarrying (e.g. in Indonesia, Lao PDR, Thailand, and Vietnam).

| **Table 1: Ecosystem change in 18 Asian countries** | |
|---|---|
| **Country** | **Status of key ecosystems and main factors degrading them** |
| Afghanistan | **Forests**. Cover is now less than 2% and declining due to illegal logging, timber exports to Pakistan, and fuelwood collection. |
| Bangladesh | **Forests**. Cover is now 10% and declining due to logging, shifting cultivation, and mangrove aquaculture. |
| Bhutan | **Forests**. Cover is now 72.5% and declining due to shifting cultivation and fires. Threats include overgrazing, encroachment, forest fires, poaching, construction of roads and transmission lines, population pressures, and timber extraction. |
| Burma/Myanmar | **Forests**. Cover is now 52% and declining due to illegal logging, timber exports to China, India and Thailand, plantations, fuelwood collection, and mangrove aquaculture. **Coral reefs**. Reefs occur particularly in the Mergui Archipelago and around the Coco Islands north of the Andamans. They are affected by over-fishing, poaching and sedimentation. |
| Cambodia | **Forests**. Cover is now 59% and declining due to logging, fuelwood collection, and agricultural encroachment. |
| China | **Forests**. Cover declined to only about 9% in 1949, but is now 18.2% and increasing due to reforestation, though mainly with exotic species. There is some illegal logging by local, Indonesian and Malaysian enterprises in parts of the south-west. **Wetlands**. Over 90% of the vast wetland plains of the NE have been drained and converted to farming. In the NW and SW, there are many small-scale drainage schemes and dams. Pollution degrades wetlands near to cities, especially along the Yangtze River, and in all wetlands in the eastern provinces. **Deserts**. Desert ecosystems are found mostly in the NW, and are being degraded by mining, fuelwood collection, overgrazing and conversion of oasis land to agriculture. **Coastal zones**. Past economic development has greatly damaged these ecosystems, and many species are now locally extinct or threatened. The remaining coastal zone ecosystems face threats from large upstream dams, numerous small-scale conversions of marsh and mangroves to farmland or aquaculture, over-collection of key species, pollution, and coastal construction. |
| India | **Forests**. Cover is now 19.4% and stable; it includes 38 million ha of dense forest, 26 million ha of open forest and 0.5 million ha of mangroves. Threats include grazing, cutting trees for fuel and timber, gathering of non-timber forest products, hunting, uncontrolled fires, and conversion for agriculture, infrastructure, industrial and commercial development. **Other ecosystems**. Deserts cover 2% of land area and there is a rich diversity of inland and coastal wetlands covering 4.1 million ha. Threats to freshwater, coastal and marine habitats include pollution, siltation, and invasive alien species. |

| | |
|---|---|
| Indonesia | **Forests**. Cover is now about 60%, but much is degraded by logging and the total is declining due to illegal logging, timber exports to Malaysia and China, plantation development, fire, shifting cultivation, and mangrove aquaculture. **Wetlands**. Up to 12 million ha were destroyed before 1996 and the rate of loss increased thereafter. Deep peat forests are logged using canals, which are often left (as 'ghost' drains) to continue draining the peat after operations cease, causing fire-proneness of the peat beds which may be up to 20 m deep. **Karst**. Limestone areas cover approximately 15.4 million ha and support specialised and fragile ecosystems with many endemic species. These are threatened by quarrying of limestone for marble and for use as cement, and by fire. **Coastal and marine**. There are abundant offshore coral reefs and other diverse marine ecosystems. Some 70% of all Indonesian coral reefs have been damaged by poison fishing, dynamite fishing, coral mining, sedimentation and pollution |
| Lao PDR | **Forests**. Cover is now about 34% and declining due to shifting cultivation, illegal logging, conversion to tree plantations, and dam building, offset by some reforestation. Hunting is reducing the populations of many species, and wildlife and other non-timber forest products are exported to neighbouring countries, this trade being effectively out of control. Consequences of dam building in forest areas include: (a) selective destruction of biodiverse valley-bottom ecosystems; (b) promotion of access by poachers and farmers to even the most remote areas; and (c) fragmentation of landscapes and ecosystems. |
| Malaysia | **Forests**. Cover is now 30-60%, depending on region and state (the states having control of land use), but much is degraded by logging and the total is declining due to plantation development and fire. |
| Maldives | **Forests**. Cover is now very little, and declining due to clearance for habitation. **Coral reefs**. The economy largely depends on the health of the reefs, since they sustain tourism and fisheries. Pressures at the local level include coral and sand mining, destructive fishing, waste disposal, and pollution. **Other ecosystems**. Loss of sea grass beds, mangroves and coral reefs occurs with dredging of harbours and reclamation of land for construction. Sand and coral aggregate are used as construction materials. |
| Mongolia | **Forests**. Cover is now 10.4 million ha (11% of land area), mostly in the north, plus two million ha of 'saxual' bush forest and 3.6 million ha of degraded forest. Forest cover is declining due to legal and illegal logging, fuelwood collection, fires, and pests. **Wetlands**. There are about 3,500 lakes, many of them shallow and/or seasonal and some of them saline, and over 3,800 rivers and streams, many with extensive flood plains, occupying some 1.5 million ha. Most of these wetlands remain pristine. **Other ecosystems**. The steppe is the last big grassland ecosystem to be found in the northern hemisphere, and covers 20% of the country. There are desert steppes in western Mongolia, and further south lies part of the Gobi Desert. |
| Nepal | **Forests**. Some 118 forest ecosystem types are found in Nepal, including the eastern Himalayan broadleaf and conifer and western Himalayan temperate forests. Cover is now 29% and declining due to fuelwood collection, offset to some extent by community forest management. **Grasslands**. These cover 14% of land area; in the Terai, they survive within protected areas on flood plains and terraces, and at higher altitudes alpine grasslands are home to a diverse array of wildlife, which compete with grazing livestock. **Wetlands**. |

| | |
|---|---|
| | Wetland areas lie within various ecosystems of both the high mountains and lowland plains of the Terai. |
| Pakistan | **Forests**. Cover is now below 5% (possibly as low as 2%), and declining due to farming, fuelwood collection and illegal logging. **Other ecosystems**. Pakistan has a diverse range of ecosystem types, from alpine to tropical, and from semi-deserts to lakes and coastal wetlands. The biggest threat to biodiversity is the progressive loss, fragmentation and degradation of natural habitats. These losses have accelerated in recent decades, and the trend is apparent in all remaining ecosystems: upland forests, scrub forests, mangrove forests, arid and semi-arid rangelands, including sand-dune deserts, inland wetlands, the Indus Delta, and coastal waters. Trapping and illegal hunting has also greatly reduced the populations of larger mammals and birds, and alien invasive species are widespread. |
| Philippines | **Forests**. Cover is now 7% and declining due to illegal logging, and shifting cultivation. On the other hand, there is genuine popular concern for the environment in the Philippines, and numerous terrestrial and marine sanctuaries have been established at the community and municipal level, and are defended by local people concerned that they would otherwise lose environmental and/or livelihood security. **Mangroves**. Most of the Philippines' mangroves have regrown after being cleared, and mangroves are still frequently felled. **Coral reefs**. 70% are now physically degraded by sedimentation and destructive fishing techniques. |
| Sri Lanka | **Forests**. Forest cover shrank during the 20th century from about 70% to about 24% of total land area, with disproportionate clearance of forests in the wet zone. Forest cover is now stable. **Mangroves**. Sri Lanka has short rivers with low sediment yield, and a maximum tidal amplitude of about 75 cm, so there are few locations suitable for the development of large stands of mangrove. Mangroves mainly occur only along the fringes of brackish-water lagoons, estuaries and inlets. **Lagoons, estuaries and wetlands**. Lagoons and estuaries cover some 160,000 ha in total. The lagoons are complexes of other wetland systems and often contain marshes, mangrove areas, seagrass beds, and mud flats. **Coral reefs**. In many areas the reefs have been all but destroyed by the mining of coral rock for making lime and cement, and elsewhere they are still recovering from warm-water bleaching in 1998. Even in protected areas they are vulnerable because management capacity is too weak to prevent destructive fishing techniques being used there. |
| Thailand | **Forests**. Cover is now 25% and declining due to illegal logging, shifting cultivation, plantation development, and mangrove aquaculture. **Wetlands**. Large areas of wetlands have been converted to rice fields and urban sprawl and suffer from pollution and many other problems. **Mangroves**. Conversion to shrimp ponds, salt pans and paddy fields has resulted in the loss of about 35% of Thailand's mangrove forests. |
| Vietnam | **Forests**. Cover is now 68%, but most is degraded and cover is declining due to shifting cultivation and plantation development, offset by some reforestation. **Other ecosystems**. Ecosystems and biodiversity are under threat from habitat losses caused by population growth, over logging legally and illegally, dam and road construction, and agricultural expansion. Demand both from within Vietnam, and outside, fuels a major wildlife trade. About 96% of Vietnam's coral reefs are severely threatened, including by destructive fishing methods, over-fishing, and pollution. |

### 2.1.6 Biodiversity and conservation

**a) Species richness**.

Among the Asian countries are five that belong to a group of 17 megadiverse countries in which live about 70% of all species on Earth: China, India, Indonesia, Malaysia, and Philippines. Others, such as Burma/Myanmar, Mongolia, Nepal, Thailand, and the Indochinese countries of Cambodia, Lao PDR and Vietnam are also very rich in absolute numbers of species, or in the case of Bhutan and Sri Lanka have very large numbers of species per unit area. Factors contributing to species richness include:

- Where a country includes or is accessible to more than one biogeographical unit, so that plants and animals from each are present (as in China, Indonesia and Malaysia);
- where it has a wide range in elevation and/or rainfall regimes, so that it has a variety of ecosystems, each with its own biota (as in China, India, Mongolia and Nepal);
- Where sources of colonisation from a species-rich source are close, yet distant enough to allow isolation and local speciation (as in Philippines and Sri Lanka); and
- where moist climate refuges persisted throughout drier intervals of the regional climate in evolutionary time, allowing whole biotas to persist which then re-colonised other areas as the climate became moist again (as in parts of Peninsular Malaysia, China and Indonesia).

**b) Endemism rates**.

The last two factors also contribute to the uniqueness of the biota in each country, or its endemism rate, since locally-evolved species are most likely to be endemic (sometimes even 'point endemics' where they are completely isolated, as among freshwater fishes in Lao PDR and Sri Lanka), and not all organisms are equally able to colonise away from a refuge, with the least-mobile ones remaining as endemics (which is why the herb families Gesneriaceae and Bignoniaceae in Peninsular Malaysia have endemism rates of 80-90%, while vertebrate animals are only 5-10% endemic). Exceptional endemism rates are found in Bhutan, China, India, Indonesia, Philippines, Sri Lanka, and Vietnam, and high ones in Burma/Myanmar, Cambodia, Lao PDR, Malaysia, Mongolia, and Thailand.

**c) Genetic resources and genetic erosion**.

The concept of *genetic resources* has the nuance that biodiversity is useful to people. Traditionally, genetic resources were defined in terms of the variety within species that were used as crops or livestock, because populations of these species could be improved by cross-breeding (e.g. in terms of disease resistance, adaptation to local growing conditions, or attributes such as ear size in cereals or milk production in mammals). Hence the sites of origin of useful species, or those with many varieties of such a species, having been used, bred and diversified by people for long periods of time, were seen as having abundant genetic resources. Countries in Asia with exceptional genetic resources in this sense include Afghanistan, China, India, and Philippines, and those

with substantial genetic resources include Bhutan, Indonesia, Lao PDR, Malaysia, Mongolia, Pakistan, Sri Lanka, Thailand, and Vietnam.

The idea of *genetic erosion* was originally linked to this, and aimed to capture the sense that in many countries traditional, distinctive varieties of crops and livestock were dying out, having been replaced by a small number of more productive, modern varieties (for example as a result of introducing 'green revolution' rice varieties). Serious genetic erosion of this sort is reported in Afghanistan, Bangladesh, China, India, Mongolia, Pakistan, Philippines and Sri Lanka, and it is also a factor in Indonesia, Malaysia, Thailand, and Vietnam.

In recent years it has become clear that *all* wild species, and *all* varieties and genes within them, are potentially useful and support bioprospecting initiatives designed to find amongst them materials or information with commercial potential in the medical, pharmaceutical, agricultural, foodstuffs, cosmetics and other industries. Hence, a country's genetic resources are now considered to include its total richness of species, sub-species and varieties, and genetic erosion is now taken to include the loss of its ecosystem types and sub-types, and the lineages, populations and species within them. Thus there has been a convergence of interest between those chiefly concerned with agricultural genetic resources and those whose primary aim is biodiversity conservation.

**d) Conservation of biodiversity**

Annex 7 IV summarises information on Asian Biodiversity Hotspots (Table 2) and Important Bird Areas (IBAs, Table 3). These are two of the ways by which the international conservation community identifies areas that are particularly important for biodiversity conservation. Biodiversity Hotspots, of which there are seven in Asia, must contain at least 1,500 endemic species of higher plants, and must have lost at least 70% of their original habitat. Meanwhile, IBAs (of which there are 1,809 in Asia), are identified because: (a) they are significant for globally-threatened bird species; (b) they are significant for restricted-range bird species (those with a global breeding range of less than 50,000 $km^2$); (c) they are important for assemblages of bird species restricted to a biome (or major regional ecological community); and/or (d) they hold globally significant congregations of waterbirds, seabirds and/or migratory raptors or cranes.

Of the Asian Biodiversity Hotspots, four are in continental Asia:

- **Himalaya**, covering the Himalayan parts of Pakistan, China, India, Nepal, Bhutan and Burma/Myanmar;
- **Indo-Burma**, including most of Thailand and Burma/Myanmar, all of Lao PDR, Cambodia and Vietnam, and adjacent parts of India, China and Peninsular Malaysia;
- **Mountains of South-west China**, covering the mountainous headwaters of the Yangtze, Mekong and Salween (Nujiang) rivers; and
- **Western Ghats/Sri Lanka**, covering the mountains of western peninsular India and Sri Lanka.

There are also three hotspots in archipelagic South-east Asia, which together with the Indo-Burma hotspot largely overlap ASEAN, so their natural history and condition can be taken to represent many aspects of the ASEAN environment:

- **Philippines**, including all 7,100 islands of the Philippine archipelago;
- **Sundaland**, comprising part of south Thailand, most of Peninsular Malaysia, and the islands of Sumatra, Borneo, Java and Bali, along with the Nicobar islands of India; and
- **Wallacea**, covering all of the Indonesian islands of Sulawesi, Maluku (the Moluccas) and Nusa Tenggara (the Lesser Sundas), as well as Timor Leste.

**Table 2: Biodiversity hotspots in Asia (from: http://www.biodiversityhotspots.org/xp/Hotspots/hotspots_by_region/)**

| | Himalaya | Indo-Burma | Mountains of SW China | Philippines | Sundaland | Wallacea | Western Ghats/Sri Lanka |
|---|---|---|---|---|---|---|---|
| Original Extent ($km^2$) | 741,706 | 2,373,057 | 262,446 | 297,179 | 1,501,063 | 338,494 | 189,611 |
| Vegetation Remaining ($km^2$) | 185,427 | 118,653 | 20,996 | 20,803 | 100,571 | 50,774 | 43,611 |
| Vegetation Remaining (%) | 25 | 5 | 8 | 7 | 7 | 15 | 23 |
| Endemic Plants | 3,160 | 7,000 | 3,500 | 6,091 | 15,000 | 1,500 | 3,049 |
| Endemic Threatened Birds | 8 | 18 | 2 | 56 | 43 | 49 | 10 |
| Endemic Threatened Mammals | 4 | 25 | 3 | 47 | 60 | 44 | 14 |
| Endemic Threatened Amphibians | 4 | 35 | 3 | 48 | 59 | 7 | 87 |
| People/$km^2$ | 123 | 134 | 32 | 273 | 153 | 81 | 261 |
| Area Protected ($km^2$) | 112,578 | 235,758 | 14,034 | 32,404 | 179,723 | 24,387 | 26,130 |
| % Original area protected | 15.2 | 9.9 | 5.4 | 10.9 | 12.0 | 7.2 | 13.8 |

**Table 3: The Asian network of Important Bird Areas (IBAs, from: http://www.birdlife.org/action/science/sites/asian_ibas/index.html)**

| | | | | Number of IBAs qualifying because of: | | | |
|---|---|---|---|---|---|---|---|
| | Number of IBAs | Area of IBAs ($km^2$) | % land area in IBAs | Globally-threatened species | Restricted-range species | Biome-restricted assemblages | Congreg-ational species |
| AFG | 17 | - | - | - | - | - | - |
| BGD | 19 | 5,396 | 3.6 | 11 | 0 | 10 | 9 |
| BTN | 23 | 12,133 | 31.6 | 23 | 12 | 15 | 4 |
| KHM | 40 | 44,170 | 24.4 | 38 | 10 | 19 | 25 |
| CHN | 445 | 1,134,546 | 11.9 | 400 | 162 | 280 | 162 |
| IND | 465 | 164,118 | 5.2 | 435 | 208 | 123 | 141 |
| IDN | 227 | 255,571 | 17.1 | 198 | 184 | 81 | 21 |
| LAO | 27 | 23,850 | 10.1 | 19 | 16 | 19 | 9 |
| MYS | 55 | 50,994 | 15.5 | 50 | 31 | 42 | 14 |
| MDV | 1 | 60 | 20.1 | 0 | 0 | 0 | 1 |
| MMR | 55 | 54,364 | 8.0 | 43 | 13 | 27 | 25 |
| MNG | 41 | 16,584 | 1.1 | 40 | 4 | 25 | 38 |
| NPL | 27 | 26,119 | 17.1 | 24 | 13 | 23 | 9 |
| PAK | 55 | 46,701 | 5.9 | 36 | 16 | 28 | 30 |
| PHL | 117 | 32,302 | 10.8 | 115 | 106 | 0 | 16 |
| LKA | 70 | 3,933 | 6.0 | 47 | 56 | 46 | 26 |
| THA | 62 | 44,426 | 8.7 | 50 | 6 | 35 | 19 |
| VNM | 63 | 16,899 | 5.1 | 56 | 32 | 40 | 18 |
| **SUM** | **1,809** | **1,932,166** | **-** | **1,585** | **869** | **813** | **567** |

AFG Afghanistan, BGD Bangladesh, BTN Bhutan, KHM Cambodia, CHN China, IND India, IDN Indonesia, LAO Lao PDR, MYS Malaysia, MDV Maldives, MMR Burma/Myanmar, MNG Mongolia, NPL Nepal, PAK Pakistan, PHL Philippines, LKA Sri Lanka, THA Thailand, VNM Vietnam.

The seven Biodiversity Hotspots occupy some 5.7 million $km^2$ in total, but are now 75-95% deforested; 5-15% of the original habitat is under some form of protection. Of the 1,809 Important Bird Areas, 56% are partly or fully protected and they occupy nearly two million $km^2$ in total. Table 4 summarises the conservation circumstances of 18 Asian countries, largely with reference to their protected area systems. These are the primary means by which countries have tried to safeguard natural ecosystems in the face of threats that are increasing severe, diverse, and often interactive (e.g. damaged ecosystems are more easily invaded by alien species, logged forests are more prone to fire). In this context, a key issue is the adequacy of conservation systems, in terms of ecosystem coverage, management capacity, or both. By these measures, serious problems are clearly evident in Afghanistan, Bangladesh, Burma/Myanmar, Cambodia, Indonesia, Maldives, Nepal, and Philippines.

| **Table 4: Conservation circumstances in 18 Asian countries** | |
|---|---|
| **Country** | **Status of protected area (PA) system** |
| Afghanistan | Six PAs were declared in the 1970s, but conservation activity has been at a standstill due to war ever since. |
| Bangladesh | PA coverage is low, with only 0.5-1.5% of the country being protected to any degree. Because of endemic corruption, these already limited conservation efforts are easily abandoned for short-term economic gains. Alien invasives include water hyacinth, *Acacia* and *Eucalyptus* trees, and exotic fish. |
| Bhutan | More than 26% of land area is protected and another 9% is designated as biological corridors. Threats include overgrazing, encroachment, forest fires, poaching, construction of roads and transmission lines, population pressures, and timber extraction. |
| Burma/ Myanmar | There are 45 terrestrial PAs with an area of 3.6 million ha, or 5.4 % of total land area. Threats include logging, mining, poaching and illegal trade of wildlife. Alien invasives include exotic fish. |
| Cambodia | There are 7 national parks, 10 wildlife sanctuaries, 3 protected landscapes, and 3 multiple-use areas, covering 3.273 million ha, or over 18% of land area. Management capacity is weak. |
| China | There are 1,999 nature reserves covering 14.4% of land area, 197 being national and the rest provincial or county. The annual nature reserve budget has grown to about $350 million from central government for 2001-2006, supplemented by external donors. Weaknesses of the system are that: (a) not all key ecosystems are adequately represented, (b) local management capacity is weak and may be corrupt, (c) the national management system is fragmented and uncoordinated, (d) the financing system is limited, fragmented and input-oriented, and (e) data, monitoring and information are inadequate for planning and decision-making. |
| India | There are 586 legally designated PAs that include 89 national parks and 479 sanctuaries covering 4.3% of land area. Since 1996, India has been experimenting with new model of ecodevelopment, involving local communities participating in protected area and ecosystem management. |
| Indonesia | Over 21.5 million ha or 11.7% of land area are included within PAs, as national parks, nature reserves, wildlife reserves, nature recreational parks, grand forest parks and game reserves. Another 4.7 million ha have been declared marine parks. Many parks and reserves have been badly damaged by illegal logging, fire, encroachment and destructive fishing practices, with poaching of valued species. Since 2004, government policy has been very supportive of conservation, but resources are limited and the donor community has largely abandoned the Indonesian forest sector because of past maladministration (see: Caldecott & Miles, 2005; Caldecott & Teusan, 2006). |
| Lao PDR | In 1993, 18 National Conservation Forests and National Biodiversity Conservation Areas were declared, and they were later expanded to cover more than 12% of the total land area. |
| Malaysia | Malaysia has created a network of PAs that are representative of most of its ecosystems, including Wildlife Sanctuaries, National Parks, State Parks, and |

| | |
|---|---|
| | Wildlife Reserves, with an area adding up to some 3.3 million hectares, or about 10% of the total land area (see also: Caldecott & Miles, 2005). |
| Maldives | 25 marine areas are protected dive sites. Lack of data on abundance and distribution of exploited species hinders monitoring efforts. The first four terrestrial PAs were declared in June 2006. Management capacity is very weak. |
| Mongolia | Special Protected Areas cover about 20.5 million ha or 13.1% of land area. There are plans to increase this to 30%, but management capacity is weak. |
| Nepal | National Parks and other PAs comprise about 18% of land area. Buffer zones help protect the enclaves. Up to 50% of revenues from national parks and wildlife reserves is returned for community development activities in the relevant buffer zones. This has improved relations between local people and park authorities and supported community-based institutions. There is a trans-frontier initiative between Nepal and India, the Terai Arc Landscape, covering 49,500 sq. km (47% in Nepal) and comprising 11 protected areas (4 in Nepal). |
| Pakistan | Pakistan has 14 National Parks, 99 Wildlife Sanctuaries and 96 Game Reserves, occupying over nine million hectares (or 10.4% of land area). Trapping and illegal hunting have greatly reduced the populations of larger mammals and birds, and alien invasive species are widespread. In short, the biodiversity of the country is fast heading towards complete annihilation. |
| Philippines | Under the National Integrated Protected Areas System Act, widely considered a landmark law because of the participatory management system it mandates, there are 244 protected areas in various categories. There are also about 500 marine protected areas. Most of these areas are legally designated on paper but have insufficient resources allocated for management. |
| Sri Lanka | There is a national system of PAs and conservation forests covering around 20% of land area. Alien invasive species, continued loss of environmentally sensitive habitats, unsustainable extraction and trade in species collected from the wild habitats (e.g. ornamental fish and plants) continue to threaten biodiversity. |
| Thailand | The PA network comprises 81 terrestrial national parks, 21 marine national parks, 55 wildlife sanctuaries and 55 managed resource wetlands, covering about 9%, 1%, 7% and 1% of the national territory respectively. There are also 38 forest reserves scheduled to be gazetted as national parks, covering a total area of 19,000 sq. km (or 3.7% of total land area). Many of the most effectively managed PAs in the region are in Thailand, although even these face a number of major threats, including resident human populations, illegal exploitation of forest products, and dams and other large development projects. |
| Vietnam | There are currently 95 decreed special-use forests, comprising 27 national parks, 40 nature reserves and 28 cultural and historical sites, covering a total land area of over 1.8 million ha. After Thailand, Vietnam has the largest number of national PAs in the Indochina region. The biggest gap in coverage of terrestrial forest ecosystems is lowland evergreen forest between 300 and 700 m elevation, and freshwater and coastal wetlands remain under represented. Although a small number of Vietnamese protected areas have levels of funding comparable to those in developed countries, the vast majority face a variety of constraints in terms of financial resources, personnel and capacity. |

Biodiversity loss is the net result of a 'witches brew' of interacting factors, but some clusters of these stand out (Caldecott *et al*., 2004). For example, governments may place, or may allow others to place, land conversion schemes in locations that contain large numbers of restricted-range species, this causing their extinction. This can occur because the active stakeholder does not know about the consequences for biodiversity, or chooses to sacrifice biodiversity in exchange for some other public or private good, or else because a stakeholder that does know, or that has different policies, may be too slow or too weak to prevent it from happening. Many of these events result from a lack of knowledge exchange between decision makers and knowledge holders. Such knowledge flow can also have an impact on rational decision making by ensuring that the many economic and other values of biodiversity are communicated to decision makers, thus making it less likely that people will be willing to sacrifice it.

People may also exploit natural ecosystems in ways that cannot be sustained, in the sense that irreversible changes occur as a result of harvesting, often causing a loss of biodiversity that is unique to the area. Or, people may design and manage protected area systems in ways that over time result in the erosion of biodiversity through isolation effects. Or, people may harvest species very heavily in one area because they are abundant there, not knowing that they migrate over a far larger area in the course of their lives, leading to a sudden collapse of the whole population and a cascade of ecological problems elsewhere. In all cases better understanding of the ecosystems and species being managed would help to encourage long-term outcomes more favourable to biodiversity survival.

Finally, many forms of environmental degradation are subtle yet can be very important, and awareness of their importance needs to be cultivated. Invasions by alien species are common examples, particularly in island systems (and ASEAN countries possess at least 23,000 of these) and areas where natural ecosystems have already been disturbed or fragmented. The risk of alien invasive species and genes contaminating or out-competing local ones is rapidly increasing throughout the ASEAN region, and the only real defence is knowledge and timely action to identify and head off the threats. This in turn also requires the taxonomic skills needed to distinguish among life forms, and such practical skills as how to rehabilitate damaged ecosystems to reduce their vulnerability to invasion. A number of other problems of biodiversity loss in the ASEAN region are summarized in Table 5, along with some potential solutions to them.

**Table 5: Problems of biodiversity loss, causes and possible solutions (from: Caldecott *et al*., 2004)**

| Problem | Direct Cause | Underlying Cause | Solutions |
|---|---|---|---|
| Resource use decisions made at all levels without adequate knowledge of biodiversity issues involved. | Information unavailable, unanalysed, lacking scale or out of date. | Weak data flow, lack of sharing, lack of standards. Poor collaboration amongst countries and institutions. | Adopt standards, upgrade data flow and improve sharing network. |
| Governments severely burdened by reporting to too many conventions and programmes. | Duplication of effort and poor access to relevant data. | Compartmentalisation of overlapping functions in different government units. | Streamline reporting functions and develop and promote harmonized reporting systems. |

| | | | |
|---|---|---|---|
| Weak management practices in protected areas and other conservation functions. | Lack of capacity and knowledge. Inadequate training for the job, poor in-service training. | Weak access to suitable materials and courses ill designed to meet job requirements. | Promote use of occupational standards. Provide better training tools and materials. Promote e-learning. |
| Alienation of local people through loss of access to traditional resources. | Poor governance. Inadequate involvement of local people in resource management or in obtaining rewards for benign environmental practices. | Weak policy and weak use of financial tools (compensations, taxes, incentives) to promote equitable sharing of benefits. Little effort to allocate resource management to local communities. | Formulate policies that safeguard ancestral rights, indigenous intellectual property and tax downstream beneficiaries to pay for upstream ecological services such as forest protection. |
| Unsustainable use of forest, land, fisheries and other resources. | Inefficient resource use practices still prevalent. Lack of knowledge. | Lack of applied research and failure of research findings to feed into improved practices. Weak extension. | Direct research into pressing problem areas and review research findings to derive quick benefits. |
| Vulnerability to biopiracy (of genes, proteins, medicines, commercial germplasm). | Lack of adequate controls. | Weak access protocols and regulations. Lack of physical enforcement measures. Poor collaboration amongst countries and institutions. | Promote access protocol and train customs officers to recognise prohibited items. Clearinghouse of reliable and black-listed bio-prospectors. |
| Unfair or environmentally unsound land-use or resource use allocations authorised. | Lack of understanding of ecological principles. National needs frustrated by personal motives. | Lack of coherent and integrated land and resource use planning. Poor access to pertinent information. Lack of transparency. Failure to involve all stakeholders. | Empower more stakeholders by establishing widely assessable and user friendly web-based information systems. |
| Increased incidence of catastrophes (climate change, floods, droughts). | Loss of forest cover. | Unsustainable land-use policies and practices. Pressures of population growth and poverty. | Increase ecological awareness and improve resource management policy. |
| Loss of harvestable renewable resources. | Over-harvesting and illegal trade. | Poorly calculated quotas or lack of controls. Lack of markets and marketing for potentially saleable products. | Base quotas on real field research. Strengthen monitoring and trade controls. |
| Threat to endemic species, habitats or loss of or damage to ecological services as a result of spreading alien invasive species and/or genetically-modified organisms. | Absence of adequate controls. | Lack of alien invasive species strategy, weak legislation, lack of assessment and field release trials. Lack of reporting. | Develop suitable strategies, laws, assessment procedures and release controls. Develop rapid response and eradication methods. |
| Increasing pollution of natural habitats. | Weak emission and dumping controls and regulations. | Lack of awareness, weak monitoring and weak reporting. | Improved habitat condition monitoring and reporting. |

## 2.2 LIVING CONDITIONS IN HUMAN SETTLEMENTS

### 2.2.1 Water quality

Rivers such as the Huang He or Yellow (China), Ganges (India), and Amu and Syr Darya (Central Asia) are among the world's most polluted rivers (http://www.unep.org/geo/pdfs/GEO-3). Inadequate water supply and poor sanitation cause more than 500,000 infant deaths a year as well as huge burden of illness and disability in the region. Hence all 18 countries report a scarcity of safe drinking water, most severely in Afghanistan, Bangladesh, Burma/Myanmar, China, India, Indonesia, Maldives, Mongolia, Nepal, Pakistan, and Philippines. The main reasons for this were given as:

- **sewage contamination**, in Afghanistan, Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Maldives, Mongolia, Nepal, Pakistan and Philippines;
- **pesticide contamination**, in Burma/Myanmar, Cambodia, Indonesia, Nepal, Philippines, Sri Lanka, and Thailand;
- **naturally-occurring arsenic**, in Bangladesh, Cambodia, Lao PDR, and Nepal;
- **leachates from garbage dumps**, in Maldives, Philippines, Sri Lanka, Thailand and Vietnam (see below);
- **seawater intrusion**, in Bangladesh, Maldives, and Sri Lanka;
- **miscellaneous industrial effluents**, in Bangladesh, China, Indonesia, Malaysia, Mongolia, Pakistan, Philippines, Thailand and Vietnam; and
- **Mining effluents** in China and Burma/Myanmar.

### 2.2.2 Solid wastes

Figures from China, Indonesia, Philippines, Pakistan, and Vietnam suggest that Asians generate 0.3-1.0 kg of solid waste per person per day on average, the amount being higher among urban dwellers than rural ones. These amounts are steadily increasing: for example in urban Vietnam, from 0.44 kg in 1996, to 0.85 kg in 2006, and projected to reach 1.3 kg by 2010; and in urban China rising at a rate of 9% per annum since 1979 (20% annually in Beijing). Systems for managing solid wastes are reportedly inadequate to the task in various ways, including the following:

- **large amounts of wastes not collected**, in Afghanistan, Bangladesh, Bhutan, Burma/Myanmar, India, Indonesia, Pakistan, Philippines, and Thailand;
- **wild dumping of wastes into the environment**, in Afghanistan, Bangladesh, Bhutan, Burma/Myanmar, Cambodia, India, Indonesia, Nepal, and Pakistan;
- **little separation of hazardous wastes**, in Afghanistan, Bangladesh, Bhutan, Burma/Myanmar, India, Indonesia, Nepal, Pakistan, Sri Lanka, Thailand, and Vietnam;
- **use of insecure dump and landfill sites**, in Afghanistan, Burma/Myanmar, India, Indonesia, Nepal, Philippines, Sri Lanka, and Thailand; and

- **Other serious deficiencies**, in Cambodia (a lack of legal guidelines, and dysfunctional and open garbage dumps), China (where 133,300 ha of farmland are described in the China Daily of 9 March 2005 as "occupied or ruined by sold wastes", overwhelmed landfills, and minimal investment in solid waste management), Lao PDR (especially severe for mine wastes), Maldives (where current waste management practices include open burning, stockpiling of hazardous wastes, and dumping of wastes on beaches, in lagoons and the open sea), and Mongolia (a generalised lack of waste management capacity and investment).

The overwhelming amounts of solid waste generated by Asia's cities in particular are causing increasing problems. Engineered landfill sites, lined with impermeable material (such as metre-deep sodium bentonite clay), with drainage channels, containment walls, cell management systems, coverings to minimise leachate release, and leachate collection and treatment systems, are an extreme rarity. Even where an engineered landfill site is built, such as that financed by Swiss aid at Piyungan near Yogyakarta in Java, poor management practices undermine its safety and performance (Haider, 2006). Leachate escaping from landfills poses special environmental problems. It is produced by percolating rain water reacting with the products of decomposition, chemicals and other materials in the waste, and is typically anoxic, acidic, rich in organic acid groups, sulphate ions and with high concentrations of common metal ions, especially iron. The risks from waste leachate are mainly due to its high organic contaminant concentrations and high ammoniacal nitrogen. Methane content may also pose a fire risk.

Significant, and possibly very large, amounts of wastes are imported into countries that include China, Indonesia and Pakistan, which have become dumping grounds for the international garbage disposal, electronic trash and toxic waste recycling businesses. The Indonesian authorities, for example, in July 2006 classified as hazardous waste the contents of 80,000 'green' bins sent there by British borough councils. That other countries are also involved is shown by recent controversies over the export of a French warship containing hazardous waste for scrapping in India, and the export of American industrial transformers falsely labelled 'PCB free' for recycling in the Philippines. Electronic wastes contain harmful substances such as lead, cadmium, mercury and chromium, and waste from abroad is additive to that produced locally. China's own e-waste, for example, is set to grow massively, along with that from old TV sets, refrigerators and washing machines, as the bulk of electronic goods purchased in the 1990s wears out.

### 2.2.3 Unexploded ordnance

Unexploded landmines and other ordnance are a particular problem in Afghanistan (with about 10 million mines), Cambodia (with 4-6 million), Lao PDR (which absorbed two million tonnes of bombs, many of them cluster munitions that delivered large numbers of bomblets that remain unexploded), Vietnam (where they have caused about 30,000 deaths and 64,000 injuries since 1975), in some parts of Sri Lanka and Indonesia. Armed conflict is continuing in Afghanistan, Nepal, Philippines and Sri Lanka.

### 2.2.4 Air quality

Seriously impaired air quality in urban areas, mainly as a result of vehicle emissions, is reported by 16 countries, the exceptions being Lao PDR and Maldives. Of the 15 cities in the world with the highest levels of particulates, tiny specks of soot, dust and other solid pollutants linked with breathing problems and heart attacks, 12 are located in Asia. Six of these cities also have the highest levels of atmospheric sulphur dioxide. As measured by microgrammes of particulate matter per cubic metre of air ($\mu gm^{-3}$), Asia's most polluted cities are: New Delhi (with about 175 $\mu gm^{-3}$), Calcutta (145 $\mu gm^{-3}$), Tianjin (140 $\mu gm^{-3}$), Chongqing (135 $\mu gm^{-3}$), Lucknow (130 $\mu gm^{-3}$), Kanpur (125 $\mu gm^{-3}$), Jakarta (115 $\mu gm^{-3}$), Shenyang (110 $\mu gm^{-3}$), Zhenzhou (105 $\mu gm^{-3}$), and Jinan (100 $\mu gm^{-3}$). By comparison, the particulate concentration was only 42 $\mu gm^{-3}$ in the air over Santiago, Chile, when a shift to natural gas was introduced in 1997, partly to control pollution; it had declined to 34 $\mu gm^{-3}$ by 2002 (UNEP, 2006).

Aggravating factors that make for very poor urban air quality include coal burning in power stations and for domestic heating in China, India and Mongolia. Haze from forest fires is an aggravating pollutant in Indonesia and Malaysia. The use of biomass fuels for cooking degrades domestic air quality in rural areas of Afghanistan, Bangladesh, India, Indonesia and Nepal, which together account for about 40% of global infantile mortality caused by pneumonia. The loss of disability-adjusted life years (DALYs, each equivalent to the loss of one year of healthy life) as a result of indoor air pollution from solid fuels is reportedly in the range 4-7.9% in Bangladesh, Burma/Myanmar, Bhutan, India, Nepal and Sri Lanka, and 2-3.9% in Afghanistan, Cambodia, China, Lao PDR, Malaysia, Mongolia, Pakistan, Philippines and Vietnam (UNEP, 2006). In China, an estimated 25 million tonnes of sulphur dioxide were emitted in 2005 (up 27% since 2000), mainly from coal burning, and caused acid rain to affect about a third of the country's land area. Around 0.28 million ha of forest land, for example, are reported to be damaged by acid rain in the Sichuan Basin of China.

## 2.3 THE ASIAN 'BROWN CLOUD'

The Asian Brown Cloud is a layer of air pollution covering parts of the northern Indian Ocean, India, Pakistan, and parts of South Asia, South-east Asia, and China. This pollution layer was observed during the Indian Ocean Experiment (INODEX) in 1999, and observations have continued under the auspices of UNEP in association with the Centre for Clouds, Chemistry and Climate (UNEP & C4, 2002). The haze is concentrated about three kilometres above the surface and can travel halfway around the Earth in less than a week. It has the effect of causing surface cooling by reducing sunlight penetration by up to 15%, and this affects plant photosynthesis and crop production, as well as having the potential to perturb weather patterns. It is thought to reduce rainfall by as much as 40% in north-west India, Pakistan, Afghanistan, and western China, and to contribute to rainfall and flooding in other areas. Its composition includes black carbon and ash, sulphates, nitrates, and mineral dust, suggesting sources in biomass burning (including forest fires), vehicle emissions and industrial emissions, as well as wind erosion and desertification. The cloud is particularly associated with the dry winter monsoon (December to April), during which there is little rainfall to wash out pollution.

## 2.4 NUCLEAR WASTE

China has operated both civilian and military nuclear programmes for several decades (http://www.ocrwm.doe.gov/factsheets/). Low-level radioactive waste (defined as that which is not spent nuclear fuel, high-level radioactive waste, uranium mining residues, or transuranic waste) is sent to various locations (reportedly including the Tibetan plateau) for near surface and above ground storage, and there are plans to construct four or five permanent repositories for such wastes. Spent nuclear fuel is cooled in water storage pools at China's three operating reactors for 15 years, and then either re-processed or stored, with liquid wastes being vitrified. High-level radioactive wastes are destined for deep geologic disposal. China is unique in that its repository plans are developed concurrently with the early stages of nuclear power plant construction. Current plans call for conducting feasibility studies between 2010 and 2020, followed by site licensing. Repository operation will begin no earlier than 2040. China carried out site screening from 1985-1986, concentrating on social, environmental, and geographical issues. The country is evaluating five potential repository sites, including its proposed underground research laboratory site in the Gobi Desert. The latter is planned to become operational around the year 2030.

The transport, treatment and storage of nuclear waste is also an issue in India and Pakistan. Waste in India is returned to Russia for processing and/or vitrified and stored in country, while that in Pakistan is stored at the reactor sites where capacity will be filled by 2012. Nuclear waste and/or fall-out from tests (or, potentially, military operations), originating on the periphery of the target Asian region, most particularly in North Korea and Iran, pose an unknown and unpredictable risk, which might one day become important.

## 2.5 CLIMATE CHANGE ISSUES

Anthropogenic greenhouse gases include (http://www.ec.gc.ca/pdb/ghg/about/gases_e):

- **Carbon dioxide**, from fossil-fuel combustion (including both stationary and mobile sources), deforestation (resulting in permanent land use change), and industrial processes such as cement production; over the 45 years to 1996, global emissions of carbon dioxide grew from about 6.4 Gt to 23.9 Gt, almost a fourfold increase.
- **Methane**, primarily released as a result of activities such as livestock and rice cultivation, biomass burning, natural gas delivery systems, landfills and coal mining; these have caused an increase of about 145% in atmospheric concentrations since the mid-1700s, with total emissions of about 360 Mt per year and making a contribution to global warming about one-third that of carbon dioxide.
- **Nitrous oxide**, resulting primarily from the application of nitrogenous fertilizers and the combustion of fossil fuels and wood; the atmospheric concentration of nitrous oxide has grown by about 15% since the mid-1700s, with total annual emissions from all sources within the range of 10 to 17.5 Mt.
- **Hydrofluorocarbons, perfluorocarbons** and **sulphur hexafluoride**, which could contribute several per cent to radiative forcing during the 21st century.

Rice fields, 90% of which are in Asia, emit 50-100 million tonnes of methane each year, and widespread deforestation in Asia results in soil oxidation and significant carbon dioxide release, but the 18 Asian countries are relatively low emitters of greenhouse gases on a per-person basis (Table 6). Their emissions lie in the range 0.01-0.4 tonnes of carbon per person per year for 14 of them, and only the coal-burning societies of China (0.86) and Mongolia (0.9) and the partly urban-industrial societies of Malaysia (1.8) and Thailand (1.1) are much above this level. The huge populations of China and India, however, and the rapid development growth in these countries, mean that they make a large and increasing contribution to emissions in absolute terms. China, for example, is now the world's second biggest emitter of greenhouse gases, after the USA, yet energy consumption per person in China is only 10-15% of that in the USA. Many analysts expect China's total emissions to overtake the USA's by about 2050.

**Table 6: Carbon emissions (as carbon dioxide released) by 18 Asian countries (Source: http://cdiac.ornl.gov/trends/emis/tre_coun.htm#P.)**

| Country | Year | Carbon emissions (million tonnes) | Carbon emissions (tonnes/person) |
|---|---|---|---|
| Afghanistan | 2003 | 0.20 | 0.01 |
| Bangladesh | 2002 | 10 | 0.07 |
| Bhutan | 2003 | 0.11 | 0.05 |
| Burma/Myanmar | 2003 | 2.6 | 0.05 |
| Cambodia | 2004 | 0.15 | 0.01 |
| China | 2003 | 1,131 | 0.86 |
| India | 2003 | 347 | 0.33 |
| Indonesia | 2002 | 84 | 0.39 |
| Lao PDR | 2003 | 0.35 | 0.06 |
| Malaysia | 2003 | 45 | 1.80 |
| Maldives | 2003 | 0.12 | 0.40 |
| Mongolia | 2003 | 2.3 | 0.90 |
| Nepal | 2003 | 0.8 | 0.03 |
| Pakistan | 2003 | 30 | 0.20 |
| Philippines | 2003 | 22 | 0.27 |
| Sri Lanka | 2003 | 3 | 0.15 |
| Thailand | 2003 | 70 | 1.10 |
| Vietnam | 2003 | 22 | 0.27 |

Climate change has the potential to degrade the socio-economic situation of all Asians. It is feared that there will be severe adverse impacts on rainfall patterns, agricultural potential, water resources, and terrestrial, wetland, aquatic and coastal ecosystems, besides increasing the range of disease vectors and rendering coastal areas vulnerable to inundation by the sea. This will especially adversely affect the poor and the marginalized who depend largely on agriculture, forests and marine resources for their

livelihoods, or who may become environmentally displaced persons. Countries that are already disaster prone (such as Bangladesh, India, Philippines and Vietnam) anticipate an additional frequency of calamity. Largely deforested countries with fragile soils and large numbers of poor people living in marginally productive ecosystems, such as many in Asia, are not in a strong position to cope with more extreme and/or unpredictable weather events. Hence government and the media take climate change seriously throughout the region, and several countries have undertaken studies on their own vulnerability and potential mitigation measures (e.g. Bhutan, Cambodia, Philippines).

The expectations of Lao PDR and Pakistan are as yet unformed because of ambiguous climate change scenarios, while no information is available for Burma/Myanmar. The other 15 countries describe their vulnerability to climate change in the following terms:

- **countries already vulnerable to drought that expect rainfall to decrease or become less reliable**: Afghanistan, China, India, Mongolia, Nepal, Philippines, Sri Lanka, and Vietnam;
- **countries already vulnerable to floods that expect rainfall to increase or become more intense**: Bangladesh, China, India, Nepal, Philippines, and Vietnam;
- **countries vulnerable to glacier melt flooding**: Bangladesh, Bhutan, and Nepal;
- **countries already vulnerable to typhoons that expect these to become more frequent and/or more severe**: Bangladesh, India, Philippines, and Vietnam;
- **countries with much of the population and infrastructure located close to sea level that expect inundation**: Bangladesh, Malaysia, Maldives, and Thailand (especially Bangkok);
- **countries that expect health effects from increased vector transmission of malaria and dengue**: India, Indonesia and Nepal;
- **countries that expect major ecosystem changes and species losses**: India, Indonesia (coral reefs, forest fires), Malaysia (high altitude forests), Maldives (coral reefs), Mongolia (receding permafrost and tree lines), and Nepal (glacier retreat); and
- **countries that expect reduced yield of rainfed crops**: Nepal, Sri Lanka (tea, coconut), and Thailand.

## 2.6 LIKELY CONSEQUENCES OF ENVIRONMENTAL TRENDS

Rapid urban-industrial growth has resulted in low energy efficiency within industry, in natural resource depletion, in materials-intensive production, and in polluted rivers and groundwater supplies and unhealthy air in many Asian cities. Energy demand in Asia has been doubling every 12 years resulting in major increases in greenhouse gas emissions. During the past ten years, greater resources have been committed to pollution control and to the remediation of existing pollution. Investments have also been made in urban infrastructure, particularly in water supply and sanitation systems, and, to a lesser extent, in mass transit systems. In addition, environmental regulatory systems are being strengthened in several countries in the region, and there are attempts to use

market-based instruments, information disclosure, public participation, clean technology and other policy approaches. Although results vary widely from country to country, enhancements in regulatory activity are yielding some incremental improvements in the environmental performance of industrial companies within the region.

What these regulatory initiatives have *not* done is to change the basic structural relationship between urban-industrial growth and the environment, and the parallel trend of increased energy and materials use, pollution and resource depletion. The core focus of environmental policy for industry continues to be that of reducing negative environmental *outputs* (e.g. pollution and waste) and on improving local environmental *outcomes* (e.g. air and water quality). Although current environmental policy yields some improvements in energy and materials efficiency, these facility-level efforts tend to be overridden by the scale effects of energy- and materials-intensive economic development. Without new policy interventions, the likely impacts of continued large-scale industrial and urban growth in Asia over the next 30 years will be declining environmental quality. This is despite substantial improvements in environmental regulation and a significant shift toward cleaner technology within the region.

Given the very likely continuing major shift from agriculture to industry, and from rural areas into cities, the critical challenge in Asia is to reduce substantially the energy, materials, pollution and waste intensity of urban-industrial activity in ways that support continued improvement in socioeconomic welfare. A trend of future urban and industrial activity in Asia toward patterns of development that are less intensive in terms of use of energy and materials and production of pollution and waste in a dynamic of continuous improvement and superior performance will be necessary. Hence, a policy framework for the future would depend on the development of low-cost, standardised, transparent and verifiable systems of environmental performance measurement at the scale of the factory, industry and industrial sector.

Environmental policy must make some critical contributions. It must articulate clear environmental and developmental goals and reflect emerging desire for greater public participation and transparency in the policy-making process. Regulators must support the integration of policy-making and policy implementation across multiple organisational domains, from industry to trade and technology, from public policy to corporate management, from local environmental quality to global and regional environmental concerns and from national policy to regional and international regulation. Traditional environmental policy has been pursued largely as an issue of environmental regulation and largely within environmental ministries or departments. The need now is to introduce environmental goals into line ministries and then to integrate environmental regulatory policy with industry, trade and technology policy. Such integration must also co-ordinate policy-making at multiple geographical scales, from the local to the national, regional (e.g. through ASEAN) and international (e.g. through the World Trade Organisation).

The critical opportunity lies in reducing the energy, materials, pollution and waste intensity of new urban and industrial investment. Success in this requires harnessing 'new' drivers of environmental performance, namely information, globalisation and technology. This would mean focusing on the development of clean technologies,

industries and urban infrastructure as sources of economic advantage and environmental improvement. This commitment would need to influence the future technology and investment decisions of private firms, capital markets, urban municipalities and consumers. Leveraging of private industry and capital as the principal agents for developing clean products and production processes would also be required. This could be achieved by strengthening the internal and external drivers of the technology and investment decision. Partly this would involve the establishment and enforcement of environmental standards. The new policy opportunity, however, involves promoting the use of information, performance measurement, market pressure and supplier linkages as a driver of superior performance. Globalisation has substantially enhanced the likely effects of such public and market drivers.

In the absence of convincing signs of irreversible change, however, it is easy to be pessimistic about the future in Asia. Compared with just 25 years ago, vast swathes of the region have been deforested, polluted or otherwise degraded to the great detriment of their capacity to sustain livelihoods or their ability to offer opportunities for new and non-destructive economic activities. Hundreds of thousands, possibly millions, of wild species have become committed to extinction, along with many languages and whole cultures. Once beautiful and diverse landscapes have been replaced by plantation monocultures, or scarred by massive quarries, or are now visible only through the haze of burning rainforests or the dust of disintegrating arid lands. As the Asian societies become wealthier, they consume much of what makes their own and each others' countries special, although they also become better able to select and protect natural parts of their lands and seas within protected areas. These, however, are becoming increasingly isolated as islands within a matrix environment dominated by the works of humanity. How many of them can survive in such isolation from the natural flows of genes, water and clean air that prevailed previously is open to question.

Over all this lies the promise of climate change, which will, in not yet fully-understood ways, upset rainfall patterns, seasons, sea-level, altitudinal zonation, and the intensity of storms and other extreme weather conditions. These effects pose a particular risk to islands (e.g. Maldives), and to low-lying coastal countries (e.g. Bangladesh), and there is clearly potential for environmental deterioration to interact with security issues, since it may result in tensions over dwindling resources (e.g. water, farmland) and ultimately the possibility of violent conflict. Into this changing world, the Asian societies have packed large numbers of additional people, many of them living close to the edge of survival in places that are already marginal ecologically, or in locations vulnerable to storm surges and land slides, and that increasingly lack the buffers offered by intact forested catchments, grasslands, wetlands and coral reefs. Millions of these may find that environmental conditions deteriorate to the point where to survive they must uproot themselves, becoming 'environmentally displaced persons'. Meanwhile, in the increasingly populous cities, day-to-day life among the urban poor will become ever more dominated by the scarcity of safe drinking water, by escalating concentrations of sewage, industrial effluent and garbage leachate in what freshwater there is, by mountainous quantities of solid wastes choking waterways and valleys, and by ever filthier air. All these trends are active and continuing, and the outlook is inevitably coloured by concern for natural ecosystems and wild species, for the quality of urban and rural life, and for the economic and social sustainability of Asian societies.

# 3. ENVIRONMENTAL POLICY, LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

## 3.1 ENVIRONMENTAL POLICY AND LEGISLATION

### 3.1.1 Environmental policies of major regional institutions

#### a) Association of Southeast Asian Nations (ASEAN)

ASEAN (http://www.aseansec.org) was established in August 1967 in Bangkok by the five original ASEAN Member Countries (AMCs), namely Indonesia, Malaysia, Philippines, Singapore, and Thailand. Brunei Darussalam joined in January 1984, Vietnam in July 1995, Laos and Myanmar in July 1997 and Cambodia in April 1999. ASEAN views the protection of the environment and the sustainable use and management of natural resources as essential to the long-term economic growth of their countries and the region. This commitment has strengthened over the years as environmental problems have become more complex, pervading almost every aspect of socioeconomic activity in the region. ASEAN milestones include:

- Signing (1984) of the revised ASEAN Declaration on Heritage Parks, which now includes all ten AMCs and recognises 27 protected areas as ASEAN Heritage Parks.
- Adopting the Framework for Environmentally Sustainable Cities in ASEAN, and the ASEAN Long-Term Strategic Plan for Water Resources Management.
- Adopting the Hanoi Plan of Action (1998) with 15 objectives for environment cooperation, which led to the adoption of the Strategic Plan of Action for the Environment, 1999-2004.
- Developing a number of mechanisms to promote regional cooperation, including ASEAN task forces on particular subjects (such as haze and forest fires), the ASEAN Working Group on Nature Conservation and Biodiversity (AWGNCB), meetings of ASEAN Senior Officers on the Environment (ASOEN) and the ASEAN Ministerial Meeting for the Environment (AMME).
- Establishing (1999) the ASEAN Regional Centre for Biodiversity Conservation with financial support from the European Union, to intensify regional cooperation on biodiversity conservation. It also serves as a focal point for networking and institutional linkage among the member countries and between ASEAN and EU partner organisations.
- An agreement on Transboundary Haze Pollution was signed by all ten AMCs in June 2002, and entered into force in November 2003 following its ratification by six AMCs (Brunei Darussalam, Malaysia, Burma/Myanmar, Singapore, Thailand and Vietnam). This is the first legally-binding ASEAN regional environmental accord and signifies the culmination of concerted and intensive regional efforts to address transboundary haze pollution since the 1997/98 haze episodes, and is seen by UNEP as a global model for tackling transboundary issues.
- Implementation of the ASEAN-Republic of Korea flagship project on Restoration of Degraded Forest Ecosystem in the Southeast Asian Tropical Regions, to contribute

to sustainable and equitable forest management and rehabilitation of deforested areas in AMCs through joint research, capacity building and information sharing.

- Adoption of Marine Water Quality Criteria for the ASEAN Region, the ASEAN Criteria for National Marine Protected Areas, and the ASEAN Criteria for Marine Heritage Areas.
- Adoption (December 2003) of the Framework for Environmentally Sustainable Cities, which provides a regional perspective in addressing environmental challenges in the areas of clean air, water and land. The Framework offers a set of best practices based on the experiences of AMCs. A conference was held in 2004 to help participating ASEAN cities identify and prioritize environmental areas of concern, and allow invited international organisations and developed countries to showcase their best practices on urban environmental management.
- ASEAN is developing a Programme of Action on Integrated Waste Management. A report on *State of Waste Management in Southeast Asia 2002* was published in cooperation with UNEP's International Environment Technology Centre.
- The ASEAN Environment Year 2003 was hosted by Cambodia with the theme "Together towards Sustainable Development." Activities highlighted national and regional environmental issues and cooperation, aiming to broaden participation by stakeholders in environmental management, and to stimulate regional efforts.
- The ASEAN Working Group on Coastal and Marine Environment identified the following issues for the integrated protection and management of coastal zones; coral reef, sea grass and mangrove; oil sludge from tankers and ballast water; management of solid and liquid waste; coastal erosion; ecotourism; and coastal wetlands, including protected marine areas. ASEAN is considering a regional action plan for coastal and marine surveillance of illegal discharges, using a region-wide community-based surveillance mechanism. ASEAN considers its main challenge as maintaining an optimal balance between development and conservation of natural resources in the region, with an integrated coastal and marine management system being part of the answer.

### b) South Asian Association for Regional Cooperation (SAARC)

SAARC was established when its Charter was adopted in December 1985 by the Heads of State or Government of Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. SAARC provides a platform for the peoples of South Asia to work together in a spirit of friendship, trust and understanding and aims to accelerate the process of economic and social development in Member States (see: http://www.saarc-sec.org). Only the CEP for Sri Lanka mentions SAARC, recommending a mission to investigate the potential for EC-funded SAARC actions to establish SAARC centres for sustainable marine fisheries, biodiversity, and forest restoration linked to poverty elimination. Several such centres are in the process of establishment, including those on culture (in Sri Lanka), forestry (in Bhutan), and disaster management and preparedness (in India). These are being added to a network of SAARC Regional Centres that already exist, comprising: an Agricultural Information Centre and a Meteorological Research Centre (in Bangladesh); a Tuberculosis Centre and an Information Centre (in Nepal); a

Documentation Centre (in India); a Human Resources Development Centre and an Energy Centre (in Pakistan); and a Coastal Zone Management Centre (in Maldives).

**c) South Asia Co-operative Environment Programme (SACEP)**

Following regional dialogue initiated in 1980, a ministerial-level meeting in 1981 approved the Colombo Declaration and the Articles of Association for the founding of SACEP (see: http://www.sacep.org). This became a legal entity, based in Colombo, Sri Lanka, in 1982, when Afghanistan, Bangladesh, Bhutan, India, the Maldives, Pakistan and Sri Lanka ratified the Articles of Association (Nepal did likewise in 1994, becoming the eighth member). SACEP has contributed regional knowledge exchange, but otherwise has little capacity to address the overwhelming environmental problems that persist among its member countries.

**d) International Centre for Integrated Mountain Development (ICIMOD)**

The International Centre for Integrated Mountain Development (ICIMOD), established in 1983 in Kathmandu, Nepal, serves eight regional member countries of the greater Himalayan region and the global mountain community, all of them target countries of the REP Asia (i.e. Afghanistan, Bangladesh, Bhutan, China, India, Burma/Myanmar, Nepal, and Pakistan). ICIMOD's cooperation policies are all ultimately geared towards improved livelihoods of mountain peoples of the Himalayan region, particularly the farmers and grassroots-level development workers and community leaders. The Centre's immediate beneficiaries are those who function as agents of change to bring about widespread improvements, such as policy and decision-makers, development researchers and practitioners, and non-government and community based institutions.

**e) United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)**

The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) was established in Shanghai, China in 1947 and has 62 members, including all 18 of the REP Asian target countries. It has the longest track record of any institution in identifying and analyzing economic and social trends in Asia and the Pacific. It established the Asian Development Bank in 1966, the Mekong River Commission in 1995, and the Asia-Pacific Centre for Agricultural Machinery in 2002. It is the biggest of the UN's five regional commissions in terms of population served and area covered. It advocates greater private sector involvement in infrastructure development, and assists in modernizing Asian highways and railways under the Asian Land Transport Infrastructure Development Programme. It also monitors progress of, and provides advice to, countries pursuing the UN Millennium Development Goals. As of 9 October 2006, UNESCAP had published 123 policy-relevant reports on the subject of the environment, clustered in categories that include: trade and investment, remote sensing and GIS, port development, use of agrochemicals, energy, cities, tourism, water, wastes, and hazards.

### 3.1.2 Multilateral environmental agreements

Table 7 summarises the membership of multilateral environmental agreements (MEAs) among the 18 Asian target countries. There are also a number of regional environmental agreements in place, including: the Malé Declaration on control and prevention of air pollution (Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan, Sri Lanka); the Agreement for the Establishment of the Indian Ocean Tuna Commission (India, Pakistan, Sri Lanka, Thailand); and the Plant Protection Agreement for Asia and Pacific Region (Bangladesh, Burma/Myanmar, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam).

Finally, there are the agreements, all with at least some environmental content, amongst the member countries of: the Mekong River Commission (Lao PDR, Thailand, Cambodia, Vietnam); ICIMOD (Afghanistan, Bangladesh, Bhutan, China, India, Burma/Myanmar, Nepal, Pakistan); SACEP (Afghanistan, Bangladesh, Bhutan, India, the Maldives, Pakistan, Sri Lanka); SAARC (Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka); and ASEAN (Burma/Myanmar, Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Thailand, Vietnam).

ASEAN is concentrating on key agreements of regional importance, including the Montreal Protocol (on ozone depletion), the Basel Convention (on hazardous wastes), the Convention on Climate Change (with the Kyoto Protocol on greenhouse gas emissions), the Rotterdam Convention (on trade in hazardous chemicals), and the Stockholm Convention (on Persistent Organic Pollutants). The main challenges to implementation of all these international agreements, which are faced by the non-ASEAN and ASEAN signatories alike, include funding, appropriate environment policies, human resources, and technological capacity. To face these challenges, ASEAN has assigned the Working Group on Multilateral Environmental Agreements to seek a common ASEAN approach to negotiating and implementing these agreements. ASEAN now takes part in conferences of parties and helps member countries assert the association's common points.

National approaches and institutional capacity to address MEAs vary widely. For example, China and India have played a key role in the global debate on climate change and have developed significant negotiating capability. Vulnerable countries have also played an active role, for example Bangladesh has developed significant scientific and analytical capability. Progress in implementing MEAs has been slow as a result of the lack of institutional, administrative and financial capability, and a lack of integration of different MEAs. Although national plans and programmes exist in some countries, institutional arrangements for implementing MEAs are not well developed. Responsibility for environmental issues lies with specific ministries and their departments. Regional NGO networks often focus on a single MEA, for example the Climate Action Network in South Asia and Southeast Asia.

Few new national institutions have been created to adopt and implement regional MEAs. Legal adoption is slow and political acceptance is below the target levels set in the agreements. The pace of implementation depends on political will which, in turn, is

controlled by the direct effect on the public of non-compliance. Secretariats are generally situated in the offices of international organizations such as FAO and ASEAN, or in the Foreign Ministries of individual countries, with national organizations being responsible for implementation. For example, the Bangladesh Water Development Board is the implementing institution for the Ganges Water Sharing Treaty and the two countries involved, India and Bangladesh, have set up a Joint River Commission. For purposes of reporting on implementation of the Convention on Biological Diversity, the responsible agency is usually one concerned with forest or protected area management, for example:

- in Cambodia, the Department of Nature Conservation and Protection, Ministry of Environment;
- in Lao PDR, the Forest Resources Conservation Division, Department of Forestry, Ministry of Agriculture;
- in Malaysia, the Nature Conservation and Environmental Management Division, Ministry of Science, Technology and Environment;
- in Philippines, the Protected Areas and Wildlife Bureau, Department of Environment and Natural Resources;
- in Thailand, the Office of Environmental Policy and Planning, Ministry of Natural Resources and Environment; and
- in Vietnam, the Nature Conservation Division, National Environment Agency.

Incentives in the form of subsidies, tax reductions and penalties on organizations in breach of an agreement are now being considered as possible mechanisms for promoting compliance. Relevant national offices can be involved in such incentives. For instance, national bodies entrusted with the conservation of forests (under the Plant Protection Agreement) provide assistance for plantation and impose penalties for cutting wood in protected areas.

The lack of accepted indicators for assessing the impact of regional MEAs means that only a qualitative view can be given of their impacts. In general, it is hard to identify any positive effects; indeed the flora and fauna of the region are rapidly decreasing, vulnerability to flooding is increasing, drought and other extreme events are growing concerns and the traditional varieties of rice are disappearing. Government and non-government agencies responsible for implementation need immediate strengthening if the situation is to be improved.

| Convention (for full names see Notes) | Table 7: Membership of multilateral environmental agreements by Asian countries (data from: Country Environmental Profiles; Convention websites; https://www.cia.gov/cia/publications/factbook/geos/) (ISO country codes from: http://userpage.chemie.fu-berlin.de/diverse/doc/ISO_3166.html) | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AFG | BGD | BTN | KHM | CHN | IND | IDN | LAO | MYS | MDV | MMR | MNG | NPL | PAK | PHL | LKA | THA | VNM |
| Basel haz. wastes | (*) | * | * | * | * | * | * | | * | * | | * | * | * | * | * | * | * |
| Biodiversity | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| Bonn migratory spp. | | * | | | | * | | | | | | * | | * | * | * | | |
| Cartagena biosafety | | * | * | * | * | * | * | * | * | * | | * | | * | | * | * | * |
| CITES | * | * | * | * | * | * | * | * | * | | * | * | * | * | * | * | * | * |
| Climate change | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| Desertification | * | * | | * | * | * | * | * | * | | * | * | * | * | * | * | * | * |
| Kyoto GHG | | * | * | * | * | * | * | * | * | * | * | * | | * | * | * | * | * |
| Marine dumping | * | | | | * | | | | | | | | | * | * | | | |
| Marine life cons'n | (*) | | | * | | | (*) | | * | | | | (*) | (*) | | (*) | * | |
| MARPOL | | | | * | * | * | * | | * | | * | | | * | * | * | | * |
| Military env. mod. | * | * | | | | | | * | | | | * | | * | | * | | * |
| Montreal ozone | * | * | | | | * | | | | | | * | * | * | | * | | |
| Ramsar wetlands | | * | | * | * | * | * | | * | | | * | * | * | * | * | * | * |
| Rome plant protect'n | | (*) | (*) | (*) | (*) | * | * | (*) | (*) | | (*) | | (*) | (*) | * | * | * | (*) |
| Rotterdam haz. chem. | | | | | * | (*) | * | | (*) | | | | | * | * | (*) | (*) | |
| Stockholm POPs | | | | | | | | | | | | * | * | * | (*) | | | |
| Tropical timber | | | | * | * | * | * | | * | | * | | * | | * | | * | |
| UNCLOS | (*) | * | (*) | (*) | * | * | * | * | * | * | * | * | * | * | * | * | (*) | * |
| Vienna ozone | * | * | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| Whaling | | | | | * | * | | | | | | * | | | * | | | |
| World Heritage | * | * | | | * | | | | | | | | | * | | * | | |

**NOTES**.
(a) Country codes: AFG (Afghanistan), BGD (Bangladesh), BTN (Bhutan), KHM (Cambodia), CHN (China), IND (India), IDN (Indonesia), LAO (Lao PDR), MYS (Malaysia), MDV (Maldives), MMR (Burma/Myanmar), MNG (Mongolia), NPL (Nepal), PAK (Pakistan), PHL (Philippines), LKA (Sri Lanka), THA (Thailand), VNM (Vietnam).

(b) * = ratified; (*) = signed or adhered but not ratified;

(c) Names of multilateral environmental agreements:

- **Basel haz. wastes**: Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (1989).
- **Biodiversity**: Convention on Biological Diversity (Rio, 1992).
- **Bonn migratory spp**.: Bonn Convention on the Conservation of Migratory Species of Wild Animals (1979).
- **Cartagena biosafety**: Cartagena Protocol (of the Convention on Biological Diversity) on Biosafety.
- **CITES**: Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington DC, 1973).
- **Climate change**: United Nations Framework Convention on Climate Change (UNFCC, Rio, 1992).
- **Desertification**: United Nations Convention to Combat Desertification (Paris, 1994).
- **Kyoto GHG**: Kyoto Protocol to the United Nations Framework Convention on Climate Change.
- **Military env. mod**.: Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (1976).
- **Marine dumping**: Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London, 1972).
- **Marine life cons'n**: Convention on Fishing and Conservation of Living Resources of the High Seas (1958).
- **MARPOL**: International Convention for the Prevention of Pollution From Ships (1973, protocol 1978).
- **Montreal ozone**: Montreal Protocol on Substances That Deplete the Ozone Layer (1989).
- **Ramsar wetlands**: Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar, 1971).
- **Rome plant protect'n**: International Plant Protection Convention (Rome, 1951).
- **Rotterdam haz. chem**.: The Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam, 1998).
- **Stockholm POPs**: Stockholm Convention on Persistent Organic Pollutants (2001).
- **Tropical timber**: International Tropical Timber Agreement (1983, 1994).
- **UNCLOS**: United Nations Convention on the Law of the Sea (Montego, 1982).
- **Vienna ozone**: Vienna Convention for the Protection of the Ozone Layer (1985).
- **Whaling**: International Convention for the Regulation of Whaling (1946).
- **World Heritage**: Convention Concerning the Protection of the World Cultural and Natural Heritage (1972).

## 3.2 ENVIRONMENTAL LEGISLATION AND INSTITUTIONAL FRAMEWORK

### 3.2.1 Institutional arrangements dealing with shared natural resources

There is no specific mention of shared resources, cross-border or transboundary programmes in the CEPs for Afghanistan (aside from the idea of a trans-border Peace Park in the Pamir region between Afghanistan, Tajikistan, China and Pakistan), Bangladesh, Bhutan, Burma/Myanmar, Cambodia, India, Indonesia, Malaysia, Nepal, Pakistan, Philippines, Sri Lanka, Thailand or Vietnam.

In **China**, the Regional Environment Cooperation Division manages agreements and co-ordinates dialogue with neighbouring ASEAN countries (i.e. Burma/Myanmar, Lao PDR, and Vietnam), tripartite Ministerial Meetings with Japan and Korea, Greater Mekong Sub-Region Co-operation, and dialogue with the EC and the OECD. The main subjects of the EU dialogue have been in the areas of biodiversity, river basin management and vehicle emission standards. Although the CEP makes no mention of institutional arrangements for their implementation, China has entered into the following formal agreements with these stakeholders:

- Sino-Japan Agreement on the Protection of Migratory Birds
- Sino-Australia Agreement for the Protection of Migratory Birds and their Habitat
- China and the former Soviet Union signed the Agreement on Fisheries
- China and Russia [Federation] initialled the Agreement for the Protection of Fish Propagation in Border Water along the Heilong River and Wusuli River
- China and Mongolia signed the Cooperation Agreement on Protection of Natural Environment

**Mongolia** has a trans-boundary protected area with Russia and China, and is also committed to joint protection of the Tumen River Basin because the Kherlen and Khalkh Gol rivers in the east of the country feed the Amur River, which ultimately flows through Russia into the Pacific. The Trans-boundary Water Conservation Inter-government Agreement between Mongolia and Russia on regional water resources had a successful study phase, but due to lack of funding little else was accomplished. The CEP says nothing on any institutional arrangements to facilitate these arrangements.

### 3.2.2 Regional co-operation on environmental issues

#### a) Association of Southeast Asian Nations (ASEAN)

At the 6$^{th}$ ASEAN Summit in Vietnam (December 1998) the Hanoi Plan of Action was developed with 15 objectives for environment cooperation, which led to the adoption of the Strategic Plan of Action for the Environment, 1999-2004, which called for:

- Implementing the ASEAN Cooperation Plan on Transboundary Pollution with emphasis on the Regional Haze Action Plan (by 2001).

- Strengthening the ASEAN Specialised Meteorological Centre with emphasis on its ability to monitor forest and land fires and provide early warning of transboundary haze (by 2001).
- Establishing the ASEAN Regional Research and Training Centre for Land and Forest Fire Management (by 2004).
- Strengthening the ASEAN Regional Centre for Biodiversity Conservation by setting up networks of relevant institutions and carrying out collaborative training and research (by 2001).
- Promoting regional coordination to protect the ASEAN Heritage Parks and reserves.
- Developing a framework for improving regional coordination for the integrated protection and management of coastal zones (by 2001).
- Strengthening institutional and legal capacities to carry out Agenda 21 and other international environmental agreements (by 2001).
- Harmonising the environmental databases of member countries (by 2001).
- Implementing a regional water conservation programme (by 2001).
- Establishing a regional centre or network to promote environmentally sound technologies (by 2004).
- Developing and adopting a Protocol on access to genetic resources (by 2004).
- Developing a regional Action Plan for the Protection of the Marine Environment from Land-based and Sea-based Activities (by 2004).
- Implementing the Framework to Achieve the Long-term Environmental Goals for Ambient Air and River Water Qualities for ASEAN countries.
- Enhancing regional efforts in dealing with climatic change.
- Enhancing public information and awareness of and participation in issues on the environment and sustainable development.

The Hanoi Plan of Action thus has measurable benchmarks based on set time frames and targets. Since environmental issues are interdisciplinary and cross-sectoral, member countries must coordinate with other sectoral bodies in ASEAN in carrying out the Plan. Similarly, the other sectors are asked to incorporate environmental considerations into their development plans.

### b) ASEAN Centre for Biodiversity (ACB)

The tropical/equatorial region occupied by the ASEAN Member Countries (AMCs) is an area of extraordinary importance for the fulfilment of global biodiversity priorities, such as the commitment by the World Summit on Sustainable Development to achieve a significant reduction in the rate of biodiversity loss by 2010, and the European Commitment to halt all biodiversity loss by 2010. The significance of ASEAN in this context can be seen from the fact that it includes three countries with exceptional levels of species richness and endemism (Indonesia, Malaysia and Philippines), several biogeographical realms and regions, and numerous centres of concentration of

restricted-range bird, plant and insect species. Species richness by area is higher in several ecosystem types (e.g. lowland rain forest and coral reefs) than anywhere else on Earth, and overall species richness is known to be very high although most species are little-studied invertebrates and unknown to science. Best estimates taking into account ASEAN marine and terrestrial species richness suggest that the territories and territorial waters of this region may contain up to 40% of all species on Earth, a total of millions to tens of millions of distinct life forms, most of them occurring nowhere else.

The AMCs are committed, through national law and policy as well as international agreement, to promote the conservation of natural ecosystems and biodiversity. Reducing the rate of biodiversity depletion in the ASEAN region is seen as being achievable through various practical protection measures as well as the development of fair and equitable partnerships to save, study, teach about and use sustainably the various components of biodiversity (genes, species and ecosystems). Almost all the AMCs have undertaken some type of biodiversity sector analysis (*Biodiversity Action Strategy*, *Biodiversity Action Plan*, *Environmental Country Study*, *Biodiversity Assessment*, etc.). At the regional level there was a 1997 *Review of the Protected Areas Systems of the Indo-Malayan Realm*, a 2003 overview of the ASEAN protected areas network for the World Parks Congress in Durban, South Africa, an IUCN study on *Biodiversity Planning in Asia*, and every two years the *ASEAN State of Environment* reports by the ASEAN Secretariat. All these studies reveal the very serious condition of the biodiversity sector in the region and the many tasks that need urgent attention.

By the mid-1990s, the concept of establishing an ASEAN institution to promote knowledge sharing about best practices and common efforts in the biodiversity sector had arisen, and led to a proposal for European Union (EU) collaboration in establishing an ASEAN Regional Centre for Biodiversity Conservation (ARCBC). This idea was developed in the context of the long-term, EU-ASEAN region-to-region partnership, and led to a Financing Agreement for a project to support the establishment of ARCBC being signed in July 1997. Participation in the ARCBC project was initially limited to seven AMCs (Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam), but Cambodia and Lao PDR also became participating AMCs from June 2002. The Implementing Agency was the Government of the Philippines' Department of Environment and Natural Resources (DENR), and ARCBC was physically located on the campus of the University of the Philippines at Los Baños. The project was implemented over a five-year period commencing 17 Feb 1999. After a slow start in 1999-2001, it made rapid progress on a number of fronts. Its basic purpose was to promote regional co-operation and strengthen human and institutional capacity across the biodiversity sector within ASEAN, and its activities were organized around the following themes:

- to make the ARCBC office operational and sustainable;
- to establish a functional network of biodiversity conservation institutions;
- to develop and deliver biodiversity conservation training;
- to upgrade conservation research standards by funding research projects;
- to develop an adaptive biodiversity database system;

- to promote regional policy development; and
- to establish National Biodiversity Reference Units (NBRUs) in each AMC to act as national focal points for biodiversity conservation and to serve as contacts with each other and with ARCBC, with the following institutions appointed as NBRUs:
    - **Brunei Darussalam**: Forestry Department, Ministry of Industry and Primary Resources (1999);
    - **Cambodia**: Department of Nature Conservation and Protection, Ministry of Environment (2001);
    - **Indonesia**: Research Centre for Biology, Indonesian Institute of Sciences (2000);
    - **Lao PDR**: Forest Resources Conservation Division, Department of Forestry, Ministry of Agriculture (2002);
    - **Malaysia**: Nature Conservation and Environmental Management Division, Ministry of Science, Technology and Environment (1999);
    - **Philippines**: Protected Areas and Wildlife Bureau, Department of Environment and Natural Resources (1999);
    - **Singapore**: National Parks Board, Nature Conservation Branch, Singapore Botanic Gardens (1999);
    - **Thailand**: Office of Environmental Policy and Planning, Ministry of Natural Resources and Environment (1999); and
    - **Vietnam**: Nature Conservation Division, National Environment Agency (1999).

In late 2003 a mission was organised to examine the possibility of a successor institution, the ASEAN Centre for Biodiversity (ACB), to continue and develop the work of ARCBC with a revised mandate and increased AMC financial support, and to institutionalise itself within ASEAN. This was done, and the ACB was created in September 2005 with the signing of ASEAN Agreement for the Establishment of the ASEAN Centre for Biodiversity by the 10 AMCs (http://www.aseanbiodiversity.org/). The EU is providing initial funding for 3.5 years while ASEAN provides counterpart funding. The purpose of the project is to achieve strengthened regional capacity on biodiversity in ASEAN. This will be done by promoting the exchange of relevant knowledge, thus helping national, ASEAN and international needs and commitments to be fulfilled in terms of retrospective monitoring and early warning systems, while facilitating greater investment in the biodiversity sector within ASEAN. In strategic terms, the roles of the ACB are to promote cooperative activities with the aim of:

- **saving biodiversity** (e.g. the design, protective management, financing, use, planning, staffing and inter-sectoral significance of protected areas and protected area systems; the management of genetic resources, species, populations and ecosystems outside protected areas; the suppression of alien invasive species, fires and other factors that pose a threat to wild species populations; and relevant legislation and policies);

- **studying biodiversity** (e.g. all actions to do with research and inventory work involving the collection of information of any kind related to any aspect of genetic resources, species, populations and ecosystems and the organization and use of that information);
- **teaching about biodiversity** (e.g. all actions that use information about biodiversity for an educational purpose whether commercialized or not); and
- **using biodiversity** (e.g. in agriculture, medicine, bioprospecting, ecotourism, natural history film-making and journalism).

### c) South Asian Association for Regional Cooperation (SAARC)

SAARC provides a platform for the peoples of South Asia to co-operate, and aims to accelerate the process of economic and social development in Member States. The areas of cooperation under SAARC's Regional Integrated Programme of Action include: Agriculture and Rural Development; Health and Population Activities; Women, Youth and Children; Environment and Forestry, Science and Technology and Meteorology; Transport; and Human Resource Development. Working Groups have also been established in the areas of: Information and Communications Technology (ICT); Biotechnology; Intellectual Property Rights (IPR); Tourism; and Energy.

The 7th conference of SAARC environment ministers (Dhaka, May 2006):

- adopted a 10-point declaration that includes the setting up of an expert committee to prepare a concept paper on a regional environment treaty and the setting up of a programme to observe 2007 as 'Green South Asia Year';
- approved the 'Framework' prepared at a workshop of SAARC experts (Dhaka, 2005) to manage and prevent disasters in the region;
- discussed the concept paper about establishing the proposed Forestry Centre in Bhutan in addition to strengthening the Meteorological Research Centre in Dhaka and Coastal Zone Management Centre in Malé;
- decided to take steps for an integrated environment standard for member countries;
- discussed the preparation of a regular SAARC state of environment report;
- agreed to hold a workshop on water preservation and river-bank management;
- discussed establishing a Centre for Disaster Management;
- stressed that member states should not take any step that harms another country; and
- recommended discussing mega-projects at a regional forum before implementation.

### d) South Asia Co-operative Environment Programme (SACEP)

SACEP's programme activities focus on: Institutional Strengthening and Capacity Building; Conservation and Sustainable Management of Ecosystems; Pollution Assessment and Control; Environmental Information, Reporting and Networks; and Environmental Education and Awareness. SACEP's programme activities focus on: institutional strengthening and capacity building; conservation and sustainable management of ecosystems; pollution assessment and control; environmental information, reporting and networks; and environmental education and awareness. Most activities focussed on organising workshops and forums, with training courses and publications. The first Governing Council meeting of SACEP approved 15 priority

subject areas that had been identified by SACEP with support from UNEP and UNDP (see Table 8).

**Table 8: Key environmental priorities in SACEP member countries (Source: high and medium priorities from http://www.sacep.org/html/regional_environment.htm).**

| | SACEP member country (ISO codes) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Key environmental priorities | AFG | BGD | BTN | IND | MDV | NPL | PAK | LKA |
| **Land degradation & desertification:** | | | | | | | | |
| 1. Water erosion | * | * | * | * | | * | * | * |
| 2. Wind erosion | * | | * | * | | | * | |
| 3. Water logging | | * | | * | * | | | * |
| 4. Salinisation | * | * | | * | * | | * | * |
| 5. Biodiversity loss | | * | * | * | * | * | * | * |
| 6. Forest loss | | * | | | * | | * | * |
| 7. Water scarcity | * | * | | | | | * | * |
| 8. Water pollution | | * | * | | | * | * | * |
| 9. Poor water supply & sanitation | * | * | * | | | * | * | * |
| 10. Poor urban waste management | * | * | * | * | * | * | * | * |
| **Degradation of air quality:** | | | | | | | | |
| 11. Urban automobile emissions | | * | * | * | * | | * | * |
| 12. Industrial emissions | | * | | | | | * | * |
| 13. Domestic cooking | | * | * | | | * | * | |
| 14. Environmental health issues | | * | * | * | | | * | * |
| 15. Coastal/marine degradation | | * | | * | * | | * | * |
| **Natural disasters:** | | | | | | | | |
| Droughts | * | * | | | | | * | * |
| Floods & land slides | | * | * | | | * | | * |
| Sea level rise | | * | | * | * | | | * |

## e) International Centre for Integrated Mountain Development (ICIMOD)

The International Centre for Integrated Mountain Development (ICIMOD), established in 1983 in Kathmandu, Nepal, serves eight regional member countries of the greater Himalayan region and the global mountain community, all of them target countries of the REP Asia (i.e. Afghanistan, Bangladesh, Bhutan, China, India, Burma/Myanmar, Nepal, and Pakistan). ICIMOD's efforts are all ultimately geared towards improved livelihoods of mountain peoples of the Himalayan region, particularly the farmers and grassroots-level development workers and community leaders. The Centre's immediate beneficiaries are those who function as agents of change to bring about widespread improvements, such as policy and decision-makers, development researchers and practitioners, and non-government and community based institutions.

### f) United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)

The regional arm of the United Nations Secretariat for the Asian and Pacific region is the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). It is located in Bangkok, Thailand, and has the following functions:

- Promoting economic and social development through regional and sub-regional cooperation and integration;
- Serving as the main economic and social development forum within the United Nations system for the UNESCAP region;
- Formulating and promoting development assistance activities and projects commensurate with the needs and priorities of the region while acting as an executing agency for relevant operational projects;
- Providing substantive and secretariat services and documentation for the Commission and its subsidiary bodies;
- Carrying out studies, research and other activities within the terms of reference of the Commission;
- Providing advisory services to governments at their request;
- Developing and executing programmes of technical cooperation;
- Coordinating UNESCAP activities with those of the major departments/offices of the United Nations at Headquarters and specialized agencies and intergovernmental organizations.

UNESCAP was established in Shanghai, China in 1947 and has 62 members, including all 18 of the REP Asian target countries. It has the longest track record of any institution in identifying and analyzing economic and social trends in Asia and the Pacific. It established the Asian Development Bank in 1966, the Mekong River Commission in 1995, and the Asia-Pacific Centre for Agricultural Machinery in 2002. It is the biggest of the UN's five regional commissions in terms of population served and area covered. It advocates for greater private sector involvement in infrastructure development, and assists in modernizing Asian highways and railways under the Asian Land Transport Infrastructure Development Programme. It also monitors progress of, and provides advice to, countries pursuing the UN Millennium Development Goals. As of 9 October 2006, UNESCAP had published 123 reports on the subject of the environment, clustered in categories that include: trade and investment, remote sensing and GIS, port development, use of agrochemicals, energy, cities, tourism, water, wastes, and hazards.

### g) The Mekong River Commission

Cambodia, Lao PDR, Thailand and Vietnam were the four signatory parties to the 1995 Agreement on the Co-operation for Sustainable Development of the Mekong River Basin and the members of the Mekong River Commission (MRC), which succeeded the

Mekong Committee. Whereas the Committee was primarily focussed on hydrology, navigation and hydropower, the mandate of the Commission is more oriented towards co-operation for the promotion of sustainable development, use, management and conservation of the water and related resources of the Mekong River Basin. The primary purpose of the Agreement is to promote economic and social well-being of the people in all the riparian countries through protection of the environment, improvement of navigation, and co-operation in the maintenance of flows and intra- and inter-basins diversions. The MRC has initiated several basin-wide planning and research programmes, including the Water Utilisation Plan, the Environmental Programme, the Basin Development Plan, and the Fisheries Programme. Lao PDR has its own National Mekong Secretariat in Vientiane.

**h) Greater Mekong Sub-region initiative**

In 1992, Burma/Myanmar, Cambodia, China (Yunnan Province), Lao PDR, Thailand and Vietnam established the ADB-supported Greater Mekong Sub-region (GMS) initiative. This involves a programme of sub-regional economic cooperation, designed to enhance economic relations among the countries. The programme has contributed to infrastructure development and better use of the resource base in the sub-region. In Lao PDR, maintaining the environmental equilibrium of almost the entire country is directly dependent upon retaining as much of the forest and vegetative cover as possible. However, Lao PDR is surrounded by resource poor (but economically richer) countries, especially Thailand, Vietnam and China, where large long-term markets exist for a wide range of forest products, including those that are endangered and/or legally protected. The lack of institutional capacity and authority of environmental institutions in Lao PDR (principally the Science Technology and Environment Agency) and consequent weak or absent enforcement of environmental legislation is a critical obstacle to future resource conservation. It has resulted in large scale unsustainable logging of the forest lowlands and export of logs, much of it supported by elements of the national army and government, and others with vested interests.

In the regional context, increasing incursion of Chinese and the opening up of vast areas of presently inaccessible wildlands in Lao PDR and along the Lao-Vietnam border by trans-national road networks between Thailand, China and Cambodia, will constitute a severe threat to forest timber reserves and to endangered wildlife. Evidence exists of overseas investors seeking and gaining logging concessions in Lao PDR. Chinese, Malaysian, Korean and other investors are rapidly stripping forests on the pretext of investment in oil palm, rubber and other tree crop plantations. Yet long-term commitment to tree crop production by foreign 'investors' has so far been superficial. Forest utilisation has essentially become a 'mining' operation, in which a potentially sustainable resource is being eliminated for a one-off private gain.

Regional economic corridors are expected to play a crucial role in delivering the development agenda in the GMS. There is concern that increasing development activities in the economic corridors may adversely affect critical ecosystems and high value biodiversity areas resulting in fragmentation of natural landscapes. This would undermine the functioning and performance of the region's ecosystems, thereby threatening long-term socio-economic development and environmental security of the

Sub-region. The GMS biodiversity conservation corridor initiative is to support the broad-based agenda of sustainable development identified by the GMS countries.

**i) Other initiatives**

Mongolia has six RAMSAR sites, one of which forms part of a trans-boundary protected area with Russia and China. Many protected areas, particularly the strictly protected areas, national parks, and forest areas, are located along Mongolia's borders. With China, Russia and Korea, Mongolia is committed to joint protection of the Tumen River Basin. Regional co-operation is also promoted with Russia and Kazakhstan on the protection of the Altai-Sayan ecoregion in Western Mongolia. A steering committee of representatives from the three countries meets annually (supported by UNDP/GEF) to discuss ways to promote trans-boundary cooperation and could become a forum for implementation of specific programmes and actions.

A joint sampling programme between Russia and Mongolia has been undertaken to monitor water quality in the Altan River, a small loop of which flows south out of Russia before continuing back into Russia. Because of heavy mining activity upstream the short loop into Mongolia is reported to be heavily polluted (UNDP, 2004). A similar agreement with the Russian forestry agency to cooperate on issues such as pest infestations and wild fires does not apparently work well. Russia provides remote imagery and other information, but action is limited by lack of funds.

Another area of intended co-operation is the programme 'Prevention and Control of Dust and Sandstorms in North-East Asia' funded by ADB. It aims to mitigate 'red' dust storms whose origins are in China and Mongolia. These are semi-natural in origin but have impacts as far away as South Korea and Japan. Mongolia has cooperated since 1998 with UNEP and the Acid Monitoring Network in East Asia and has participated with Russia and China in Tripartite Environmental Ministerial Meetings.

### 3.2.3 Role of international NGOs

The CEPs mention international NGO activities in Afghanistan, Cambodia, China, Mongolia, Nepal, Pakistan, Philippines and Vietnam. Combining these and other sources, it is clear that the Asian countries (with the exception of Maldives, although Wetlands International is considering establishing a national programme there) host programmes run by international NGOs or national organisations closely affiliated with them. In many cases, these significantly supplement government and other national capacity to analyse, monitor and report on environmental events, particularly those concerning biodiversity and protected areas. In these fields, national-level reporting by international NGOs is an important contributor to environmental monitoring, for example of progress towards the 2010 biodiversity targets. A partial list of international NGO programmes in Asia is as follows:

- **Afghanistan**, where unspecified NGOs were involved in government-donor meetings on the development of wind energy projects, and where there is a national programme of the Wildlife Conservation Society.
- **Bangladesh**, which has a national programme of IUCN.

- **Bhutan**, which has a national programme of WWF, focussed on big cats and protected areas.
- **Burma/Myanmar**, where there is a national affiliate of BirdLife International, and at least some activity by the Wildlife Conservation Society and Wetlands International.
- **Cambodia**, where IUCN is present and Global Witness was contracted by the government to act as an independent monitor of the forestry sector specifically regarding illegal logging until recently replaced; there are also national programmes of Fauna & Flora International, Conservation International and the Wildlife Conservation Society.
- **China**, where WWF China has had a significant impact in advancing the environmental policy agenda in biodiversity management, environmental education and river basin management. Its international brand status allows it formal access to high-level policy makers. It works closely with international agencies in China, notably UNDP, and has had privileged access to the China Council for International Cooperation on Environment and Development, helping to coordinate the task force on river basin management. Its influence in promoting environmental education in schools will be critical to China's future development. Other international NGOs active in China include Friends of the Earth, Wetlands International, The Nature Conservancy, Conservation International and the Wildlife Conservation Society. Greenpeace has been mounting a campaign against an Indonesian logging company, Asia Pulp and Paper Co., for its alleged illegal destruction of primary forest in Yunnan.
- **India**, which has national programmes of at least WWF, Wetlands International and the Wildlife Conservation Society, and where there is a national partner of BirdLife International.
- **Indonesia**, which has national programmes of at least WWF, The Nature Conservancy, Wetlands International, the Environmental Investigation Agency, CARE International, Fauna & Flora International, Conservation International and the Wildlife Conservation Society, and a national affiliate of BirdLife International, and where it is now government policy for each major protected area to be partnered with an international NGO.
- **Lao PDR**, which has national programmes of at least IUCN and the Wildlife Conservation Society.
- **Malaysia**, which has national programmes of at least WWF, Wetlands International and the Wildlife Conservation Society, and a national partner of BirdLife International.
- **Mongolia**, where WWF Mongolia is involved in pushing for reforms to legislation, and managing a SIDA-funded programme on rural development and environmental education, and where there is a national programme of the Wildlife Conservation Society.
- **Nepal**, where many international NGOs are active and play a vital, stimulating and coordinating role in helping to innovate, develop, implement and promote practicable cleaner technologies, in the rural areas in particular; to protect and

conserve wildlife, plants and ecosystems; and raise awareness on environmental-ecological issues. Many work in partnership with government ministries. Key players include: IUCN Nepal, which focuses on nature conservation, urban air quality, transport policy, and awareness raising; Winrock International, concentrating on transport and urban air pollution; and WWF Nepal Programme, which addresses nature conservation and climate change. There is also a national affiliate of BirdLife International.

- **Pakistan**, where IUCN has projects that focus on: medicinal plants; environment and security; climate change adaptation; environment and trade (agro-biodiversity, food security, and biodiversity registers); government capacity building and impact of WTO on the economy; environment and health; coastal and marine issues (e.g. studies of fish stocks and policies); Red Listing of threatened mammals; environmental fiscal reforms; arid lands in Baluchistan and Sindh; poverty reduction and sustainable livelihoods; and multilateral environmental agreements. There is also WWF Pakistan, which devises long-term programmes and funding schemes, centred on community management of natural resources, to set individual project interventions in a broader development context. New focal areas are the Indus Delta region and coastal livelihoods, and freshwater and marine ecosystems, and wetlands. Work continues on projects to do with community-based conservation of forests and mountain areas. These programmes are complemented by capacity-building measures in the areas of environmental education (EC co-financed) and environment-related research and training. In addition, the Hazarganji National Park in Baluchistan is managed by WWF. There is also a national affiliate of BirdLife International, and a national programme of the Wildlife Conservation Society.
- **Philippines**, where LRC-KSK/Friends of the Earth was established in 1987 with the aim of empowering marginalised peoples who depend on natural resources. This NGO has developed expertise on the subjects on indigenous people's rights, environmental management, forestry issues, energy efficiency, community and local initiatives. WWF in the Philippines began with a focus on the marine environment, but later developed programmes which include work in freshwater and forest ecosystems, and pioneering projects on toxics and climate change while maintaining a strong emphasis on oceans, coasts, and marine species. There is also a national partner of BirdLife International, and a national programme of Conservation International.
- **Sri Lanka**, which has a national programme of IUCN, hosts the regional Ecosystems and Livelihoods Group of IUCN, and has a national affiliate of BirdLife International.
- **Thailand**, which has a national partner of BirdLife International and a national programme of the Wildlife Conservation Society.
- **Vietnam**, which has national programmes of WWF, IUCN and Fauna & Flora International.

### 3.3 INTEGRATION OF ENVIRONMENTAL CONCERNS INTO THE MAIN SECTORS

By their multi-country nature, SAARC and ASEAN are well-placed to promote and encourage the mainstreaming of environmental concerns into the economic sectors, and many of the current programmes have elements that would support that indirectly. A key challenge for both is how to maintain an optimal balance between development and conservation of natural resources in the region for present and future generations, not merely across sectors. At the national level, there is no specific mention of matters related to the integration of environmental concerns into the main sectors in the CEPs for Burma/Myanmar, Lao PDR or Vietnam. There is information, however, from the other countries, which may be summarised as follows:

- **Afghanistan**. Some themes, such as gender and environment, are mainstreamed into overall development assistance via cross-cutting Advisory Groups. The mainstreaming of environmental issues into reconstruction and development programmes via the Environmental Advisory Group is not considered effective.
- **Bangladesh**. Integration at the policy level is recognised as being needed and the integration of climate change issues into national water policy are cited as a first success. Others to be pursued include land use and integrating environment and climate change into sectoral policies.
- **Bhutan**. There is little actual integration, though the potential cumulative impact of many smaller development proposals has been noted.
- **Cambodia**. An environmental inter-ministerial working group has been created to mainstream environment concerns into the various sectors of the economy. Agriculture is a notable priority.
- **China**. The following mainstreaming areas have been identified: agriculture, land use, water resources, industrial pollution, municipal wastewater, river and coastal pollution, solid waste management and disposal and air quality and energy use.
- **India**. Agriculture (including sugar, textiles, jute, food processing, and milk processing) is identified as a key sector for environmental mainstreaming.
- **Indonesia**. In general, environmental concerns are well integrated into all main sectors at government level but not in the private sector, especially SMEs. It is, however, difficult to operate competitively in a business environment dominated by illegal operations and government institutions that with the right incentives are willing to waive environmental and other requirements.
- **Malaysia**. Mainstreaming environmental concerns is expected to be an important aspect of the Ninth Malaysia Plan (2006-2010), which is being prepared under the coordination of the Economic Planning Unit of the Prime Minister's Department. Malaysia is thought to be capable of mainstreaming environmental concerns in its economic development, but the general perception is that such mainstreaming would be difficult due to institutional and managerial constraints.
- **Maldives**. The cross-cutting nature of environmental issues was highlighted in the NEAP II, which advocated a more comprehensive and integrated approach to allow for more coordination and cooperation amongst the sectors, and as a way to deal

with environmental management actions that might not be addressed through individual approaches. Emphasis has been on maintaining existing partnerships and developing new ones with key stakeholders. To some extent, this has been achieved due to the fact that many other sectors have integrated environmental resources management actions into their own programmes. In practice, the main obstacle is the sector-by-sector approach taken by the ministries concerned, with each one developing and implementing its own work plan according to its mandate. Some ministries have established their own environment-related policies and programmes leading to overlap and in some cases conflict.

- **Mongolia**. The need is recognised to integrate environmental concerns into the main sectors, especially land and pasture management, forest resource exploitation and use, and minerals extraction. Progress on implementation is constrained by public sector bureaucracy.
- **Nepal**. Cross-sectoral actions that would help overcome recognised generic deficiencies include formation of a properly funded, national inspectorate, adoption of strategic environmental assessment into legislation, adoption of a system of land-use planning and authorisation/approval (with SEA), and adoption of formal river catchment planning.
- **Pakistan**. Cross-sectoral mainstreaming is limited to the environment ministry being invited to participate in all deliberations of the Planning Commission as a permanent adviser. This does not imply that an effective screening of development projects takes place. One limiting factor is the lack of technical capacity of the MoE. Ineffective sectoral integration is the result.
- **Philippines**. The following mainstreaming areas have been identified; forestry, agriculture, fishery, energy, mineral resources, water, industry and production, tourism, financial sector, transport, and waste management.
- **Sri Lanka**. Key mainstreaming issues include: integration in relation to ministerial hierarchy and spatial integrated planning.
- **Thailand**. Different government departments share responsibilities for the integration of environmental concerns. Successful implementation of integrated natural resource and environmental management calls for changes in the organisational culture of Thailand. This is in line with suggestions from different sources in Bangkok that the various government departments in Thailand often find it difficult to exchange and share information or to work together.

Despite progress achieved in mainstreaming environmental issues, coordination and collaboration between the different ministries need to be strengthened in many of the above countries. Lack of inter-ministry cooperation is a widespread issue.

# 4. EU AND OTHER DONOR CO-OPERATION WITH THE REGION

## 4.1 LEGAL BASIS FOR EU CO-OPERATION

The legal basis for EC development assistance to Asia is Council Regulation 443/92, which will be replaced by the Development Cooperation Instrument (DCI) for the financial period 2007-2013 with a broader geographical coverage than the present regulation. The respective new regulation on the DCI is currently under negotiation, with foreseen entry into force in early 2007. The DCI will also incorporate thematic programmes, among them a thematic programme for environment and the sustainable development of natural resources including energy.

## 4.2 STRATEGIC POLICY ENVIRONMENT

The Commission's Communication on *Europe and Asia: A Strategic Framework for Enhanced Partnership* (2001, 469 final, 4 Sep 2001) identified six objectives for EU-Asia cooperation:

- contributing to peace and security in the region and globally, through a broadening of EU engagement with Asia;
- strengthening mutual trade and investment flows with the region;
- promoting the development of the less prosperous countries of Asia, addressing the root causes of poverty;
- contributing to the protection of human rights, spreading of democracy, good governance and the rule of law;
- building global partnerships and alliances with Asian countries, in appropriate international forums, to help address both the challenges and the opportunities offered by globalisation and to strengthen EU joint efforts on global environmental and security issues; and
- helping to strengthen the awareness of Europe in Asia and vice versa.

These priorities remain valid and are consistent with the more recent development cooperation policy adopted by the Commission. Note, however, that environment was not identified in the 2001 Communication as one of the key priorities for cooperation in Asia. The thematic programmes authorised under the DCI, which do include reference to the environment, reflect the current priorities of EC aid, and relate to the EU Development Policy Statement (also called the 'European Consensus'), which has the primary objective of eradicating poverty in the context of sustainable development, and the pursuit of the Millennium Development Goals (MDGs). The policy also emphasises that EU partnership and dialogue with third countries should promote the common values of respect for human rights, fundamental freedoms, peace, democracy, good governance, gender equality, the rule of law, solidarity and justice. EU's commitment to multilateralism is also reaffirmed.

## 4.3 THE ASIA-EUROPE MEETING (ASEM) PROCESS

The Asia-Europe Meeting (ASEM) is an informal process of dialogue and cooperation covering political, economic and cultural issues and bringing together the 25 EU member states and the European Commission, with 13 Asian countries (Burma/Myanmar, Brunei Darussalam, Cambodia, China, Indonesia, Japan, Lao PDR, Republic of Korea, Malaysia, the Philippines, Singapore, Thailand, and Vietnam). The first ASEM Summit was held in Bangkok in 1996, and others have since been held every two years, alternately in Europe and Asia. The ASEM dialogue aims to strengthen and deepen the relationship between the two regions, and has the following features:

- informality (complementing rather than duplicating the work already being carried out in bilateral and multilateral forums);
- multidimensionality (devoting equal weight to political, economic and cultural dimensions);
- emphasis on equal partnership, rather than a donor-recipient relationship, in favour of a more general process of dialogue and cooperation; and
- high-level focus, stemming from the Summits themselves.

Apart from the Summit meetings, the ASEM process is carried forward through a series of ministerial and working-level meetings, as well as a number of activities arising from them. Foreign, Finance and Economic Ministers meet regularly in separate gatherings, each supported by more frequent meetings of senior officials, and there are also occasional ministerial conferences in other fields, for example on Science and Technology, Environment, and on Cooperation for the Management of Migratory Flows. ASEM thus covers potentially all issues of common interest to Europe and Asia, and has provided a dialogue platform to address international matters such as UN reforms, weapons of mass destruction issues, terrorism and other trans-national crimes, human rights (including the welfare of women, children and workers), globalisation and World Trade Organisation negotiations, and environment and sustainable development topics such as environmental technology, cooperation on forest conservation, water management, and public participation in environmental policies. ASEM has no secretariat, and the only existing ASEM institution is the Asia-Europe Foundation (ASEF), a not-for-profit foundation based in Singapore, charged with promoting cultural, intellectual and people-to-people contacts between the two regions. The ASEM Trust Fund was set up in response to the Asian Financial crisis of 1997-1998, in order to provide technical advice and training on financial sector reform and social policy reform. The Trans-Eurasian Information Network project was endorsed as an ASEM initiative in 2000.

In March 2006, the ASEM dialogue yielded the ASEM Oceans Initiative, which aims to ensure the sustainable use of the seas and ocean (including the seabed) and conservation of the marine ecosystem for the benefit of the present and future generations through inter-regional cooperation. Its strategic areas of concern include ocean governance, marine environmental protection and marine scientific research, the aim being to integrate these within the broader Asia-Europe dialogue and cooperation framework.

This is designed to advance human-centred and sustainable development, principally by addressing issues to do with:

- climate change;
- renewable energy sources (e.g. technologies and markets to do with the use of gas hydrates, hydrogen and deuterium, and energy from thermal, wave, current, tidal and offshore wind sources);
- sustainable production and consumption;
- integrated coastal and ocean management;
- marine biodiversity and protected areas, species and habitats;
- hazard forecasting and mitigation;
- sustainable fisheries management and rebuilding of fish stocks (and combating illegal, unreported, and unregulated fishing); and
- issues to do with oil spills, ocean dumping, and the management of noxious and hazardous substances (including issues to do with eutrophication, red tide, anoxic water formation, the fate of waste oil, heavy metals, toxic synthetic and other new pollutants, and sediment transport and coastal erosion).

The sixth Asia-Europe Meeting (ASEM 6) was held in Helsinki in September 2006 to discuss various issues of common interest under the overarching theme '10 Years of ASEM: Global Challenges Joint Responses'. The meeting reiterated the importance of respecting the limits to Earth's natural resources, and of ensuring a high level of protection and improvement in the quality of the environment. It issued a Declaration on Climate Change and emphasised the strong links between energy and climate. Also addressed was the need to manage sustainably and otherwise safeguard forest resources, to combat desertification and illegal logging, to strengthen international cooperation on oceans and seas, to reduce the rate of biodiversity loss by 2010, and to accelerate actions promoting sustainable production and consumption. The Meeting also decided to expand the partnership to include India, Pakistan and Mongolia, officially as of the next ASEM Summit in Beijing, China, scheduled for October 2008. Finally, the Commission anticipates the launch of an ASEM dialogue facility that will enable funding of activities in various fields including the environment, and should be up and running by mid-2007. Meanwhile, the ASEM dialogue on environmental issues was agreed to be continued at the next Environment Ministers' Meeting in Denmark in 2007.

## 4.4 THE ASIA PRO ECO PROGRAMME

The Asia Pro Eco Programme was established in 2002 as a five-year instrument to provide EU funds to support projects that contribute to improving environmental quality in Asia, to promoting investment and trade between EU and Asia, to facilitating EU-Asia co-operation amongst institutions, business, and civil society, and to improving mutual awareness and cooperation on environmental issues (ECORYS-NEI, 2006). Its scope was comprehensive, in order to tackle broader urban and rural key issues, such as water and coastal zone management, waste management, cleaner energy and transport,

air pollution abatement, and climate change. It operated through calls for proposals, with four deadlines in 2003 and two deadlines in 2004. By July 2006, the Programme had provided €44.5 million for 112 projects involving about 500 partners. Proposals were initiated by EU-Asian partnerships of universities, NGOs, government agencies, research institutes and industry associations, subject to fairly broad guidelines specifying the types of projects and maximum EU grants. Proposals were then subject to a competitive selection.

In July 2004 the European Commission adopted the "Strategy Paper and Indicative Programme for Multi-country programmes in Asia 2005-2006", defending the implementation of short-term solutions to major, immediate, pressing urban pollution problems in Asia (i.e. an agenda targeting 'brown environmental issues'), through the establishment and strengthening of a sustainable network of institutions. The Asia Pro Eco Programme had similar objectives, as did the phased-out programme of decentralised, city-to-city co-operation known as Asia URBS, so the Strategy Paper laid down the foundations for the merger of these two programmes into a single, more focussed new environmental programme. This was known as Phase II of Asia Pro Eco, and was created to give priority to projects offering solutions to major environmental problems with a negative impact on the quality of life and living conditions in Asian cities. Phase II of Pro Eco was launched in 2005 with one deadline in April 2005 and another in June 2006.

Meanwhile, in response to the urgent need to rehabilitate areas affected by the Indian Ocean Tsunami of 26 December 2004, the Commission decided to launch a Pro Eco IIB – Post Tsunami Call for Proposals. This is a programme specifically designed to help local communities rehabilitate and reconstruct effectively and efficiently in the tsunami-hit areas of India, Indonesia, Maldives, Thailand and Sri Lanka. The call for proposals was published in March 2005 with one deadline in June and another in October 2005.

A final evaluation of Asia Pro Eco was undertaken in 2006, by which time Phase I had given rise of Phase II and Phase IIB had been instituted in reaction to the 2004 tsunami. Moreover, many of the projects funded under Phase I (and more so Phase II or IIB) had yet to be completed. Hence the evaluation focused on lessons learned in a dynamic context. It was concluded:

- that the Programme had given rise to a number of excellent and often innovative projects, while creating stronger linkages between EU and Asian institutions;
- that arrangements for networking among partners was very successful, and should be developed further;
- that around half of a sample of 20 projects were assessed as having good or very good performance, and to be doing well in terms of the key criteria of relevance, efficiency, effectiveness, impact and sustainability; and
- that the Programme was successful at drawing lessons from its experience, and using them to achieve adaptive learning.

Weaknesses were also detected, however, and it was noted:

- that to maximise replicability, Programme managers should play a role in dissemination activities of project results, which may be involve professional support and the organisation of international seminars and workshops; and
- that the main quality control checkpoint was project selection, in which minor issues of administrative non-compliance ruled out some projects that were otherwise strong, while genuine weaknesses in successful proposals were often not spotted because they were too plausibly written for assessors, who were unfamiliar with the target countries, to detect whether a proposed project matched real needs, complemented other activities, or overlapped with existing work;
- that accountability arrangements were imperfect, with weak arrangements for project steering, reporting and supervision by the Delegations;
- that most of the multi-country projects involved South East Asian countries, but the potential synergy among them was often not fully exploited; and
- that the call for proposals mechanism used in Phase I and II was less appropriate in Phase IIB, as projects that seek both to serve the environment and play a role in the post-disaster reconstruction are particularly hard to assess centrally and should have drawn on consultations with local authorities and donor coordination structures.

Other observations made by the evaluators included:

- that European partners need to spend more of their time in Asia;
- that involving a competent and motivated local organisation greatly increases replicability and sustainability;
- that involving local and/or national government as full partners or steering committee members is helpful, especially where policy and legislative strengthening is needed; and
- that successful projects often involved experienced European engineers working directly with industry to achieve win-win solutions in areas of environmental protection, resource usage and corporate profitability, and especially so in activities concerning energy conservation or waste minimisation.

### 4.5 THE TROPICAL FORESTS PROGRAMME

Since the UN Conference on Development and Environment in Rio de Janeiro in 1992, the importance of forests, and in particular tropical forests, for the well being of mankind is generally accepted. The importance of forests for millions of forest dependent peoples is also well understood. In addition it is common knowledge that forests are shrinking in many developing countries. To hinder, or if possible reverse this trend, the EU's programme "Tropical forests and other forests in developing countries" has been funding actions since 1990 that are specifically targeted at the sustainable management or conservation of tropical forests, and since 2000 in other forests in developing countries also. The following definitions guide the work undertaken by the EU in this field (Regulation 2494/2000, Art 2):

- **Conservation** means all activities to preserve and rehabilitate forests, in particular activities designed to protect or restore the biological diversity and ecological

functions of the forest ecosystem, while securing as far as possible their current and future value for mankind and in particular for forest-dependent people.

- **Sustainable forest management** means the management and use of forests and wooded lands in a way, and at a rate, that maintains their biological diversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, without causing any damage to other ecosystems.

Activities funded under this Regulation generally aim to achieve the following results:

- Raising the status of forests in national policies and integrating forest policies based on sustainable forest management in development planning;
- Promoting the production and use of wood and non-wood forest products from sustainably managed resources;
- Contributing to the adequate valuation of forest resources and services;
- Ensuring active participation of forest-dependent people and local communities in the development of national forest policies and in development planning; and
- Improving co-ordination and the flow of information between the Commission and Member State projects so as to put in place coherent actions in that area.

In the forestry context there exists a number of multilateral agreements, and the forestry programme tries to foster their implementation in developing countries. Work carried out under the forestry programme is also aimed to be complementary to the international commitments taken by the EU.

### 4.6 THE ENVIRONMENT IN DEVELOPING COUNTRIES PROGRAMME

The EU acknowledges that environmental sustainability is an essential precondition for sustainable development, and identifies it as a cross-cutting issue to be addressed in all development activities. Hence the EU provides financial assistance and expertise to help draw up and implement policies, strategies, tools and technologies for the pursuit of sustainable development. This support is provided directly to developing country stakeholders as well as indirectly through the strengthening of environmental aspects of economic and development cooperation. In addition to global and multilateral actions, those funded in Asia since 2004 include:

- Preservation of forest resources and improved livelihoods of forest peoples through conservation of great apes as flagship species (partly in Indonesia, implemented with GRASP and UNEP);
- Advancing capacity, partnerships and knowledge to support climate change adaptation in Africa and Asia (implemented with UNITAR);
- Strengthening and capacity development for the long-term management and conservation of marine protected areas encompassing coral reef resources in South Asia (implemented with UNEP); and

- Strengthening national and regional capacities for implementing the Globally Harmonized System of Classification and Labelling of Chemicals in ASEAN countries (implemented with UNITAR).

Strategic guidelines and priorities for the programme are reviewed every two years, with the current programming document being for 2005-2006 (see also http://ec.europa.eu/comm/europeaid/projects/forests/about_environment_en.htm#top).

### 4.7 THE EC-ASEAN ENERGY FACILITY (EAEF)

This is a programme of cooperation between Europe and ASEAN, aiming to facilitate partnerships in developing joint regional projects in the energy sector. The overall objectives are:

- to increase the security of energy supply of ASEAN countries and indirectly of Europe;
- to increase the economic exchanges between European Union and ASEAN countries;
- to improve the environment at local and global level; and
- to facilitate the implementation of the ASEAN Plan of Action for Energy Co-operation 2004- 2009.

The sub-sectors involved include: electricity, focusing on the interconnection of the electricity grids (the ASEAN Power Grid, APG); the reduction of generation losses and the modernisation of distribution companies; natural gas with emphasis on gas transmission, the TAGP (Trans-ASEAN Gas Pipeline) and distribution; clean coal technology; energy efficiency; and renewable energy. The expected results include: stronger linkages between EU and ASEAN businessmen and policy makers; regulatory frameworks conducive to investment in regional energy issues; detailed investment and business opportunities for energy equipment and service suppliers; references of European technology solutions adapted to ASEAN conditions; and substantial implementation of the ASEAN Plan of Action for Energy Co-operation 1999-2004, and also for continuation for 2004-2009.

### 4.8 PARTNERSHIP WITH SUB-REGIONAL INSTITUTIONS

Asia is too complex and diverse a region to allow for just one political communication and one strategy to govern the entire EU-Asia relationship. Hence the Commission highlighted, in its 2001 Communication, that cooperation and policy approaches with sub-regions and countries in Asia would be specifically developed by issuing a series of new Communications. One example is the Communication on *A New Partnership with South East Asia* (2003, 399 final, 4 Jul 2003), which among other things identified environment and forestry as areas requiring strengthening in the development of less prosperous countries, and the environment as an area in which to intensify dialogue and co-operation. Others include Policy Papers on EU partnership with China (2003, 533 final, 10 Sep 2003) and India (2004, 430 final, 16 Jun 2004). These reflect the fact that the Commission places great emphasis on its dialogue with Asia and closely monitors

and supports overall policy dialogue among the various Asian countries. The political dialogue within Asia is complex and it involves traditional sub-regional partners such as the South Asian Association for Regional Cooperation (SAARC) and the Association of Southeast Asian Nations (ASEAN), as well as policy forums such as the Asia-Europe Meeting (ASEM) and the ASEAN Regional Forum (ARF). These and other institutions and programmes, such as the ASEAN Centre for Biodiversity (ACB) and the South Asian Cooperative Environment Programme (SACEP), offer mechanisms for EU support to be delivered at an effective regional and thematic level.

In East Asia, the EU supports ASEAN's continued integration and its efforts to engage in dialogue and economic and political co-operation with its neighbours. In South Asia, the EU is eager to enhance trade and investment links with this fast-developing region, still accounting for less than two percent of EU exports. It also takes the view that increased regional cooperation should help prevent internal conflicts from spilling across borders. The EU also monitors developments such as the East Asia Summit, a manifestation of a new East Asian regionalism that could become the precursor of an East Asian Community. Through ASEM the EU pursues its broader informal dialogue and co-operation with the region. ASEM's main objective is to strengthen relations between Asia and Europe (addressing political, economic and cultural issue), in a spirit of mutual respect and partnership.

### 4.9 THE TRANS-EURASIA INFORMATION NETWORK (TEIN)

It is hard to overstate the strategic importance of universal digital information access and flow in all sectors of economic and social activity. This is because the global sum of on-line information is increasingly vast enough to match the creativity and processing power of billions of networked human minds. More simply, and crucially for the environment, it allows individuals and small groups to discover almost anything, and to find opportunities and potential solutions for almost any challenge that may arise. For this reason, there are initiatives to extend Internet access in developing countries, for example those of the US-based NGO One Laptop Per Child, which has agreements to provide large numbers of cheap, robust, Linux-based, Internet-enabled computers to school-age children in several countries including, via an arrangement with Libya, to such poorer African countries as Chad, Niger and Rwanda (Whitaker, 2006).

Such developments resonate with longstanding European efforts. The Trans-Eurasia Information Network (TEIN), for example, is a large-scale data communications network for the research and education communities in the Asia-Pacific, enabling them to engage in joint projects. Offering direct connectivity to GÉANT 2, Europe's own network, it allows regional researchers to collaborate with their counterparts in Europe. Now entering its third phase (TEIN 3) the enterprise is designed to extend and deepen connectivity within Asia and between Asia and Europe, particularly among research and education communities in the fields of telemedicine (remote medical and surgical training), disaster warning, oceanographic research and climate modelling, and e-learning. TEIN 3 will maintain and further develop the communications infrastructure, permitting additional collaboration in research and education and providing a sustainable environment for research networking. With its thematic approach, the project takes into account lessons learned from other EC-assisted connectivity projects,

such as GÉANT (the European Research Network Backbone), EUMEDCONNECT (in the Mediterranean region) and ALICE (in the Latin American region).

### 4.10 ECHO'S DISASTER PREPAREDNESS PROGRAMME (DIPECHO)

Over 300 million people are affected by natural disasters every year. The poorest communities are usually hurt most, because they tend to live in greater density in badly-built housing on land at risk. An estimated 97% of natural disaster-related deaths occur in developing countries, also reducing the output of the poorest nations by around 13%. When a serious disaster strikes, emergency aid can take hours or even days to arrive, so it is crucial for the people to be prepared. Indeed, the affected populations themselves both during and after a disaster usually carry out the most effective life-saving efforts.

In 1996 and within this context, the EC's humanitarian assistance agency ECHO set up the DIPECHO (Disaster Preparedness ECHO) programme, to promote disaster preparedness and risk reduction. It began with projects in Southeast Asia, the Caribbean and Central America, and later extended itself to South Asia and the Andean Community (1999) and Central Asia (2003). It targets vulnerable communities living in the main disaster-prone regions of the developing world, concentrating on reducing the vulnerability of the population, especially through pre-emptive measures. DIPECHO's primary goal is to ensure the integration of disaster reduction measures into wider national policies, including education, building codes and health. ECHO's disaster preparedness projects are therefore designed to build up local reaction capacity and enable inhabitants to prepare themselves for future disasters. The selection of projects is based on their potential to achieve concrete results such as spreading knowledge on disaster preparedness, and getting communities to work together. DIPECHO projects are designed as pilot strategies for their region.

### 4.11 EU ACTION PLAN ON FOREST LAW ENFORCEMENT, GOVERNANCE AND TRADE (FLEGT)

Illegal logging was first raised as a serious international problem in 1998 in the G8 foreign ministers' 'Action Programme on Forests'. In April 2002, the EC hosted an international workshop to discuss how the EU should combat illegal logging. At the World Summit on Sustainable Development (WSSD), held in Johannesburg in the same year, the EC set out a strong commitment to combat illegal logging and the associated trade in illegally-harvested timber. To build on this commitment, the Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan was adopted in May 2003 and endorsed by the European Council in October 2003. This sets out a range of measures to combat the problem of illegal logging, including:

- support for improved governance and capacity building in timber-producing countries;
- development of Voluntary Partnership Agreements with timber-producing countries to prevent illegally produced timber from entering the EU market; and
- efforts to reduce the EU's consumption of illegally harvested timber and discourage investments by EU institutions that may encourage illegal logging.

Illegal logging is most prevalent in developing and emerging-market countries. Co-operation between these countries and EU Member States can therefore play an important role in tackling the problem. Support under FLEGT focuses on:

- developing reliable verification systems to distinguish legal from illegal timber;
- encouraging transparency through the provision of accurate information on forest ownership, condition and legislation;
- building the capacity of government agencies and other institutions to enforce existing legislation, implement governance reforms and deal with the complex issues related to illegal logging;
- strengthening enforcement by improving co-ordination between forest regulators, police, customs and the judiciary; and
- assisting policy reform to ensure appropriate incentives for legal forest management, and disincentives for forest crime.

Such co-operation complements existing processes, such as national forest programmes, that already address illegal logging and related issues. The involvement of civil society is important for transparency and to ensure that enforcement actions do not have adverse impacts on vulnerable communities.

The Voluntary Partnership Agreements (VPAs) proposed in the Action Plan are bilateral agreements between producing countries (FLEGT Partner Countries) and the EU. VPAs set out the commitments and actions of both parties to tackle illegal logging. There is currently no mechanism whereby customs agencies can recognise illegal timber and prevent it from entering the EU. VPAs offer an approach by which legally produced timber exported to the EU can be identified using licences issued by FLEGT Partner Countries. This scheme, permitted through an EU Regulation adopted in December 2005, enables customs agencies to allow verified legal timber from Partner Countries to enter the EU, while excluding unidentified (and potentially illegal) timber. The scheme initially covers only roundwood and rough sawnwood, because of the complexities of ascertaining the origin of processed timber products.

The Action Plan also includes measures to promote the use of legally sourced timber within the EU. These include:

- encouraging Member States to refer to EU public procurement legislation, which clarifies the options for promoting the use of legal and sustainable timber;
- encouraging private sector initiatives based on the principles of corporate social and environmental responsibility; and
- encouraging banks and financial institutions to take environmental and social factors into account when conducting due diligence assessments for forestry investments.

Effective regional initiatives require a common understanding between participating countries about the problems of illegal logging, and a joint commitment to finding solutions. They also need institutions that are capable of providing a focus for co-ordinating regional actions, holding discussions, and ultimately forming agreements

with other countries or regions. In the long term, a multilateral agreement may be the most effective means of addressing trade in illegal timber. A multilateral agreement would address the problem of evasion of bilateral or regional agreements, and would also provide an international basis for defining the legal management of forests. In addition, any measure targeting trade flows that include other major importing countries is likely to be the most effective option. Hence the Action Plan envisages exploring with other major timber consumers ways of working towards a more comprehensive framework to address international trade in illegal timber. Initial dialogue with Japan and the USA might be widened to include other major timber-producing and consuming countries. Ultimately, it may be appropriate to transform this step-by-step approach into a global process or multilateral agreement. Existing multilateral environmental agreements such as CITES and CBD can provide lessons for a multilateral approach to illegal logging, but progress on a multilateral agreement on trade in illegal timber is likely to be slow because of concerns about sovereignty and disguised protectionism.

## 4.12 THE ASIA INVEST PROGRAMME

### 4.12.1 Main objectives

One of the main objectives of the EC is to strengthen mutual trade and investment flows between Asia and the EU. This is to be advanced through: (a) bilateral cooperation; (b) further development of sub-regional cooperation; (c) strengthening of private sector cooperation; (d) supporting cooperation and dialogue in economic and financial policies; and (e) enhancing access to markets, especially for the poorest countries. To help achieve these aims, the Commission maintains dialogue with most Asian countries, addressing issues such as those to do with customs procedures, financial supervision, anti-corruption, technical standards, sanitary and phytosanitary standards, and support to the financial sector.

Asia Invest targets participation by less developed countries and support for these countries to increase their knowledge of, and access to, international markets, while also developing a permanent network of business organisations between Europe and Asia, and promoting successful mechanisms and tools through an Export Help Desk. Clean production is particularly relevant to Asia given the rapid expansion of industrial production there and its impact on air and water quality in so many locations. Many Asian producers are SMEs that rely on outdated production processes and technologies which too often result in environmental degradation and unsustainable natural resource use. This component of Asia Invest therefore aims to transfer environmental technology and know-how related to cleaner production to the Asian SMEs.

In related initiatives, the Commission is increasing funding of trade-related technical assistance programmes at national and regional level to cover specific trade studies, technical assistance, capacity building, expertise, and training. Issues being addressed include investment climate, financial sector and banking, corporate governance, improvement of economic environment, competition and regulation. Preference is given to regional programmes, exchanges, dissemination of experience and lessons learned, thus supplementing activities and demands for those countries where funds for trade and investment could not be allocated under the respective country programmes.

### 4.12.2 Sustainable consumption and production

Protection of the environment is now one of the major political commitments of the EU and of its external relations actions. Most environmental problems must be addressed at the national level through national programmes, with additional targetting through thematic programmes for global issues. The limited resources available per country require the EC to focus its cooperation on one or two target or priority themes, and environment is rarely one of them. There are, however, certain challenges that can only, or can best, be addressed at a sub-regional or even an Asia-wide level. Some of these involve improving reciprocal understanding and strengthening the environmental dialogue between Europe and Asia, notably by mobilising the private sector and focusing on priority economic sectors in Asia. The latter include urban and industry-related issues, pollution prevention, and the introduction of cleaner technologies. Based on these priorities, Asia Invest is being financed by the EC to develop direct business co-operation between Asia and the EU, to strengthen South-South and business links at the regional level, to raise awareness of the EU in Asia and vice versa, and to promote cleaner technologies. Asia Invest activities therefore focus on:

- helping companies, especially small and medium sized enterprises (SMEs), to internationalise their business;
- reinforcing private sector and new business development opportunities;
- developing greener technologies and practices and reduce environmental pollution;
- promoting exchange of know-how and technologies within the private sector and in intermediary business organisations; and
- exchanging best practices and experiences of European and Asian intermediaries.

Other stakeholders are involved in addressing these themes. One is the International Finance Corporation (IFC), part of the World Bank group, which has been developing an Environmental Business Finance Programme (EBFP) based around the selective financing of business projects proposed by small and medium sized enterprises (SME). These would be chosen based on a scorecard approach using the following criteria:

- **Degree of environmental sustainability**, in which an SME that engages in environmentally-beneficial activities that have been independently certified, will be considered more sustainable and thus score more highly than an uncertified company or a company that is more peripherally environmentally friendly.
- **Magnitude of environmental benefits**, in which different kinds of environmental benefits (e.g. area conserved, avoided greenhouse gas emissions) are measured.
- **Financial sustainability**, in which company profitability and growth potential are assessed, taking into account the latest research on predicting financial viability from a variety of management-related factors.
- **Environmental management & monitoring system**, in which the quality of a company's environmental management system is measured as a proxy for the quality of the environmental benefits that it is currently generating and that it claims it will generate in the future.

- **Replicability**, in which the degree to which the SME's business model could be readily replicated by others is assessed, as a means of promoting investment specialisation by sector and the replication of environmental benefits.
- **Centrality to industry**, in which the importance of the SME to other players in its economic sector or industry is assessed, as a way to support influential companies.

Another is UNEP's Division of Technology, Industry and Economics (DTIE), which has assembled a series of case studies on SCP interventions with stakeholders in China (legislation), India (consumer courts, cleaner production centres), Philippines (waste recycling), Sri Lanka (SME networking), Thailand (environmental education, industrial efficiency, SME networking), Vietnam (cleaner production centres), and nine Asian countries collectively (Greenhouse Gas Emission Reduction from Industry), as well as Australia (engaging automobile SMEs), Japan (green procurement), New Zealand (zero waste production), Singapore (eco-labelling), and South Korea (life-cycle approach, producer-consumer interactions).

The Asia Invest programme is already committed to promoting cleaner production through engagement with SMEs, and has participated in projects that include:

- introducing environmental management planning and practices for hotels and resorts in Vietnam;
- cleaner production in the foundry industry of China;
- 'Green Ventures Asia', a partnership forum for SMEs in the energy and water industries;
- exploring the implications of relevant EU environmental directives on non-EU suppliers of textiles, clothing, electrical and electronic goods, and automobile components;
- advancing EU-Malaysia SME partnerships in environmental technology solutions;
- promoting European technology and services for renewable energy development in Bangladesh; and
- advancing business partnerships for industrial energy efficiency in Malaysia.

Although indirect, it is hard to fault the logic that a steady encouragement of cleaner production (CP) and sustainable consumption and production (SCP) within the Asian business community will have a major long-term influence, especially when combined with EU import standards that reject environmentally-damaging products, and with the increased activism of Asian citizens in favour of the same thing. In view of the urgency of environmental challenges in Asia, however, a suite of more direct regional interventions will also be needed and is recommended below. It should be noted, however, that questions have arisen over the feasibility of including a CP/SCP component in the future Asia Invest programme, and there is the intention to develop an alternative mechanism for promoting sustainable consumption and production in Asia.

## 4.13 THE 2007-2013 COOPERATION PROGRAMME IN ASIA

The future cooperation programme is still being elaborated. It is guided by the principles that it should add value to interventions at country, sub-regional, and global level, that it should be based upon policy dialogue, and that it should respond to the agenda of the EU in Asia. The tenth draft, dated 6 October 2006, of the Commission's RSP (i.e. the *Regional Programming Document (2007-2013) and Regional Indicative Programme for Asia (2007-2010)*, envisions that the 2007-2013 regional co-operation will focus on only three main issue areas in addition to multi-country programmes on uprooted people and avian influenza:

- contributing to sub-regional integration, in dialogue and cooperation with ASEM, ASEAN and SAARC;
- providing incentives for trade, investment and environment, mainly by strengthening private sector co-operation (especially with SMEs), supporting co-operation and dialogue in economic and financial policies, and by enhancing access to markets (especially for the poorest countries); and
- supporting higher education and partnerships, with about 20% of the whole budget earmarked for higher education.

This strategy has been criticised (Anon., 2006), on the grounds that financing for environment would be cut from 12% of the total budget under the previous financial arrangements to 3% or less. This reduction is foreseen because of the termination of the Asia Pro Eco programme and the Environment and Tropical Forests budget lines managed by AIDCO, and the absence of visible EC-funded environment actions in the Asia region in the RSP 2007-2013. The main points of criticism were:

- that major funding cuts in the environment are inconsistent with the conclusions of the European Court of Auditors (2006), which noted a weakness in the Commission's mainstreaming of environment into its development cooperation, and stressed the need to integrate environmental protection into all Community policies and activities, including the Community's external aid (see also Riesco, 2006);
- that the cuts would amount to a perverse response to environmental deterioration in Asia, which includes severe biodiversity loss, natural resource depletion, air and water pollution and rising greenhouse gas emissions, while also noting that a failure to address these issues could offset the advantages that economic growth has brought to the countries of the region and their populations, especially the poor, and observing (with reference to Humphrey, 2006) that the 'grow first, clean up later' paradigm is being increasingly discredited; and
- that such cuts would send a negative signal regarding the EU's commitment to promoting sustainable development in the region, contrasting starkly with the EU's numerous high-level statements (for example at ASEM summits) on the need for more cooperation and attention to environment and sustainable development, including the need to ensure that Asia's projected economic growth is effectively decoupled from natural resource use and environmental degradation.

It was also observed that the cleaner production (CP) and sustainable consumption and production (SCP) component of the Asia Invest programme has been deemed unfeasible, so the EC could conceivably end up with few or no projects focused on CP/SCP at all. Instead, Anon. (2006) proposed that a 12% budget commitment to environment be maintained if not increased in the RSP 2007-2013. It was argued that the key strategic priority should be greenhouse gas emissions, and therefore CP, mainly in alliance with SME actors, and it was proposed that a distinct environment initiative along these lines be included in the RSP 2007-2013. Entitled Sustainable Consumption and Production in Asia (SCP-ASIA), this would be a four-year programme focused on promoting 'green growth' in the region by financing projects that encourage sustainable consumption and production (SCP). This proposal was described as being thematically in line with the former proposal on clean production under the Asia Invest programme, while addressing numerous challenges, from pollution reduction and the sustainable use of natural resources, to energy security/sustainability and emissions reductions. The proposal referred to:

- the existing policy dialogue on SCP in the region;
- the Asia-Pacific Roundtable for Sustainable Consumption and Production;
- UNEP's Asia-Pacific Regional Expert Meetings on SCP;
- the recent launch of the Global Energy Efficiency and Renewable Energy Fund (GEEREF), which will mobilise private-sector finance for renewable energy projects in developing countries, and which is seen as highly complementary to the SCP-ASIA programme; and
- the fact that the Commission has recently organised bilateral initiatives on SCP with China and India.

It was envisioned that the SCP-ASIA programme could organise two calls for proposals over the four-year period, dedicating alternate years to selecting and initiating projects, and to ensuring project follow-up, oversight, and networking activity. It was also noted that other environmental issues in Asia would also need to be addressed, including biodiversity loss, deforestation and illegal logging, which would require additional funding. This would be justified by the findings of this Regional Environmental Profile, and other observations such as that 18 of 23 Asian countries are regressing in terms of their progress towards meeting the 'forest cover' target under MDG 7 (UN, 2006).

This study can add little to the analysis of Anon. (2006), which it endorses. It should be added, however, that the logic of earmarking 20% of the 2007-2013 budget for higher education is not obvious. The burgeoning middle classes and ever-wealthier governments of many Asian countries are increasingly able to invest in national higher education, or else to buy European educational services in Europe or in Asian branch campuses of European educational institutions. It is therefore suggested that consideration be given to reassigning the higher education component of the RSP 2007-2013 to environment, thereby providing for both the SCP-ASIA and also for a range of actions needed to respond to 'green' environment priorities.

## 4.14 NON-EU DONOR COOPERATION AT A REGIONAL LEVEL

### 4.14.1 Association of Southeast Asian Nations (ASEAN)

The AMCs vary greatly in their national economic circumstances, and the ASEAN grouping contains countries with a very wide range of GDPs per person, which is strongly correlated with the UNDP Human Development Index (Table 9). This diversity means that it is often impossible for uniform standards to be applied across the region without special measures being applied to strengthen the capacity to meet them among the less prosperous AMCs. It also means that the official donor community is much more strongly engaged with the poorer AMCs (Philippines, Indonesia, Vietnam, Lao PDR and Cambodia) than with the others (Burma/Myanmar is an exception, being excluded for political reasons by many donors).

**Table 9: AMCs (excluding Burma/Myanmar) ranked by GDP per person (sources : www.undp.org, www.fco.gov.uk)**

| Country | GDP/person (US$ 2001) | GDP rank within ASEAN | HDI rank among 175 countries | HDI rank within ASEAN |
|---|---|---|---|---|
| Singapore | 23,000 | 1 | 28 | 1 |
| Brunei Darussalam | 20,400 | 2 | 31 | 2 |
| Malaysia | 4,530 | 3 | 58 | 3 |
| Thailand | 1,991 | 4 | 74 | 4 |
| Philippines | 926 | 5 | 85 | 5 |
| Indonesia | 823 | 6 | 112 | 7 |
| Vietnam | 443 | 7 | 109 | 6 |
| Lao PDR | 328 | 8 | 135 | 9 |
| Cambodia | 278 | 9 | 130 | 8 |

As a group, ASEAN has developed external relationships with:

- **ASEAN+3**. This grouping provides for dialogue and various forms of cooperation among ASEAN, China, Japan and the Republic of Korea. Active since 1997 and institutionalised in 1999, ASEAN+3 focuses on:
  - Political and Security Cooperation against trans-national crimes in the areas of terrorism, drug trafficking, people trafficking, sea piracy, arms smuggling, money laundering, international economic crime, and cyber crime;
  - Economic, Trade and Financial Cooperation, with trade value between the groups reaching US$ 195.6 billion in 2003, and building towards a possible East Asia Free Trade Area (EAFTA);
  - implementation of East Asia Study Group (EASG) measures, of which 17 are short-term, and 9 medium and long-term measures, the latter including the promotion of closer regional marine environmental cooperation for the entire region through ASEAN+3 Ministers Meetings on the Environment.
- **ASEAN – CER Countries**, covering arrangements between ASEAN and the parties to the Australia New Zealand Closer Economic Relations (CER) Trade Agreement.

- **Australia**. ASEAN-Australian cooperation began in 1974 and its third phase began in July 1994 with a total budget of about $38 million. The aim of this was to facilitate broad-based economic cooperation and integration between ASEAN and Australia. It consisted of a program of six regional projects, with budgets of $4 to $6 million, and a flexible, small activities scheme that aimed to build links between the two partners.
- **Canada**. The ASEAN-Canada Economic Cooperation Agreement came into force in 1982, and provides for industrial and commercial cooperation in addition to technical cooperation. Over the years, Canada has extended development cooperation to ASEAN in the areas of forestry, human resources development, fisheries, energy, agriculture, transportation and communication.
- **Russian Federation**. Russia became a full Dialogue Partner of ASEAN in July 1996. In addition to trade relations, ASEAN and Russia are keen to pursue cooperation in the fields of science and technology, tourism, culture and people-to-people contacts.
- **Treaty of Amity and Cooperation in Southeast Asia**. This provides a code of conduct governing relations in the region for the promotion of regional peace and stability. It unites all AMCs, and other countries wishing for closer ties with ASEAN have acceded to it with the unanimous consent of the AMCs, including Australia (2005), China (2003), India (2003), Japan (2004), Mongolia, New Zealand (2005), Pakistan, Papua New Guinea, Republic of Korea (2004), Russia (2004), while France has indicated its wish to join, and ASEAN has indicated that it would welcome US accession to the treaty.
- **United States of America**. ASEAN-US dialogue has continued since 1977, and in late 2005 an Enhanced Partnership was launched with a view to promoting political and security cooperation (on nuclear proliferation, trans-national crimes), economic cooperation (on trade and investment, including the development and employment of cleaner, more efficient energy technologies of all kinds, including renewable and other low-emitting sources of energy, promoting the protection of the environment and the sustainability of natural resources), and social and development cooperation (on sustainable development, disaster management, and knowledge exchange).
- **UNDP**. In 1977, UNDP was officially designated an ASEAN Dialogue Partner, the only multilateral aid organisation to be accorded this status. UNDP technical assistance up to 1990 was instrumental in promoting regional cooperation in a wide range of areas: trade, industry, agriculture, environment, women in development, institution-building, scientific and technological programmes, educational and cultural exchanges, finance and banking and transport and communications. More recently, it has focussed on strengthening the ASEAN institutional structures, trade and investment liberalization; institutional capacity building; human resource development; trade and environment; and science and technology.
- **International/Regional Organizations**. ASEAN has established frameworks of cooperation with the UN and the Andean Community (Bolivia, Colombia, Ecuador and Perú).
- **NGOs**. ASEAN has established links with 55 ASEAN-wide or ASEAN-based NGOs, mostly trade or professional bodies.

### 4.14.2 South Asian Association for Regional Cooperation (SAARC)

To further cooperation across its diverse portfolio of interests, SAARC has signed Memoranda of Understanding with: UNCTAD (1993), UNICEF (1993), APT (1994), ESCAP (1994), UNDP (1995), UNDCP (1995), EC (1996), ITU (1997), CIDA (1997), WHO (2000), UNIFEM (2001), PTB (2003), WB (2004), ADB (2004), UNAIDS (2004), and SACEP (2004). A revised MoU was signed with the SAARC Japan Special Fund (SJSF) in 2006. In 2005, it was decided to reconstitute the existing the South Asian Development Fund (SADF) and create the SAARC Development Fund, an umbrella organization for all SAARC development funding, with a view to mobilising funds from within and beyond the region. The SAARC Development Fund would have a Social Window, an Infrastructure Window, and an Economic Window.

### 4.14.3 South Asia Co-operative Environment Programme (SACEP)

SACEP's activities are usually undertaken in partnership with other institutions, and involved five projects in 1983-1991 (with UNDP, UNEP, ESCAP and others), nine in 1992-1996 (with NORAD, UNEP, WHO, EAP-AP and ESCAP), 11 in 1996-2000 (with NORAD, UNEP, IMO, SIDA and EAR-AP), and ten in 2000-2003 (with UNEP, NORAD, UN-ESCAP, IMO, GCRMN/CORDIO, GEF and others).

### 4.14.4 International Centre for Integrated Mountain Development (ICIMOD)

As a mountain learning and knowledge centre, ICIMOD seeks to develop and provide innovative solutions, in cooperation with over 300 regional and international partners, which foster action and change for overcoming mountain people's economic, social and physical vulnerability. In 2003 ICIMOD embarked on a new five-year strategic plan to address:

- Natural Resources Management;
- Agriculture and Rural Income Diversification;
- Water, Hazards and Environmental Management;
- Culture, Equity, Gender and Governance;
- Information and Knowledge Management; and
- Policy and Partnership Development.

# 5. CONCLUSIONS AND RECOMMENDATIONS

## 5.1 CONCLUSIONS

### 5.1.1 Conclusions overview

The review of the state of the Asian environment in Section 2.5 made some dire predictions based on the continuation of recent trends. It is possible, however, to be more optimistic, if deeper social processes are taken into account. For example, there are past cases of Asian cities bringing especially air pollution under control (e.g. Seoul, Tokyo and Kitakyushu), and improving waste management and water supply systems. It has been speculated that a threshold in per-person income must be reached before environmental clean up becomes possible, a phenomenon known as the environmental Kuznets curve (http://en.wikipedia.org/wiki/Kuznets_curve). The idea is that individual wealth is positively correlated with opportunities to learn about and become active on health and environmental matters, and with a greater collective ability to pay, through taxes and markets, for environmental solutions. Other important mechanisms, which are not necessarily wealth-dependent, must include people becoming aware enough, motivated enough and organised enough to encourage municipal governments to clean up the environment, and private corporations to stop polluting it. It is at least possible that very poor communities can take effective action once the oppressive effects of environmental deterioration are recognised, especially if they enjoy effective and accountable leadership. There are cases at the city level which illustrate the importance of leadership and example:

- **Curitiba** (population 1.6 million), in south-east Brazil, had massive problems of unemployment, slums, pollution and congestion which were largely overcome through the deliberate use of appropriate technology in public transportation (with 1.3 million people using the system daily), waste separation and recycling (with two thirds of the city's daily waste being processed), and soft engineering (with 21 million square metres of parks, woods, gardens and squares, mostly along river banks and in valley bottoms, where they act as water flow regulators during the rainy season). Curitiba, which is twinned with Hangzhou in China, was awarded the United Nations' highest environmental prize in 1990 by UNEP.
- **Dalian** (population 6.2 million), in north-east China, one of the most heavily developed and polluted industrial areas of China, achieved major environmental improvements since 1990 through a 'twinning' arrangement with Kitakyushu, Japan, involving the training of factory managers, refitting of factories, and development of a local government environmental zone. As a result, the Dalian Municipal Government was elected to UNEP's Global 500 Roll of Honour for outstanding contributions to the protection of the environment.

Observations suggest that there is a rapid growth in awareness, concern, self-organisation and influence among community groups, NGOs and local government institutions in many countries (e.g. India, Indonesia, Malaysia, Philippines), which are starting to impose environmental protection on larger-scale actors (e.g. Noguchi, 2006). These groups are increasingly networked and informed by each other's efforts, failures

and successes. Although warfare and/or dictatorship can and has blocked progress in some countries (e.g. Afghanistan, Indonesia, Philippines, Sri Lanka), often for decades, there does seem to be an inexorable rise in accountable governance, which applies pressure on decision makers to provide environmental security (or at least to reduce disaster risk) and improved air and water quality, and water supply.

Over the last two or three decades, governments in the region have adopted numerous policies and laws, and international agreements, committing themselves to set aside protected areas within which viable and representative samples of their ecosystems are to be preserved. These protected areas have received increasing amounts of public investment, as their actual and potential importance to national economic activity and well-being has gradually come to be understood. Countries such as India, Indonesia, Malaysia, Sri Lanka, Thailand and Vietnam are now quite plausibly committed to the future of their protected area systems, and are investing in ways to resist what are in many cases still quite significant threats to the reserves' integrity. There is also a trend for governments to co-venture in reserve protection with local community groups, providing for revenue sharing (e.g. in Nepal) and/or co-management (e.g. India, Philippines), and with private corporations (e.g. in Maldives) or international NGOs (e.g. in Indonesia).

These new ways forward in many cases are helping to embed the reserves in a permanent way within social and economic systems, their presence and protection being accepted and expected by all concerned, and opportunities being found to exploit sustainable revenue streams from them, for example those linked to ecotourism. Connected with this is the fact that biodiversity is increasingly seen as a valuable resource upon which can be based bioprospecting activities that are capable of generating significant profits. Several jurisdictions (e.g. Sarawak, Sabah and Peninsular Malaysia, India, Indonesia, Philippines, Singapore and Thailand) have debated or established new legal regimes governing bioprospecting, biopiracy and biodiversity property rights, with a view to encouraging new discoveries and the sharing of benefits arising from them. All of these forces in favour of valuing natural ecosystems and biodiversity as resources for environmental security, ecotourism, and bioprospecting help to encourage investment by stakeholders in conservation.

Meanwhile, some Asian countries are beginning to take environmental sustainability seriously (UNEP, 2006). China, for example, has adopted the concept of the 'circular economy', in which all economic activities pursue low resource use, maximum efficiency, and low waste generation, with one facility's waste energy, water and materials becoming another facility's inputs. The country has established key targets for 2010 (using 2003 indicators as the baseline), including: that resource productivity per unit of energy and material is to be increased by 25%; that energy consumption per unit of GDP is to be reduced by 18%; that the efficiency of using irrigation water is to be increased by 50%; that the rate of re-use of industrial solid waste is to be increased to over 60%; and that the rate of recycling or re-use of major renewable resources is to be increased by 65%.

In Indonesia, Malaysia, the Philippines, Thailand and China there is an urgent need to strengthen the basic institutions of environmental regulation and ensure the

development of effective capacities for implementation and enforcement. In some countries (e.g. Thailand and Philippines), environmental agencies operate without landmark environmental legislation that empowers them to set ambient and emissions standards, monitor performance and enforce compliance. In others (e.g. Indonesia), regulatory agencies have little authority to monitor, inspect or enforce facility-specific emissions standards. In most, regulatory agencies lack both sufficient technical capacity and sufficient resources to manage national environmental protection programmes effectively. Even as these basic capacities of environmental regulation are being strengthened, countries must draw on the experience of industrial economies around the world and move aggressively toward the adoption of market-based instruments, pollution prevention, clean production and superior environmental performance.

A possible policy initiative could be to strengthen non-regulatory drivers of environmental performance, including market demand, community pressure, cost reduction, and market development. The key to this would be the development and disclosure of transparent, low-cost, scaleable and standardised information on the environmental performance of production lines, enterprises, firms, industrial sectors, urban areas and national economies. A proposed Global Energy Efficiency and Renewable Energy Fund (GEEREF) which aims to leverage finance for investments in energy efficiency and renewable energy projects and businesses, is a welcome advance in unlocking finance through the application of public-private financing. However, without attention to parallel policy changes its potential will not be fully realised.

The sheer size and population of Asia, coupled with extremely rapid economic growth, means that environmental pressures and problems will tend to increase unless vigorous and effective policies are put in place and implemented (UNEP, 2006). The overall expectation is that a wealthier Asia, with a more environmentally-aware leadership and a better-informed and more politically-active population, should be able to achieve cleaner urban environments as well as more secure protected areas, albeit surrounded by landscapes in which native biodiversity has largely been expunged. This will be a patchy outcome, though, since progress depends on peace and accountable governance at all levels, and in some cases the externalities arising from the destruction of native ecosystems will simply overwhelm the capacity of local societies to organise their own solutions. This last point is relevant both locally, for example with settlements vulnerable to land slides, and globally, with whole populations vulnerable to the effects of global warming and climate change.

Most of the environmental problems that have been identified in the Asian countries can only be corrected by the countries themselves, with their governments and populations working together. A major path to change would involve the people who actually experience air and water pollution, or inadequate waste disposal, or the consequences of deforestation, self-organising to oppose further degradation and restore environmental security, and demanding that their governments support them in doing so through an enabling legislative environment that also sets and enforces standards of private, corporate and governmental behaviour. The provision of technical support to governments in their efforts to respond to such public pressure, by setting standards, designing regulations, and building capacity for monitoring and enforcement, is

properly the subject of bilateral assistance programmes. In this view, specifically regional interventions should rather focus on:

- encouraging and enabling knowledge to flow amongst elements of civil society in different countries, so as to build public awareness of environmental issues and threats, and what to do about them;
- promoting the emergence of common, high standards of environmental governance, so as to make governments better able to respond to and/or to lead their peoples;
- engaging with private corporations at all scales to encourage investment in cleaner and more sustainable forms of production and consumption; and
- a suite of activities designed to encourage and enable governments to cooperate in addressing issues that can best or only be addressed through such cooperation.

### 5.1.2 Encouraging knowledge flow

Promoting the exchange of knowledge is a task that is especially suited to being addressed at a regional level, particularly in complex fields such as ecosystem and biodiversity management where there is a vast diversity of techniques that have been or could be applied in various combinations and circumstances, and where choices need to be made to adapt solutions to local conditions. Here, success often depends on conservation managers selecting precisely the right combination of interventions and approaches, and the broader their knowledge the better. In this field, the knowledge concerned is about the nature of ecosystems, the biodiversity they contain, and techniques, technologies and institutional arrangements required to manage them sustainably. This knowledge can be organized digitally and be transmittable electronically, or it can be organized in other ways and be transmittable through face-to-face 'meeting, talking, teaching and learning' (MTTL) activities.

The content of the knowledge can include awareness of training opportunities, international standards and guidelines on protected area management or the formulation of bioprospecting contracts, location of expertise or written information resources, maps of habitat distributions or important bird areas, how to manage particular ecosystems or species sustainably, or species lists. An intervention aimed at regional knowledge sharing might therefore be organised around four components: **networking** and **training** to deal with MTTL activities and policy development, **research** to help fill in knowledge gaps, and **databasing** to promote the management and exchange of knowledge that is organized in digital form. At a regional level, the aim would be to provide knowledge services to Asian countries that derive from a regional perspective which is not available to individual countries acting on their own. This it would do by facilitating regional and Asian-EU MTTL work, to encourage understanding of relevant issues and to develop and help implement Asian standards and guidelines, by communicating with focal points in each country, and by providing tools for promoting digital knowledge exchange, web-sites to provide access to other regional knowledge resources, and regional overview analyses to inform public debate on biodiversity and its conservation. An increasingly important contributor to research, networking and digital knowledge exchange is the Trans-Eurasia Information Network (TEIN), which

links the research and education communities in the Asia-Pacific to each other, and to Europe's GÉANT network.

An important approach that has been proven in the ASEAN region by the EC-supported ARCBC is in the development of professional competence standards for protected area managers, and this can serve as an example of an approach that could be applied in other areas. Here, ARCBC training programme managers decided not to develop standardized training modules for delivery to each country. Instead they identified the indicators of competence for various professional roles that were already in circulation within ASEAN, and consolidated and codified them so that they could be offered to countries for adoption as common regional standards. Each country could then design its own methods for achieving them in their own way. This approach is analogous to EU operating procedures, in which common standards are established (e.g. on waste emissions, water quality, protected area functionality), but each country is free to find its own way to achieve them.

### 5.1.3 Encouraging locally-accountable ecosystem management

Most ecosystem management is done by local people and small businesses on a day-to-day basis, with occasional interventions by governments and donors to create protected areas and special management zones for environmental purposes. Local stakeholders often have the motivation to manage ecosystems sustainably, because they suffer the consequences if they are damaged, but often do not possess the authority, knowledge, organisation or resources to do it properly. Government interventions, meanwhile, are often donor driven and subject to stop-start financing and poor institutionalisation. Hence it is now generally accepted that where local people can manage ecosystems effectively, governments have good reason to make sure that they are encouraged and enabled to do so. This is because local cooperation can be a cheap and effective way for governments to achieve their own conservation aims, while also advancing other policy objectives such as equity, poverty relief and disaster preparedness. Hence, money spent effectively on local empowerment (i.e. removing barriers to locally-accountable resource tenure security, increasing local understanding of ecological and economic systems, and promoting solidarity and self-organisation) is an efficient use of funds because it draws on human enthusiasm, while also releasing funds for actions that cannot be undertaken solely by local partners (e.g. regulation, prosecution, landscape policing, conflict resolution).

The geographic and human scale of the Asian region precludes a monolithic, universal approach, but still there is a clear need for a strategic replicable process of local empowerment, which could be rolled out on a pilot basis in areas that have major ecological features in common. A case in point is the Indian Ocean, which links the coastal zones of Bangladesh, Burma/Myanmar, India, Indonesia, Maldives, Pakistan, Sri Lanka, and Thailand. A common process and supportive mechanism could be designed to promote the capacity of local stakeholders throughout the coastal zones of the Indian Ocean to make informed decisions about their own development and security, and to put those decisions into effect. Treating the sub-regional as an ecological whole would have the advantage that common themes and ecologically-relevant best practices could draw on a common knowledge base and be shared effectively. This is an approach that

is currently being explored through the IUCN-UNDP-UNEP Mangroves for the Future Initiative. Here it is recognised that because local empowerment can only be achieved slowly, through participatory research, dialogue, debate and experimentation, there is a need for a long-term, sustainable financing mechanism that is able to disburse grants over time to a steadily expanding base of stakeholders such as communities, local governments and their NGO and academic institutional partners.

A Regional Trust Fund (RTF) offers one way by which such a mechanism could be established and managed. It would be complementary to, and synergistic with, the many other means by which governments and donors manage funds to accomplish their own tasks, which can include national government budgets, partnerships with corporations, external subsidies (e.g. from other governments), earmarked payments (e.g. taxes on tourism), funds raised locally (e.g. park entry fees), charges for ecological services (e.g. coastal protection to urban areas, industry and infrastructure), fees for taking specimens (e.g. in biodiversity prospecting), returns on portfolio investments of various kinds (e.g. trusts and trust-like mechanisms), and offset transfers (e.g. against carbon emissions). The Global Environment Facility and others have assessed experience of environmental and conservation trust funds and similar mechanisms, and it is clear that governments often see them as useful ways to help address certain kinds of challenge, specifically where a programme of similar actions is needed over many years, even where the trust fund is outside direct government control.

The purpose of such an RTF would be to encourage and enable communities to understand, take charge of, manage and benefit from the sustainable use of their local ecosystems. This would involve making grants for this purpose to stakeholders such as communities, local governments and their NGO and university partners. The indicative activities that would be supported would include: promoting participatory research, inventory, monitoring, mapping, management and land/resource-use planning, social analysis, dialogue, debate and experimentation; training and providing facilitators, expert and material support, inter-community exchange visits, and generally developing action competence. Activities financed by such an RTF would need to comply with the following guidelines:

1. Activities should neither require indefinite subsidy nor create dependency or a sense of entitlement; they should help conservation directly, and should raise incomes or reduce labour needs locally.
2. Earned benefits and gifts should be received quickly and obviously by participating people, and should be seen by them as rewards for conservation action by themselves.
3. Activities should be dispersed and benefits spread evenly to reduce jealousies within and between communities.
4. Activities should be large enough to yield tangible benefits locally, but too small to attract unwanted outside entrepreneurs.
5. Activities should be diverse, aimed to supply local markets, and should not compete with one another for human, physical or financial resources.

The design and establishment of such a mechanism for a single ecologically-defined sub-set of the Asian region, such as the Indian Ocean, could be seen as a pilot for a series of similar initiatives. These could address, for example, mountain ecosystems (particularly relevant to Afghanistan, Bhutan, China, India, Mongolia, Nepal, and Pakistan), inland wetlands and river systems (particularly relevant to Bhutan, China, India, Indonesia, Nepal, and Malaysia, with the Mekong River Commission countries of Cambodia, Lao PDR, Thailand and Vietnam, and their dialogue partners Burma/Myanmar and China, also providing a basis for development), and grassland ecosystems (particularly relevant to Mongolia, and Nepal). In each case, there are common environmental challenges and similar potential solutions available that are specific to the ecosystems involved.

### 5.1.4 Engaging with private corporations

It is clear that the replication of a fossil-fuel-based, automobile-centred, throw-away economic system throughout Asia cannot be environmentally sustainable, regardless of the capacity of local social units to achieve better defence and management of their own environments. This is because of the nation-wide, trans-frontier, region-wide and global consequences of attempting to consume enough resources and generate enough wastes to extend traditional industrial-economy practices and lifestyles to additional billions of people. Hence a massive structural change is needed in the economic systems and technologies that are used to generate energy and create food, water and livelihoods. This observation can be extended to the world as a whole, since there are no grounds for supposing either that non-Asian economic systems are themselves sustainable, or that Asian decisions can be made in isolation from what happens elsewhere. On greenhouse gas emissions, for example, it is increasingly clear that conventional market and political systems are quite unable to restrict the use of fossil energy, and that all fossil energy sources will eventually be exploited by someone. Hence solutions must involve both carbon sequestration on an unprecedented scale, and international carbon emission rationing. Such challenges will need to be addressed in all sorts of ways over the next few decades, starting immediately.

Meanwhile, it can be considered that small and medium-sized enterprises (SMEs) comprise 80% of businesses in Asia, and are expected soon to be contributing 70-80% of the manufacturing output and a similar share of environmental impact. Big corporations may offer more efficient dialogue partners per unit effort, but unless the SMEs are also engaged, progress towards sustainable production will inevitably be limited. Sustainable production is the creation of goods and services using processes and systems that are non-polluting, conserving of energy and natural resources, economically viable, safe and healthful for employees, communities, and consumers, and socially and creatively rewarding for all working people. In all cases, the aim must be to encourage and enable businesses to make management decisions in favour of pollution control, recycling economy, industrial symbiosis, cleaner production, eco-efficiency, dematerialization, better product design, integrated materials management, life-cycle management, green purchasing and eco-labelling. Possible management approaches include expanding the traditional focus on waste symbiosis to build synergies also around products and their use by consumers; expand environmental objectives beyond pollution issues to include sustainable development priorities

concerning materials toxicity, biodiversity, health and safety, and social factors, and to build life-cycle management arrangements based on materials flow analysis and social assessment.

This approach is particularly urgent in view of the way that in Asia the rapidly growing middle-income class is striving to adopt the affluent consumption patterns of wealthier people, but is also in line with the growing environmental awareness of the same people. Opportunities therefore include that sustainable consumption and production (SCP) is recognized as an important factor for accessing international markets. When it comes to influencing the consumption side of society, the media are particularly useful tools. Policies and legislation are the corner stone for promoting a more coherent approach to SCP, and national and local governments play important roles in developing it, with NGOs also being important stakeholders.

### 5.1.5 Managing trans-frontier reserves and corridors

#### a) International reserves

Protected areas historically were often located in montane areas that were relatively easy to set aside. The watersheds within such remote areas often coincided with national frontiers. As a result, there are many borders with protected areas on both sides of them. These have increasingly come to be seen as trans-frontier reserves, involving in each case a single ecosystem with a political boundary running through it. Because, however, such a reserve is wholly vulnerable if one national authority is unable to manage its own sector effectively, there has been a trend to build cooperation between the parties in managing the whole reserve to common standards. This might allow, for example, ecotourists to hike freely across the frontier within the reserve, or poachers to be pursued across it, or revenues to be shared between the parts.

Such arrangements have proved hard to implement in practice, however, since they often run counter to traditions that derive from and define the countries concerned, which being neighbours may have a long history of competition or rivalry. Incentives, dialogue and political encouragement at the regional level can be used to transcend some of these issues, making it possible for countries to subscribe to the common management of trans-boundary reserves, and this is an outcome to which regional engagement should be directed.

One high priority trans-boundary reserve complex is that which encompasses the Betung Kerihun National Park in West Kalimantan, Indonesia, and two protected areas in Sarawak, Malaysia, the Batang Ai National Park and Lanjak-Entimau Wildlife Sanctuary. The whole complex has a combined area of about 11,000 $km^2$. It is a critical habitat for the endangered north-west Bornean orangutan (*Pongo pygmaeus pygmaeus*), with a combined total population in excess of 2,500 individuals, but has been (and is being) badly affected by illegal logging. The latter is opposed increasingly vigorously by the Government of Indonesia, and a high-profile court case in 2005 resulted in the conviction of three Malaysian nationals and their sentencing to the longest prison terms ever imposed for illegal logging in Indonesia. Because of the involvement of Malaysians in the illegal extraction and export of timber from the

reserve complex, it can be seen that the trans-boundary reserve issue is inter-woven with the trans-frontier poaching and smuggling issues.

Although first proposed by WWF (Malaysia and Indonesia) in 2001, when it was judged premature, the idea that all the jurisdictions on the island of Borneo might cooperate to conserve the forests and biodiversity of the island as a whole won political support from Indonesia, Malaysia and Brunei Darussalam in 2005. The result is an international initiative known as the 'Heart of Borneo' project, which with WWF encouragement seeks to establish a chain of trans-frontier and other reserves throughout the interior of Borneo, from West Kalimantan to Sabah. As a regional, multi-country activity this will serve to advance the EU's strategic aim of promoting cooperation across national frontiers while also contributing to achieving the EU's goal of halting biodiversity loss by 2010. The ASEAN Centre for Biodiversity might provide a vehicle for exploring ways to mobilise EC support for the Heart of Borneo project.

Other opportunities for trans-boundary cooperation to be promoted in Asia include:

- A possible trans-border Peace Park in the Pamir region that straddles Afghanistan, Tajikistan, China and Pakistan, where flagship endangered species like the Marco Polo sheep (*Ovis ammon*) and the snow leopard (*Uncia uncia*), and spectacular landscapes, offer potential for ecotourism and the fostering of regional co-operation once security concerns are alleviated.
- The Mongol Daguur RAMSAR site, a 210,000 ha wetland in the Dornod Aimag region of Mongolia, which forms part of a trans-boundary protected area with Russia and China, and several other strictly protected areas, national parks, and forest areas along Mongolia's borders.
- The Altai-Sayan eco-region in Western Mongolia, which is adjacent to Russia and Kazakhstan, and which already possesses a trilateral steering committee (supported by UNDP/GEF) to discuss ways to promote trans-boundary cooperation, and could become a forum for implementation of specific programmes and actions.

**b) Inter-provincial reserves**

It can also be observed that the frontiers involved in trans-frontier reserve management need not be between countries, since very similar principles apply to conservation actions that straddle two or more sub-national jurisdictions. This is particularly relevant to federal systems, where adjacent states each have control over land use and conservation and forest law (e.g. Sabah and Sarawak in Malaysian Borneo), and where adjacent provinces may have different kinds or degrees of autonomy. The latter case is exemplified by the Leuser Ecosystem in the Indonesian provinces of Aceh and North Sumatra, with Aceh having recently obtained (after a long armed struggle) a high degree of autonomy over its natural resources.

The Leuser forest is some 27,000 $km^2$ in area, and stretches from the beaches of the Indian Ocean right across Sumatra almost to the mangrove swamps of the Malacca Straits (Griffiths, 2005). It is the last place where there are viable populations of the Sumatran elephant (*Elephas maximus sumatranus*) and tiger (*Panthera tigris sumatrae*), as well as the critically-endangered Sumatran orangutan (*Pongo abelii*) and two-horned

rhinoceros (*Dicerorhinus sumatrensis*). It has populations of tapir (*Tapirus indicus*), sun-bear (*Helarctos malayanus*) and red hunting dog (*Cuon alpinus*), and a full complement of primate species including gibbons (*Hylobates agilis*), siamang (*Symphalangus syndactylus*), and cercopithecine and colobine monkeys. The rest of the biota is extraordinarily rich, with over 1,000 vertebrate species, thousands of higher plants, and an unknown but very large number (at least hundreds of thousands) of invertebrate species, many of them yet to be discovered. It is probably the richest biodiversity resource still surviving in South-east Asia.

These forests also provide vital environmental services to the people of Aceh and North Sumatra, including water supply, flood prevention, erosion mitigation, and climate regulation. Economic valuations of the Leuser Ecosystem forests (van Beukering *et al.*, 2001) concluded that these ecological services were worth several hundred million euros annually, a net benefit of conservation relative to deforestation over 30 years of over € 4.3 billion, with most of the benefits flowing to communities in the downstream environment. For these various reasons, the Leuser Ecosystem and associated forests have been classified as having maximum environmental sensitivity by the ADB-BRR Earthquake & Tsunami Emergency Support Project (ADB & BRR, 2006).

An Indonesian Ministerial Decree in 1980 confirmed the Gunung Leuser National Park and its immediate buffer zone at 9,000 $km^2$, about one-third in North Sumatra and the rest in Aceh. Another in 1995 extended the Leuser Ecosystem to 17,500 $km^2$, before a Presidential Decree in 1998 ratified its area at 27,000 $km^2$. An EU-supported Integrated Conservation and Development Project (ICDP) for Lowland Rainforests in Aceh operated in 1992-2004, and was followed by the Leuser Development Programme and the establishment of the Leuser International Foundation with the express aim of conserving the Leuser Ecosystem. The continued engagement of the EC with the Leuser Ecosystem over many years despite the difficult conditions associated with the armed struggle in Aceh has earned Europe much good will in Indonesia in general and in North Sumatra and Aceh in particular. The institutionalisation of the Leuser Ecosystem as a valued natural resource and management unit belonging to both provinces may well help it survive current challenges, in which the provinces are resisting central government efforts to re-activate logging and plantation concessions in the forest area. Their motivation comes partly from the value of environmental services provided by the ecosystem, and partly from the awareness that biodiversity itself may become a strategic asset at a time of global mass extinction. Should this lead to a bioprospecting initiative in Leuser, trans-frontier coordination between Aceh and North Sumatra will become essential to prevent biopiracy directed at the shared biodiversity resource (Caldecott, 2006a).

### c) Biodiversity corridors

Moving beyond simple bilateral arrangements on the 'peace park' model, current conservation science suggests that it is necessary to identify and promote the management of networks key biodiversity areas and corridors connecting them. The reasoning is that to allow the persistence of biodiversity, landscapes must be anchored on core areas, embedded in a matrix of natural and/or anthropogenic habitats. Therefore, conservation corridors are anchored on key biodiversity areas (core areas), with the rest

of the conservation corridor comprising either areas that have the potential to become key biodiversity areas in their own right (through management or restoration) or areas that contribute to the ability of the conservation corridor to support all elements of biodiversity in the long-term. Therefore, key biodiversity areas are the starting point for defining conservation corridors. This approach has been used for the Indo-Burma/Myanmar hotspot of the Indochina region by BirdLife International (2004), in dialogue with numerous other stakeholders. The process involves three critical steps:

- **Identify key biodiversity areas**. These are based on: (a) the occurrence of significant numbers of one or more globally-threatened species; (b) the occurrence of restricted-range species (i.e. those with a global breeding range of less than 50,000 $km^2$); and (c) occurrence of congregatory species (i.e. those which gather together at a particular time of year, such as breeding, wintering and staging sites for migratory waterbirds, with a threshold of 1% of the Asian biogeographic population being used).
- **Identify conservation corridors**. These are defined wherever: (a) it is considered necessary to maintain connections among key biodiversity areas in order to meet the long-term conservation needs of species with wide home-ranges, low natural densities, migratory behaviour, or other characteristics that make them unlikely to be conserved in single, isolated reserves (i.e. 'landscape species'); or (b) it is considered necessary to increase the area of actual or potential natural habitat in order to maintain evolutionary and ecological processes, with emphasis on maintaining continua of natural habitat across environmental gradients, particularly altitudinal ones, in order to maintain such ecological processes as altitudinal migration of bird species, and to provide a safeguard against the potential impacts of climate change.
- **Prioritise corridors and sites**. Corridors are prioritised by taking into account their importance for globally threatened species (i.e. those considered Critically Endangered and Endangered), for the conservation of landscape species, and for the conservation of ecological and evolutionary processes (i.e. containing unique or exceptional examples of ecological and evolutionary processes). All key biodiversity sites within priority conservation corridors were automatically given high priority, along with some others important for the conservation of globally threatened species outside of conservation corridors.

This approach led to the identification of 362 key biodiversity areas and 53 conservation corridors in the Indochina Region. Thirteen of the latter are trans-frontier corridors, straddling frontiers between Cambodia, China, Lao PDR, Thailand and Vietnam, and therefore suitable targets for regional intervention (Table 10). Of these, three belong to the list of identified top priority corridors: (a) *Huanglianshan/Hoang Lien Mountains* and (b) *Northern Highlands Limestone*, both between China and Vietnam, and (c) *Mekong River and Major Tributaries*, between Cambodia, Lao PDR and Thailand (Table 11). The one single-country and three priority sites named in Table 10 additionally represent major ecosystems which are among the most threatened in the Indochina Region: coastal, riverine, lowland evergreen forest, and southern China/northern Vietnam forest.

| Table 10: Trans-frontier Conservation Corridors in Indochina | | | |
|---|---|---|---|
| **Conservation Corridor** | **Countries** | **Area ($km^2$)** | **No. of Key Biodiversity Areas** |
| Cambodia-Lao PDR-Vietnam Tri-border Forests | Cambodia, Lao PDR & Vietnam | 11,278 | 4 |
| Central Annamites | Lao PDR & Vietnam | 32,951 | 18 |
| Central Indochina Limestone | Lao PDR & Vietnam | 8,017 | 4 |
| Doi Phuka-Mae Yom | Lao PDR & Thailand | 17,105 | 10 |
| Eastern Plains Dry Forests | Cambodia & Vietnam | 19,905 | 8 |
| Huanglianshan/Hoang Lien Mountains (Table 11) | China & Vietnam | 20,215 | 6 |
| Mekong River and Major Tributaries (Table 11) | Cambodia, Lao PDR & Thailand | 15,571 | 10 |
| North-western Mekong Delta Wetlands | Cambodia & Vietnam | 7,865 | 7 |
| Northern Annamites | Lao PDR & Vietnam | 21,220 | 7 |
| Northern Highlands Limestone (Table 11) | China & Vietnam | 24,477 | 17 |
| Northern Plains Dry Forests | Cambodia & Lao PDR | 19,460 | 4 |
| Quang Binh-Quang Tri-Xe Bangfai Lowlands | Lao PDR & Vietnam | 3,823 | 2 |
| Southern Annamites Western Slopes | Cambodia & Vietnam | 3,932 | 2 |

| Table 11: Priority trans-frontier Corridors and Sites for biodiversity conservation in Indochina | | | |
|---|---|---|---|
| **Priority Corridor** | **Priority Sites** | **Countries** | **Area ($km^2$)** |
| **Trans-frontier Priority Corridors and the Priority Sites they contain** | | | |
| Huanglianshan/Hoang Lien Mountains | Che Tao; Daweishan; Fan Si Pan; Fenshuiling; Huanglianshan; Van Ban | China and Vietnam | 20,215 |
| Mekong River and Major Tributaries | Basset Marsh; Boeung Veal Samnap; Mekong from Kratie to Lao PDR; Mekong from Phou Xiang Thong to Siphandon; Mekong upstream of Vientiane; Sekong River; Sesan River; Siphandon; Upper Lao Mekong; Upper Xe Khaman | Cambodia, Lao PDR & Thailand | 15,571 |
| Northern Highlands Limestone | Ba Be; Ban Bung; Ban Thi-Xuan Lac; Binh An; Cham Chu; Diding; Dong Phuc; Du Gia; Gulongshan; Kim Hy; Na Chi; Nongxin; Sinh Long; Tat Ke; Tay Con Linh; Thanh Hen Lake; Trung Khanh | China and Vietnam | 24,477 |
| **Additional single-country Priority Sites and the Hainan Mountain Corridor** | | | |
| Hainan Mountains | Bawangling; Datian; Diaoluoshan; Fanjia; Ganshiling; Houmiling; Jianfengling; Jianling; Jiaxi; Liji; Limushan; Lotung; Nanmaoling; Sanya; Shangxi; Tongtieling; Wanling; Wuzhishan; Yinggeling | China | 16,780 |
| none | Chao Phraya River from Nonthaburi to Nakon Sawan | Thailand | 965 |
| none | Mae Klong Basin | Thailand | 482 |
| none | Nam River | Thailand | 968 |

The key sites and corridors analysis described here offers a perspective to biodiversity conservation planning that is highly meaningful in terms of the needs of real ecosystems and species populations, especially those which are threatened and are now fast running out of time. It identifies locations where regional intervention can do most to preserve ecological integrity of the multi-national environment.

**d) Migratory species**

Mention of congregational species draws attention to another approach to multilateral cooperation in biodiversity conservation. Many wild birds undergo annual migrations between equatorial (or even southern hemisphere) and Palaearctic or north temperate ecosystems, variously taking advantage of temporary food abundance in more seasonal areas, the reversed seasonality of the northern and southern hemispheres, and the more continuous food availability in equatorial regions. Such migrations mean that the populations and species concerned are vulnerable to predation or the destruction of necessary habitats throughout their annual ranges. Since the latter typically involve several to many countries, all must take consistent action, meaning that the conservation of migrant species can only be undertaken effectively at a regional level.

The European-African Waterbird Agreement (EAWA) provides for common action among the countries of Africa, the Middle East and Europe in the protection of migrating waterbirds and their wetland habitats. This seems to have been a significant success, and could provide a model for at least two other similar agreements in Asia. The first, an East Asia-Australasia Flyway Agreement, would cover migrant species travelling between Australia/New Zealand and north-east Asia (Siberia, Korea, Japan, etc.), while the second, a Central Asia Flyway Agreement, would cover those travelling between Sri Lanka/India and Russia. The negotiation and implementation of these agreements would best be coordinated with the Secretariat of the Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn 1979).

Comparable reasoning can be applied to multi-country and multi-wetland swimway connections for aquatic organisms, building on the experience of the Mekong River Commission, applied for example to the major rivers of the northern Indian sub-continent, shared by Nepal, India and Bangladesh, or to the Tumen River Basin of Mongolia, China, Russia and Korea, where the Kherlen and Khalkh Gol rivers feed the Amur River which ultimately flows into the Pacific. Also relevant here would be to identify appropriate locations for marine and coastal protected area systems that would guarantee the survival of aquatic organisms in the event that climate change (and associated alterations in currents and edaphic conditions) will force populations to move over the coming decades.

The EU countries through the EU Water Framework Directive are managing major European riverways and catchments to achieve a multitude of different objectives including water supply, drainage, flood control, navigation, water pollution control, nature conservation and recreation. EU experience in trans-boundary issues has relevance to China, for example, both in regard to the Mekong and Nujiang (Salween) Rivers, and in general in relation to equitable cross-regional water management

agreements between upstream and downstream provinces. The Chinese are also embarking on major cross-watershed transfer schemes (South to North Water Transfer Projects). Also relevant here is the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki 1992).

Taken together, joint management of bilateral or trilateral trans-frontier reserves and corridors, and multilateral agreements, offer a way to define an expanded, focussed programme of regional intervention which could contribute much to biodiversity conservation in Asia.

### 5.1.6 Managing alien invasive species on islands

After habitat destruction, alien species invasions are regarded as the second-most severe threat to the biodiversity of Asia's approximately 23,000 islands, and aggravate the impact of habitat disturbance by taking advantage of new opportunities in damaged ecosystems. This issue is little appreciated and under-resourced by biodiversity managers in the countries concerned, which include Burma/Myanmar, India, Malaysia, Maldives and Sri Lanka, but are principally the archipelagic countries of Indonesia and Philippines which with Burma/Myanmar and Malaysia are members of ASEAN and partners of the EC-supported ASEAN Centre for Biodiversity (ACB). The ACB's predecessor, the ASEAN Regional Centre for Biodiversity Conservation (ARCBC) adopted alien invasive species as a focal subject and published a special issue of its regional magazine *ASEAN Biodiversity* on it in late 2002, thereafter establishing a regional database and sponsoring several workshops. The scale of this effort is small relative to the scale of the problem, however, and in these circumstances continuity and the steady build-up of awareness and capacity is vital.

### 5.1.7 Disaster preparedness and risk reduction

Coastal ecosystems in the tropics, such as coral reefs, mangroves, sea-grass beds, salt-marshes, swamp forests and lagoons, are known to be highly productive ecologically, and thus capable of supporting the livelihoods of millions of people. They and others, such as sand dunes, are also known to be robust to several kinds of environmental shocks, especially high-energy sea-born events associated with storms. Unfortunately, these ecosystems have suffered several decades of widespread neglect, exploitation and conversion, for example affecting coral reefs (often mined for limestone, damagingly fished and/or polluted), dunes (often mined for sand), and mangroves (often clear-felled and/or converted to aquaculture). Their decline has been coupled with an increasing density of people, settlements, resorts and infrastructure in the Indian Ocean's coastal zone. Thus, there is a realisation that life in this region has been growing increasingly precarious, especially in view of the global warming/climate change process, since the latter is implicated in increasingly severe and unpredictable storms, and is raising mean sea levels through both thermal expansion and ice melt.

The great tsunami of December 2004 impacted the coastal zones of countries all around the Indian Ocean, and it is reasonable to ask if coastal ecosystems had a role in mitigating these impacts. Answers are mixed, however, because it is hard to separate out the influences of pre-tsunami damage and the variation in tsunami scale caused by

distance from the earthquake epicentre and other factors such as the shape of the sea bed. The fact is that coastal ecosystems are adapted to absorbing wave energy and preventing coastal erosion by trapping mud and sand, but can also be overwhelmed by events as extreme as that of a tsunami close to the epicentre of a powerful earthquake. All that can be concluded at present is that these coastal ecosystems cannot necessarily protect against rare, overwhelming events such as giant tsunamis, for which early warning arrangements and the siting of settlements and infrastructure away from the most exposed locations are more effective measures. They certainly can, however, help protect against lesser, more common environmental shocks, while also supporting mass livelihoods through ecological productivity. Research since the tsunami deepened understanding of these matters, leading to the idea that the wholesale restoration of coastal ecosystems is justified for many reasons. It must be based, however, on adequate knowledge and local participation, and hence on local understanding, obtained through environmental education, of how and why to undertake the work in the context of sustainable development and livelihood strategies.

Meanwhile, the tsunami precipitated at least three other realisations. First, that disasters generate immense amounts of debris, some of it toxic, which needs to be relocated, stored, separated and otherwise processed in ways that minimise secondary environmental damage and health risks. Second, that reconstruction after a disaster is politically charged, with decisions characteristically made under pressure, and can cause further environmental harm both as a result of the location of new build in sensitive areas and also because of the demand for timber, rock and sand, which often falls upon protected areas or resource reserves that are already depleted or vulnerable. These ideas lead to the third realisation, which is that environmental expertise is needed from the very beginning of the local, national and international response to disaster, and should not be added on later, when key decisions have already been made. The best way to deliver environmental expertise immediately after a disaster is for it to be present already in the disaster-affected population, meaning that environmental education should be integral to all aspects of disaster preparedness. This helps increase local people's understanding of their own environment and how to use it in their own interests. Hence it is a key necessity, both in ecosystem restoration for disaster risk reduction and livelihood sustainability, and in disaster preparedness.

### 5.1.8 International movement of hazardous wastes and pollutants

A variety of processes that occur within Asian countries yield environmental hazards that cross international frontiers and impose costs on other countries and/or damage to shared, non-territorial resources such as the open ocean. The latter include Nitrogen run-off from fertiliser and automobile emissions, which can cause eutrophication, algal blooms and oceanic dead zones, as well as the more general issue of greenhouse gas emissions and their role in climate change. Examples of the former include: dust resulting from deforestation and desertification (e.g. from China and Mongolia to Korea and Japan); acid rain from sulphur and other emissions from burning coal and petroleum; mining wastes and tailing leachates (e.g. from Russia to Mongolia via the Altan River); 'haze' resulting from the burning of rainforest, peat-swamp forest and scrub (e.g. from Sumatra and Kalimantan in Indonesia, with impacts throughout South-east Asia); and the Asian Brown Cloud phenomenon.

Global mechanisms such as the Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel 1989), and regional ones such as the ASEAN Agreement on Transboundary Haze Pollution, offer frameworks for resolving such issues, but their urgency suggests that more active regional intervention would be appropriate. For example, many logged peat swamps in Indonesia and Malaysia have been worked (legally or illegally) using canals to provide access and routes to export logs. These canals are often left behind, and continue to drain the peat, which may be up to 20 metres deep. Once these areas dry out they become vulnerable to fire, releasing vast amounts of particulate haze and carbon dioxide, with appalling consequences for regional air quality, global warming, and biodiversity loss. Blocking peat drainage canals and restoring water-logged conditions has proved feasible in Kalimantan (Suryadiputra *et al*., 2005), and would be a rational focus for urgent regional intervention.

### 5.1.9 International movement of forest and wildlife products

The great natural forest estates of South-east Asia have largely been liquidated during timber booms that occurred at different times in different countries (Ross, 2001): the 1950s to 1970s in the Philippines; the 1960s to 1980s in Sabah; the 1980s to 2000s in Sarawak; and the 1970s to 1990s in Indonesia. Over-investment in sawmills, pulp mills and other wood-processing facilities during the boom means that countries such as Malaysia have a demand for logs far in excess of their own national supplies, while rapid economic growth in China especially has created an insatiable demand for timber, aggravated by China's own cessation of internal logging in the late 1990s.

These factors contribute to a massive growth in timber smuggling, both across land borders (e.g. from Kalimantan to Sabah and Sarawak) and by sea (e.g. from Indonesia to Singapore, Peninsular Malaysia and China), as well as the aggressive expansion of logging into non-traditional source countries, such as Papua New Guinea (EIA, 2005; EIA & Telapak, 2005a, 2005b; Telapak & EIA, 2005). The EC-supported multi-country activity known as the Forest Law Enforcement, Governance and Trade (FLEGT) initiative is addressing the resulting issues to some extent, but there is clearly much room for improvement in developing a regional-level response in the form of providing resources for surveillance, investigation, interception, prosecution and public information directed to all of the illegal trade interfaces.

This also applies to the international trade in wildlife, which is only partly addressed by the record-keeping arrangements of the Convention on International Trade in Endangered Species (CITES, Washington 1973). The need for better information and greater capacity for intervention applies to many species, including those that are in demand in China (and among overseas Chinese communities elsewhere) for traditional medicines (e.g. seahorses, tigers) and exotic foods (e.g. Napoleon wrasses, pangolins).

### 5.1.10 Environmental policy, legislation and institutions

There are generic challenges throughout Asia of weak institutional capacity, authority of environmental institutions, and enforcement of environmental legislation. The key

driver for this is lack of political will due to vested interests or competing, more lucrative, propositions. The three main regional entities (SAARC, SACEP and ASEAN) have broadly similar aims and each purport to protect the environment and promote the sustainable use and management of natural resources as being essential to the long-term economic growth of their countries and regions. A review of the programmes and activities of these three organisations reveals overlapping interests and expenditures. A general conclusion is that beneficial outcomes could be obtained through cooperation among these regional organisations. Each has administrative structures, conferences and expansive declarations of intent, all of which contribute to potential synergy. International NGOs also play a variable role depending upon the country and the NGO's specific interest. A more regional focus could be promoted through the replication of good NGO programmes and projects. In practice, NGOs are as un-coordinated as countries on a regional scale.

### 5.1.11 Mainstreaming of environmental concerns

There is little or no specific mention in the Asian CEPs of matters related to the integration of environmental concerns into the main sectors. Whilst integration is broadly recognised as important and beneficial, there are few good examples of this actually taking place. Whilst mainstreaming of environmental concerns is within the technical capability of the countries, it is likely to be difficult due to institutional and management constraints. In some cases, the sector by sector approach undertaken by the ministries concerned defeats integration, while in others the constraint is simple public-sector bureaucracy. Otherwise, the tendency is usually to regard 'environment' as a sector, and an arcane and unimportant one at that, leading to the observation that "it is shockingly easy for politicians, economists and planners to forget that the economy is a wholly owned subsidiary of the environment" (Andrew Simms, New Economics Foundation, *The Independent* 9 October 2006). This attitude still prevails in very many institutions, in Asia and elsewhere, at the national and international level.

A degree of re-visioning is needed to supplement and encourage the flow of environmental ideas across the main sectors. One way forward is the use of inclusive 'green' national accounting techniques to calculate real economic performance, taking into account the consumption and degradation of natural resources as well as the conventional transaction measures that contribute to GDP calculations. This approach can highlight overhanging ecological debt that jeopardises conventional economic progress: for example the depletion of fresh water resources that undermines the sustainability of agriculture and industry. A development of this theme is the calculation of National Footprint Accounts (NFAs), which in 2005 used over 4,000 data points per year to calculate each country's demand on nature and to assess its biological capacity (www.footprintnetwork.org). NFAs currently exist for over 150 countries, for each year from 1961 to 2002. A nation's consumption is calculated by adding imports to and subtracting exports from national production. Results from this analysis shed light on a country's ecological performance. For example, the NFAs identify whether or not a country's ecological footprint exceeds its biological capacity ('biocapacity'). A country has an ecological reserve if its footprint is smaller than its biocapacity; otherwise it runs an ecological deficit. The ecological deficit that exists when ecological demand exceeds supply can be financed by importing biocapacity,

liquidating existing stocks of ecological capital, or allowing wastes to accumulate and ecosystems to degrade. Today most countries are running ecological deficits, as is the world as a whole.

NFA analyses are the most accurate of all ecological footprint assessments because complete trade statistics are available at the national level, and because national analysis does not require data on consumer behaviour or final use of resources within the country; all that is required are data on aggregate final demand. The footprints of nations and their biocapacity can be directly compared because resource flows are translated into a common unit of biologically productive area known as a 'global hectare'. This is the average per hectare regenerative capacity of all the planet's biologically productive surfaces. Currently, the planet has approximately 11.3 billion hectares of biologically productive land and sea surfaces. Examples of NFAs for Asia include (GFN & WWF, 2006):

- **China, 1961-2002**. China has moved from using, in net terms, about 0.8 times its domestic biocapacity in 1961 to twice its biocapacity in 2002.
- **India, 1961-2002**. Although India's Footprint has exceeded its domestically available biocapacity for over forty years, ecological demands have continued to grow to more than double biocapacity by 2002.
- **Philippines, 1961-2002**. The Philippines' demand on ecological resources increased from less than its own biocapacity in 1961 to more than double its domestically available biocapacity in 2002.

Using exactly the same measures, France's demand on ecological resources increased from less than its domestic biocapacity in 1961 to twice its own biocapacity in 2002, while the Netherlands' demands were already twice its own biocapacity in 1961 and increased to almost six times domestically available biocapacity in 2002. The total ecological deficit of the EU 25 countries in 2001 was 2.8 global hectares per person.

While national accounting exercises can help draw attention to strategic weaknesses in how the environment is treated, and resulting dangers, the concern so generated needs to be converted into opportunities for or constraints on investment if a real difference is to be achieved. Opportunities include fiscal and other incentives to promote business engagement with waste disposal (separation, recycling, engineered landfills, leachate treatment, etc.), energy and materials conservation, or renewable energy generation. A related concept is that of realistic water pricing, and investment of charges to water users in the protection and management of water catchments. Constraints include spatial planning and the use of social and environmental impact analysis, both of which have at their heart comparisons among different scenarios on how resources are used, usually couched in economic terms. Most economists are now familiar with the value of economic services provided by ecosystems, such as water catchments, and at least include an estimate in their calculations. As a result, high-value ecosystems may have become safer, on average, from development projects. To some extent, also, certain wild species and populations have been accorded economic values, usually in terms of a willingness of tourists to pay to see them (e.g. elephants in Kenya, sharks in Maldives, gorillas in Uganda).

What is lacking, however, is an accepted value for unknown wild species, those that make up most life on Earth, which are completely unknown even to the extent of having scientific names, but which go extinct in reasonably predictable numbers as a result of ecosystem destruction. At present, the EIA for developing an oil palm plantation in lowland rain forest, for example, cannot include a cost for the loss of unknown wild species anticipated as a result of the project. Since it is known that each species must have at least some existence, option or bequest value, even if it currently has no use value (other than as part of an ecosystem), it would be more appropriate to adopt an arbitrary minimum value for each species than to give it a zero value as at present. The EC could reasonably apply such a value to every economic calculation performed on its behalf, and this alone would go some way to mainstreaming safeguards for biodiversity.

One way to rationalise the establishment of an existence value for an unknown wild species would be to assume that the value of humanity is equal to that of all other species put together. A proxy for the value of humanity might be the Gross World Product (GWP), which in 2005 was estimated to be about US$ 44 trillion (€ 36 trillion; http://en.wikipedia.org/wiki/World_economy). This could be divided by the total number of species in the world, which is thought to lie in the range 20-100 million, to give an existence value for an unknown wild species. Assuming 50 million species, the figure would be US$ 880,000 (€ 715,000) per species. For any given species, to this minimum value would be added direct and indirect use values if these have been studied, as well as the option and bequest values imputed from any mechanisms that might be developed for trading in the future use of wild species (such as in bioprospecting). Once such a rule was applied, it would then be up to project proponents and critics to make a plausible scientific estimate of the number of species extinctions incurred or avoided in each case, under various project scenarios.

### 5.1.12 Environmental indicators and research needs

The net effect of extreme growth and maldistribution in human population, consumption and waste, visible in Asia as well as globally, has been to disrupt or destroy many natural ecosystems and to drive a large and increasing proportion of the Earth's pre-20$^{th}$ Century biota up to or beyond the threshold of extinction. As a result, we are often described as living in and causing a Great Extinction, that will show up in the geological record of future millennia as the sixth such event in the Earth's history, and the only one so far to have been induced by a single species. Recognizing this outcome as undesirable, the conclusions of the Gothenburg meeting of the European Council in 2001 led to the 2004 EU Council's statement on *Halting the loss of biodiversity by 2010*. This informed the Johannesburg World Summit on Sustainable Development (WSSD) in 2002, which accepted the target (previously adopted by CBD) of achieving a significant reduction in the rate of global biodiversity loss by 2010. Since biodiversity loss and environmental change are proxies of each other, the indicators by which the EU and international community is proposing to recognise the achievement or otherwise of these targets cover a range of features which collectively say much about the state of the Asian environment. These internationally-agreed indicators are summarised below.

**Focal Area 1: Status and trends of the components of biodiversity.**

- Headline Indicator: Trends in extent of selected biomes, ecosystems and habitats:
  - Extent of forests and forest types (using remote sensing data, and forest assessments using data from the FAO forest resource assessments);
  - Extent of grassland and dryland ecosystems (using remote sensing data);
  - Extent of agriculture ecosystems (from FAO statistics);
  - Extent of urban habitat (using 'lights-at-night' data for observations by NOAA satellites).
  - Extent of snow/ice biomes (using NASA MODIS coverage).
  - Extent of wetland ecosystems (using remote sensing, and sampling for small, numerous sites – e.g. for RAMSAR sites by Wetlands International and the European Space Agency – and for coral reefs using as a baseline maps by the University of South Florida).
- Headline Indicator: Trends in abundance and distribution of selected species:
  - Living Planet Index (reporting trends in populations of species);
  - Global Wild Bird Index (reporting average population trends of a suite of representative wild birds, as an indicator of the general health of the wider environment);
  - Abundance of selected forest tree species (using FAO statistics).
- Headline Indicator: Coverage of protected areas:
  - Coverage according to World Database on Protected Areas (using data from 110,000 protected areas maintained by UNEP-WCMC);
  - Management effectiveness of protected areas (in terms of protected area design, adequacy and appropriateness of management systems and processes, and delivery of protected area objectives, using data from WWF, World Bank, WCPA and WDPA); Overlays with areas of key importance to biodiversity (using species/taxon diversity – e.g. endangered, endemic species, areas of high endemism, important bird areas, areas of high plant diversity – and ecosystem/habitats protection – e.g. unique or sensitive terrestrial and marine ecosystems);
  - Other indicators of coverage of protected areas (ecological networks and corridors, and inclusion of community and private protected areas).
- Headline Indicator: Change in status of threatened species:
  - Red List Index (reporting trends in the threat status of species, based on population and range size and trends, as quantified by categories on the IUCN Red List);
- Headline Indicator: Trends in genetic diversity of domesticated animals, cultivated plants, and fish species of major socio-economic importance:
  - Genetic diversity in off-site (*ex situ*) crop collections (reporting trends in conservation of crop plants and their wild relatives, based on data from the

World Information and Early Warning System, the Global Plan of Action for the Conservation and sustainable use of Plant Genetic Resources for Food and Agriculture, and the International Plant Genetic Research Institute).

- Genetic diversity of terrestrial domesticated animals (based on the global inventory of livestock genetic diversity, using the internet-based Domestic Animal Diversity Information System, FAO and the World Watch List for Domestic Animal Diversity);
- Genetic diversity of domesticated aquatic species (using data from diverse sources to compensate for poor data availability overall);
- Tree genetic resources (a proxy of forest tree genetic diversity and an indicator of documentation effort and knowledge).

**Focal Area 2: Sustainable use**

- Headline Indicator: Area of forest, agricultural and aquacultural ecosystems under sustainable management:
  - Area of forestry under sustainable management: Forest certification (using data from the Forest Stewardship Council and other certifiers);
  - Area of forestry under sustainable management: Degradation and deforestation (reporting changes in growing stock in managed forests of selected forest species using remote sensing and national inventories);
  - Area of agricultural ecosystems under sustainable management (based on the adoption of policies, strategies and plans that support and promote sustainable use of agriculture, adoption of best practices, status and trends of agriculture biological diversity and ecosystem services, and status and trends in sustaining agricultural livelihoods, using data from FAO's World Agricultural Information Centre database).
- Headline Indicator: Proportion of products derived from sustainable sources:
  - Proportion of fish stocks in safe biological limits (based on formal assessments carried out at national and regional levels, and analysis of FAO fisheries statistics);
  - Status of species in trade (using CITES data);
  - Other sustainable use indicators (e.g. based on further development of the IUCN Red List, assessing the potential use of trade and associated data maintained by FAO, ITTO, INBAR, RFMOs, Customs, etc., locally-sited case studies on known commodity groups such as medicinal plants, wild species for meat, timber, and marine fisheries, and a Red List Index of used/traded species).
- Headline Indicator: Ecological footprint and related concepts:
  - Ecological Footprint (using data from the Global Footprint Network and the National Footprint Accounts).

**Focal Area 3: Threats to biodiversity.**

- Headline Indicator: Nitrogen deposition:
    - Nitrogen deposition (using wet deposition databases for USA, Canada, Europe and of Asia, and data from the WMO's Global Atmospheric Watch programme, as a basis for improving poor knowledge).
- Headline Indicator: Trends in invasive alien species:
    - Trends (using national and regional databases and the Global Invasive Species Information Network).

**Focal Area 4: Ecosystem integrity and ecosystem goods and services.**

- Headline Indicator: Marine Trophic Index:
    - MTI (using data from the Sea Around Us Project, FAO and the University of British Columbia).
- Headline Indicator: Water quality:
    - Quality trends (based on Biological Oxygen Demand, nitrates, suspended sediments, pH, and temperature using the UNEP GEMS/Water database).
- Headline Indicator: Connectivity/ fragmentation of ecosystems:
    - Fragmentation of forest systems (to be developed, initially for forests).
    - Fragmentation of river systems (based on damming and flow regulation by dams).
- Headline Indicator: Biodiversity for food and medicine:
    - Floristic biodiversity for nutrition, food and medicine (based on FAOSTAT and FAOCOMP, INFOODS Network databases, and others to be developed).
    - Contribution of wild fauna and flora to human diet and healthcare (based on the number of species used for food, livestock feed/fertiliser, or human and/or animal medicine, the number of people consuming wild species directly, or using wild species for livestock feed/fertiliser, the number of people lacking regular access to 'western' medicine, and the economic contribution of biodiversity to income from sale, or overall health, using species assessments within the Species Information Service and IUCN, FAO and IPGRI data).

**Focal Area 5: Status of traditional knowledge, innovations and practices.**

- Headline Indicator: Status of traditional knowledge, innovations and practices:
    - Status and trends in linguistic diversity and numbers of speakers of indigenous languages (to be developed).

**Focal Area 6: Status of resource transfers.**

- Headline Indicator: Official development assistance provided in support of the Convention:

- ODA trends (based on data from the OECD/Development Assistance Committee and the CBD secretariat).

Additionally, the UN Commission on Sustainable Development (CSD) was established in 1992 to ensure effective follow-up of the United Nations Conference on Environment and Development. The Commission is responsible for reviewing progress in the implementation of Agenda 21, which calls on countries and the international community to develop indicators of sustainable development. A core set of 58 indicators has been developed, divided into social, environmental, economic, and institutional indicators. Of the CSD's environmental indicators, the following are most closely aligned with the 2010 indicators:

- Arable and permanent crop land area;
- Forest area as a percentage of land area;
- Wood harvesting intensity;
- Land affected by desertification;
- Area of urban formal and informal settlements;
- Annual catch by major species;
- Biological Oxygen Demand in water bodies;
- Area of selected key ecosystems;
- Protected area as a percentage of total area; and
- Abundance of selected key species.

Finally, of the eight Millennium Development Goals (MDGs), the 2010 biodiversity target is most directly relevant to the achievement of MDG 7, which commits nations to "ensure environmental sustainability". In general terms it has been recognized that the conservation of biodiversity and its sustainable and equitable use are key components of environmental management and sustainability. MDG 7 can be seen to underpin the achievement of all the other seven MDGs, especially MDG 1 on reducing hunger and extreme poverty. Progress towards the MDGs in South and South-east Asia is summarised in Table 12.

| **Table 12: Progress towards the MDGs in South and South-east Asia (Source: UN, 2006)** | |
|---|---|
| Goal 1: Eradicate extreme poverty and hunger | Progress in both regions. The main driver has been the economies of China and India. |
| | Progress has been made in South-east Asia on decreasing hunger but in South Asia the number of hungry people has increased by tens of millions |
| | Conflict and extreme events such as the tsunami were identified as exacerbating the situation for poverty and hunger in South Asia |
| Goal 2: Achieve universal primary education | Four out of ten children out of school live in South and South-east Asia |
| Goal 3: Promote gender equality and empower women | While South-east Asia has nearly achieved this goal, South Asia is the region with the poorest performance in its implementation. |
| Goal 4: Reduce child mortality | While South-east Asia is making good progress, more than a third of all deaths in children under five occur in South Asia and a drastic reduction in mortality will need to occur |
| Goal 5: Improve maternal health | |
| Goal 6: Combat HIV/AIDS, malaria and other diseases | HIV/AIDS prevalence has increased in both South and South-east Asia and significantly so in South Asia. Malaria cases show a downward trend in most countries in the region. |
| Goal 7: Ensure environmental sustainability | The proportion of land covered by forests in South-east Asia is decreasing (down to 49%) while that in South Asia is stable but only 13% of land area |
| | The extent of protected areas has increased slightly, but remains below the 10% target set by IUCN |
| | Good progress is being made in both regions with respect to access to water and sanitation |
| | The number of urban dwellers living in slums is increasing in both regions |
| Goal 8: Develop a Global Partnership for Development | Youth unemployment is increasing in both regions with a doubling in South-east Asia between 1993 and 2003. |

MDG 7 has three Targets (9, 10 and 11) and eight indicators for reporting on progress to meet these Targets. For three of these indicators there are similar or relevant indicators for the 2010 biodiversity target:

- Proportion of land area covered by forests (Target 9, Indicator 25);
- Ratio of area protected to maintain biological diversity to surface area (Target 9, Indicator 26);
- Proportion of population with sustainable access to an improved water source, urban and rural (Target 10, Indicator 30).

These indicators are closely related to the 2010 indicators of trends in extent of selected biomes, ecosystems, and habitats; coverage of protected areas; and water quality in aquatic ecosystems, respectively. Indeed, the linkages between the 2010 indicators and the MDGs may become considerably stronger if, as proposed by the UNDP-UNEP Poverty-Environment Partnership, the CBD's 2010 indicators are adopted as the

indicators for the biodiversity component of MDG 7. Such integration would result in a strengthening of the linkages between biodiversity and environmental sustainability and development, and the biodiversity indicators would reach a much wider audience. Institutional and financial resources for calculating the 2010 biodiversity target indicators at the national level would also be increased.

Most if not all of the CSD, CBD, MDG and EU indicators require further development, in some cases from a very low level, and the investment of considerable resources if they are to be used at a global or Asia-wide level. This development represents a substantial part of any future research agenda for Asia. More generally, research needs are distributed across the biodiversity sector, since every part requires more and better-organized knowledge to support wise decision making. Particular gaps include:

- research to help understand what works and what does not, and why, in terms of publicly-accountable investments in conservation;
- research to identify better means to engage human minds in appreciating nature and participating in its protection and sustainable use;
- research to find new ways to engage very large numbers of 'citizen scientists' in monitoring and reporting on ecosystem and population health and vitality;
- research to design distance learning and advice systems to support public efforts to participate in biodiversity conservation and the promotion of good governance;
- research to encourage private and community investment in the use of biodiversity in ways that contribute to its conservation and do not conflict with the public interest;
- research to provide ways for local institutions to harness modern computational power to the management of data about species and naturally-occurring chemical substances within their home regions;
- research to allow the international community to report on progress towards agreed international targets for reducing the rate of biodiversity depletion and achieving thresholds for the protection of viable samples of all ecosystems; and
- research to address the open-ended task of describing all aspects of the living world and extracting meaning from those descriptions.

## 5.2 RECOMMENDATIONS

### 5.2.1 Introduction to the recommendations

Three key directions need to be integrated and balanced within each strategic intervention. First, there should be the effect of improving public awareness of environmental issues and challenges, which is essential if change is to enjoy sustainable levels of political support. Second, there should be the effect of promoting intergovernmental cooperation on shared environmental challenges, which is essential if best practices are to be developed on the integration of environment into other policy fields. Finally, there should be the effect of engaging the private sector, which is the

primary engine of change, growth and development in all the Asian countries. The recommendations are formulated with these interlinked priorities in mind. They are in some cases quite specific, partly reflecting high levels of certainty about the kinds of interventions that are needed, and partly because it is often easier for stakeholders to respond to specific ideas than generalities. They should, of course, be considered as starting points for further discussion between the EC and Asian counterparts.

### 5.2.2 Promote sustainable consumption and production

There is an overwhelming strategic need to decouple economic growth from natural resource use and environmental degradation, in Asia as elsewhere. With respect to reduced emissions of greenhouse gases, interim aims include reducing pollution in energy generation and boosting the efficiency of energy use, while the strategic objective would be the systematic abandonment of the fossil-fuel-based economy, by promoting the development of hydrogen cells, fusion, geothermal, solar, hydroelectric, wind, tidal, wave, and other energy sources. Comparable aims in terms of solid wastes, air and water pollution would include a huge effort to reduce, reuse, recycle and manage the residuum of waste in as benign a manner as possible. All these areas contain business opportunities where investment can be leveraged and SMEs engaged through a focussed, targetted, transparent and highly visible intervention such as the proposed Sustainable Consumption and Production in Asia programme (SCP-ASIA), financing of which is therefore recommended. The impact of this would be further amplified through the efforts of other institutions (e.g. IFC, UNEP), increased dialogue with which is therefore also recommended.

### 5.2.3 Promote disaster preparedness and risk reduction

Environmental deterioration, climate change and infrastructure and population growth in vulnerable locations all contribute to making Asia increasingly prone to costly calamities. Regional governments are improving their ability to predict and share warnings of disasters. An example is the Indian Ocean Tsunami Warning System, which became operational in 2006. The system apparently detected the Java tsunami of 17 July 2006, but institutional constraints meant that the alert was not conveyed in time to people at risk (Caldecott, 2006b). This performance could no doubt be improved. The melting of Himalayan glaciers due to climate change, and the associated risk of dam failure, illustrate another regional need for an early warning mechanism to help mitigate stress and mobilise resources to deal with potential environmental disasters. The building of working relations between staff in relevant institutions in different countries, and their participation in disaster scenario and modelling activities, would also contribute to the effectiveness of early warning mechanisms. In addition, local stakeholders can improve their environmental security by analysing their vulnerabilities to various kinds of disaster and taking such actions as restoring protective ecosystems, and by agreeing responsibilities and courses of action before, during and after disasters. A comprehensive approach to disaster preparedness and risk reduction is therefore recommended, including dimensions of early warning, environmental education, networking and investment in measures, such as ecosystem restoration, to improve resilience and environmental security.

### 5.2.4 Promote climate change mitigation and adaptation

There is already a Regional EU-ASEAN Dialogue Instrument (READI dialogue) on climate change, but the true scale and diversity of proven, anticipated and feared climate change impacts is only gradually becoming apparent. Regional efforts should focus on sharing knowledge, preparing for an increased frequency and intensity of weather-related disasters, and anticipating and mitigating for the main ecological and human impacts. For example, it will be necessary to re-examine national and regional protected area systems, both terrestrial and marine, to ensure inclusion of representative samples of ecosystems that will remain viable under foreseen climatic conditions, and that, where possible, are connected with one another to allow movement of populations and genes in an adaptive response to climate change. Likewise, where large numbers of environmentally-displaced persons are anticipated to result from sea-level rise (e.g. from Maldives and Bangladesh), the international consequences should be examined and planned for on a contingency basis.

### 5.2.5 Control international movement of hazardous materials

The capacity for handling hazardous and toxic material imported from Europe safely is barely present in Asia, and it is recommended that the EC take a much more proactive approach in assessing Asian capacity in this area and monitoring the flow of EU-Asia wastes in dialogue with Asian ministries of environment. The blocking of peat drainage canals and restoration of water-logged conditions in Kalimantan peat forests would be a rational focus for urgent regional intervention, in view of the scale of carbon and particulate emissions from fires that are consuming peat beds.

### 5.2.6 Promote the 'green' environmental agenda

A number of priorities have been identified where regional and region-to-region cooperation will be necessary to safeguard ecosystems and the biodiversity they contain. These are consistent with European and international commitments to ensure environmental sustainability (MDG 7) and reduce the rate of biodiversity loss by 2010 (or as soon as possible thereafter). They include investment in:

- **Controlling international movement of forest and wildlife products**, by improving surveillance, investigation, interception, prosecution and public information directed to all illegal trade interfaces for timber and wildlife products.
- **Managing trans-frontier reserves and corridors**, by improving efforts in trans-frontier biodiversity corridors (e.g. those among Cambodia, China, Lao PDR, Thailand and Vietnam), and trans-boundary reserve complexes (e.g. those between Indonesia and Malaysia, Afghanistan, Tajikistan, China, and Pakistan, and China, Mongolia, and Russia).
- **Protecting migrating species and their habitats**, by developing an East Asia-Australasia Flyway Agreement, and a Central Asia Flyway Agreement, modelled on the successful European-African Waterbird Agreement.

- **Amplifying anti-alien invasion efforts in insular Asia**, by assessing risks, developing toolkits of practical management aids and best practices, producing identification and management guides to common alien invasives, developing databases on alien invasions, and organising regional workshops.
- **Mainstreaming biodiversity values in economic assessments**, by establishing an economic existence value for unknown wild species so that the cost of extinction of unknown wild species can be internalised to cost-benefit analyses of development projects.

### 5.2.7 Develop environmental indicators

The following CBD/EU 2010 biodiversity target indicators require development through an active goal-oriented research agenda before they can be used effectively:

- *Extent of grassland and dryland ecosystems* (needs assessment of grassland conversion or degradation).
- *Living Planet Index* (needs species population data for Asia).
- *Abundance of selected forest tree species* (needs standardised data for Asia).
- *Coverage according to World Database on Protected Areas* (needs data on community and local-government protected areas).
- *Management effectiveness of protected areas* (needs data from Asian protected areas).
- *Genetic diversity of terrestrial domesticated animals* (needs high quality, up-to-date, and standardized data on breeds in Asia, and threshold values for categories of risk of genetic erosion).
- *Genetic diversity of domesticated aquatic species* (needs baseline data and information on fishing/farming methods in Asia, and genetic data for inland fisheries).
- *Tree genetic resources* (needs terrestrial ecogeographic zonation in Asia to allow distribution maps of important trees to be produced, and further work to evaluate the extent of species gene pools).
- *Area of forestry under sustainable management: Forest certification* (needs standardization of what certification means, and increased data capture and mapping in Asia).
- *Area of forestry under sustainable management: Degradation and deforestation* (needs baselines and technical guidelines for national information, and standard classifications of forest types for Asia).
- *Area of agricultural ecosystems under sustainable management* (needs consistent definitions, improved data collection, and better understanding of changes in ecological functioning in agricultural areas under various uses and management regimes).
- *Proportion of fish stocks in safe biological limits* (needs assessment of Asia's inland fish stocks).

- *Ecological Footprint* (needs expansion of data sources behind current calculations, and improved transparency, also better data for Asia on aspects of human demand such as freshwater use, persistent toxics, waste flows, and greenhouse gases).
- *Nitrogen deposition* (needs data on wet and especially dry deposition and the environmental response to it in Asia).
- *Marine Trophic Index* (needs better catch information from Asia, including data on small-scale fisheries and diet composition for species at the bottom of the food chain).
- *Water quality* (needs improved data collection from wetlands and inland water, and, generally more data from Asia).
- *Fragmentation of forest systems* (needs the lack of available data in Asia and various methodological and technical issues to be addressed).
- *Fragmentation of river systems* (needs better datasets for Asian dam locations, discharge information, water diversions and transfers).

## 6. REGIONAL STRATEGY PAPER – ENVIRONMENTAL ANNEX SUMMARY

**Land degradation** is widespread among the 18 Asian countries studied here, involving salinisation due to over-irrigation, waterlogging due to poor drainage, erosion due to farming or logging on steep slopes and fragile soils, over-grazing, and desertification, with land (coal and peat) fires occurring in some areas. **Water stress** is becoming increasingly severe: in India, some 250 $km^3$ of water are extracted for irrigation each year, 100 $km^3$ more than are replaced by rainfall; in Pakistan, around 90% of all crops are watered by irrigation from the Indus river, which now often fails to reach the sea; and in China, 100 million people live on crops grown with groundwater that is not being replenished, while water tables are falling fast all over the north China plain. **Poor water quality** is becoming increasingly prevalent, mainly due to sewage contamination, pesticide contamination, naturally-occurring arsenic, leachates from garbage dumps, seawater intrusion, miscellaneous industrial effluents, and mining effluents. **Solid wastes** are being generated by Asians at a rate of up to about one kg per person per day, and this amount is increasing rapidly to overwhelm the limited waste collection, processing and landfill arrangements. This is aggravated by the illegal or undocumented export of solid wastes to countries that include China, Indonesia and Pakistan.

Outside the cities, **natural forest cover** has been catastrophically reduced in Afghanistan, Bangladesh, China, Pakistan and Philippines, and widely lost, fragmented and/or degraded elsewhere, with Indonesia and Burma/Myanmar having particularly high deforestation rates. Causes include logging (often legal at first, then illegal), fuelwood collection, shifting cultivation, aquaculture, forest fires, tree plantations, and aggravating factors such as timber smuggling, hunting and harvesting non-timber forest products and the smuggling of resulting products, alien invasive species, and weak forest governance and law. **Damage to other ecosystems** has also been extensive, including to coral reefs (by destructive fishing, coral mining, pollution and sedimentation), wetlands (by drainage, dams, pollution, construction, farming and fire), deserts (by mining, fuelwood collection, overgrazing and conversion of oasis land to agriculture), and limestone areas destroyed by quarrying.

Such intense and widespread loss and degradation of ecosystems means **massive loss of biodiversity** in some of the world's most species-rich countries, five of them (China, India, Indonesia, Malaysia, Philippines) belonging to a group of 17 megadiverse countries in which live about 70% of all species on Earth. Most others are also very rich in absolute numbers of species, and Bhutan and Sri Lanka have very large numbers of species per unit area. Exceptional endemism rates are found in Bhutan, China, India, Indonesia, Philippines, Sri Lanka, and Vietnam, and high ones in Burma/Myanmar, Cambodia, Lao PDR, Malaysia, Mongolia, and Thailand. **Serious genetic erosion**, the loss of variety among crops and livestock, is occurring in Afghanistan, Bangladesh, China, India, Mongolia, Pakistan, Philippines and Sri Lanka. Since all wild species are potentially useful, species richness and endemism are now considered to be genetic resources, their loss being genetic erosion which is now widespread and severe in Asia.

The Asian countries are contributing increasing emissions of the greenhouse gases, especially methane (e.g. from rice fields, which emit 50-100 million tonnes each year) and carbon dioxide (e.g. from deforestation and soil oxidation), and although they are relatively low emitters on a per-person basis, the huge populations of China and India, and rapid economic growth in these and other countries, mean that Asia makes a large contribution to emissions in absolute terms. **Climate change** has the potential to cause severe adverse impacts on rainfall patterns, agricultural potential, water resources, and terrestrial, wetland, aquatic and coastal ecosystems, besides increasing the range of disease vectors and rendering coastal areas vulnerable to inundation by the sea. This will especially adversely affect the poor and the marginalized who depend largely on agriculture, forests and marine resources for their livelihoods, or who may become environmentally displaced persons. It will also undermine the viability of protected areas, which are becoming increasingly isolated and vulnerable to changing conditions. Meanwhile, countries that are already disaster prone (such as Bangladesh, India, Philippines and Vietnam) anticipate an additional frequency of calamity.

Into this changing world, the Asian societies continue to pack large numbers of additional people, many of them living **close to the edge of survival** in places that are already marginal ecologically, or in locations vulnerable to storm surges and land slides, and that increasingly lack the buffers offered by intact forested catchments, grasslands, wetlands and coral reefs. Millions of these may find that environmental conditions deteriorate to the point where to survive they must uproot themselves, becoming 'environmentally displaced persons'. Meanwhile, in the increasingly populous cities, day-to-day life among the urban poor will become ever more dominated by the scarcity of safe drinking water, by escalating concentrations of sewage, industrial effluent and garbage leachate in what freshwater there is, by mountainous quantities of solid wastes choking waterways and valleys, and by ever filthier air. All these trends are active and continuing, and the outlook is inevitably coloured by concern for natural ecosystems and wild species, for the quality of urban and rural life, and for the economic and social sustainability of Asian societies.

It is nevertheless possible to be more optimistic, if deeper social processes are taken into account. For example, there are cases of Asian cities bringing especially air pollution under control (e.g. Seoul, Tokyo and Kitakyushu), and improving waste management and water supply systems. It has been speculated that a threshold in per person income must be reached before environmental clean up becomes possible, the idea being that individual wealth is positively correlated with opportunities to learn about and become active on health and environmental matters, and with a greater collective ability to pay, through taxes and markets, for environmental solutions. Other important mechanisms, which are not necessarily wealth-dependent, must include people becoming aware enough, motivated enough and organised enough to encourage municipal governments to clean up the environment, and private corporations to stop polluting it. It is at least possible that very poor communities can take effective action once the oppressive effects of environmental deterioration are recognised, especially if they enjoy effective and accountable leadership.

Observations suggest that there is a rapid growth in awareness, concern, self-organisation and influence among community groups, NGOs and local government

institutions in many countries (e.g. India, Indonesia, Malaysia, Philippines), which are starting to impose environmental protection on larger-scale actors. These groups are increasingly networked and informed by each other's efforts, failures and successes. Although warfare and/or dictatorship can and has blocked progress in some countries (e.g. Afghanistan, Indonesia, Philippines, Sri Lanka), often for decades, there does seem to be an inexorable rise in accountable governance, which applies pressure on decision makers to provide environmental security (or at least to reduce disaster risk) and improved air and water quality, and water supply.

Over the last two or three decades, governments in the region have adopted numerous policies and laws, and international agreements, committing themselves to set aside protected areas within which viable and representative samples of their ecosystems are to be preserved. These protected areas have received increasing amounts of public investment, as their actual and potential importance to national economic activity and well-being has gradually come to be understood. Countries such as India, Indonesia, Malaysia, Sri Lanka, Thailand and Vietnam are now quite plausibly committed to the future of their protected area systems, and are investing in ways to resist what are in many cases still quite significant threats to the reserves' integrity. There is also a trend for governments to co-venture in reserve protection with community groups, providing for revenue sharing (e.g. in Nepal) and/or co-management (e.g. India, Philippines), and with private corporations (e.g. in Maldives) or international NGOs (e.g. in Indonesia). These new approaches are helping to embed the reserves in a permanent way within social and economic systems, contributing to environmental security and offering continued access to resources needed for ecotourism, education and both pure and applied research.

Meanwhile, some Asian countries are beginning to take environmental sustainability very seriously. China, for example, has adopted the concept of the 'circular economy', in which all economic activities pursue low resource use, maximum efficiency, and low waste generation, with one facility's waste energy, water and materials becoming another facility's inputs. It has established key targets for 2010, aiming to increase resource productivity per unit of energy and material (by 25%), to reduce energy consumption per unit of GDP (by 18%), to increase the efficiency with which irrigation water is used (by 50%), to increase the rate of re-use of industrial solid waste (to 60% or more), and that of recycling or re-using major renewable resources (by 65%). Elsewhere, favourable policies are increasingly falling into place, although there are frequent weaknesses in the basic institutions of environmental regulation and enforcement (e.g. in Indonesia, Malaysia, Philippines, Thailand and China), a lack of legislation empowering environmental agencies to set ambient and emissions standards, monitor performance and enforce compliance (e.g. Indonesia, Thailand and Philippines), and a lack of adequate technical capacity and sufficient resources with which to operate is almost universal. Even as these basic needs are being met, Asian countries will need to draw on the experience of industrial economies around the world and move aggressively toward the adoption of market-based instruments, pollution prevention, clean production and superior environmental performance.

It is however clear that the replication of a fossil-fuel-based, automobile-centred, throw-away economic system throughout Asia cannot be environmentally sustainable,

regardless of the capacity of local social units to achieve better defence and management of their own environments. This is because of the nation-wide, trans-frontier, region-wide and global consequences of attempting to consume enough resources and generate enough wastes to extend traditional industrial-economy practices and lifestyles to additional billions of people. Hence a massive structural change is needed in the economic systems and technologies that are used to generate energy and create food, water and livelihoods. This observation can be extended to the world as a whole, since there are no grounds for supposing either that non-Asian economic systems are themselves sustainable, or that Asian decisions can be made in isolation from what happens elsewhere. On greenhouse gas emissions, for example, it is increasingly clear that conventional market and political systems are quite unable to restrict the use of fossil energy, and that all fossil energy sources will eventually be exploited by someone. Hence solutions must involve both carbon sequestration on an unprecedented scale, and international carbon emission rationing. Such challenges will need to be addressed in all sorts of ways over the next few decades, starting immediately.

Meanwhile, the sheer size and population of Asia, coupled with extremely rapid economic growth, means that environmental pressures and problems will tend to increase unless vigorous and effective policies are put in place and implemented. The overall expectation is that a wealthier Asia, with a more environmentally-aware leadership and a better-informed and more politically-active population, should be able to achieve cleaner urban environments as well as more secure protected areas, albeit surrounded by landscapes in which native biodiversity has largely been expunged. This will be a patchy outcome, though, since progress depends on peace and accountable governance at all levels, and in some cases the externalities arising from the destruction of native ecosystems will simply overwhelm the capacity of local societies to organise their own solutions. This last point is relevant both locally, for example with settlements vulnerable to land slides, and globally, with whole populations vulnerable to the effects of global warming and climate change.

Most of the environmental problems that have been identified in the Asian countries can only be corrected by the countries themselves, with their governments and populations working in cooperation. A major path to change would involve the people who actually experience air and water pollution, or inadequate waste disposal, or the consequences of deforestation, self-organising to oppose further degradation and restore environmental security, and demanding that their governments support them in doing so through an enabling legislative environment and one that sets and enforces standards of private, corporate and governmental behaviour. The provision of technical support to governments in their efforts to respond to such public pressure, by setting standards, designing regulations, and building capacity for monitoring and enforcement, is properly the subject of bilateral assistance programmes. In this view, specifically regional interventions should rather focus on:

- encouraging and enabling knowledge to flow amongst elements of civil society in different countries, so as to build public awareness of environmental issues and threats, and what to do about them;
- promoting the emergence of common, high standards of environmental governance, so as to make governments better able to respond to and/or to lead their peoples;

- engaging with private corporations at all scales to encourage investment in cleaner and more sustainable forms of production and consumption; and
- a suite of activities designed to encourage and enable governments to cooperate in addressing issues that can best or only be addressed through such cooperation.

# 7. TECHNICAL APPENDICES

## I. ENVIRONMENTAL MAPS OF THE REGION

http://www.nationalgeographic.com/wildworld/global.html
http://grid2.cr.usgs.gov/datasets/datalist.php3
http://www.unep-wcmc.org/imaps/imaps_index.htm
http://earthtrends.wri.org/maps_spatial/maps_detail_static.php?map_select=376&theme=2
http://www.biodiversityhotspots.org/xp/Hotspots/hotspots_by_region/

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## III. LIST OF KEY ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACB | ASEAN Centre for Biodiversity |
| ADB | Asian Development Bank |
| AMC | ASEAN Member Country |
| AMME | ASEAN Ministerial Meeting for the Environment |
| ARCBC | ASEAN Regional Centre for Biodiversity Conservation |
| ASEAN | Association of Southeast Asian Nations |
| ASEM | Asia-Europe Meeting |
| CBD | Convention on Biological Diversity |
| CEP | Country Environmental Profile |
| CIDA | Canadian International Development Agency |
| CITES | Convention on International Trade in Endangered Species |
| CORDIO | Coral Reef Degradation in the Indian Ocean |
| CP | Cleaner production |
| CSD | United Nations Commission on Sustainable Development |
| DALY | Disability-adjusted life year (= loss of one year of healthy life) |
| DCI | Development Cooperation Instrument |
| EAP-AP | UNEP Environmental Assessment Programme for Asia and the Pacific |
| EAEF | EC-ASEAN Energy Facility |
| EC | European Commission |
| ESCAP | United Nations Economic and Social Commission for Asia and the Pacific |
| EU | European Union |
| FAO | Food and Agriculture Organisation of the United Nations |
| FFI | Fauna and Flora International |
| FLEGT | Forest Law Enforcement, Governance and Trade |
| GCRMN | Global Coral Reef Monitoring Network |
| GÉANT | Gigabit European Academic Network |
| GEEREF | Global Energy Efficiency and Renewable Energy Fund |
| GEF | Global Environment Facility |
| GIS | Geographic information system |
| GRASP | Great Apes Survival Partnership |
| IBA | Important Bird Area |
| ICIMOD | International Centre for Integrated Mountain Development |
| IMO | International Maritime Organisation |
| IUCN | World Conservation Union (International Union for Conservation of Nature, etc.) |
| MEA | Multilateral Environmental Agreement |
| MDG | Millennium Development Goal |
| MRC | Mekong River Commission |
| NFA | National Footprint Analysis |
| NORAD | Norwegian Agency for Development Cooperation |
| PDR | People's Democratic Republic |

| | |
|---|---|
| SAARC | South Asian Association for Regional Cooperation |
| SACEP | South Asian Cooperative Environmental Programme |
| SCP | Sustainable consumption and production |
| SIDA | Swedish International Development Agency |
| SME | Small and medium enterprises |
| TEIN | Trans-Eurasia Information Network |
| UNCED | UN Conference on Environmental and Development |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment Programme |
| UNEP-WCMC | UNEP World Conservation Monitoring Centre |
| UNESCAP | United Nations Economic and Social Commission for Asia and the Pacific |
| UNITAR | United Nations Institute for Training and Research |
| WMO | World Meteorological Organisation |
| WHO | World Health Organisation |
| WSSD | World Summit on Sustainable Development |
| WTO | World Trade Organisation |
| WWF | World Wide Fund for Nature (World Wildlife Fund) |

# IV. BIODIVERSITY HOTSPOTS AND IMPORTANT BIRD AREAS IN ASIA

## 1. Biodiversity Hotspots

Life on Earth faces a crisis of historical and planetary proportions. Unsustainable consumption in many northern countries and crushing poverty in the tropics are destroying wild nature. Biodiversity is besieged. Extinction is the gravest aspect of the biodiversity crisis: it is irreversible. While extinction does occur naturally, human impacts have elevated the rate of extinction by at least a thousand and possibly several thousand times the natural rate. Mass extinctions of this magnitude have only occurred five times in the history of our planet; the last brought the end of the dinosaur age.

In a world where conservation budgets are insufficient given the number of species threatened with extinction, identifying conservation priorities is crucial. The biodiversity hotspot concept was defined in 1988 to address the dilemma that conservationists face: what areas are the most immediately important for conserving biodiversity? To qualify as a hotspot, a region must meet two strict criteria: it must contain at least 1,500 species of vascular plants (more than 0.5% of the world's total) as endemics, and it has to have lost at least 70% of its original habitat. Thus the 34 biodiversity hotspots hold especially high numbers of endemic species, yet their combined area of remaining habitat covers only 2.3% of the Earth's land surface. Each hotspot faces extreme threats and has already lost at least 70% of its original natural vegetation. Over 50% of the world's plant species and 42% of all terrestrial vertebrate species are endemic to biodiversity hotspots.

The Asian region contains seven biodiversity hotspots. Four are in continental Asia (the Himalaya, Indo-Burma, Mountains of South-west China, and the Western Ghats/Sri Lanka), and three are in archipelagic South-east Asia (Philippines, Sundaland, Wallacea). These, together with the Indo-Burma hotspot, largely overlap ASEAN, and their natural history and condition can be taken to represent many aspects of the ASEAN environment.

### a) Himalaya

Stretching in an arc over 3,000 km of northern Pakistan, Nepal, Bhutan and the north-western and north-eastern states of India, the Himalaya hotspot includes all of the world's mountain peaks higher than 8,000 m. This includes the world's highest mountain, Sagarmatha (Everest) as well as several of the world's deepest river gorges. This immense mountain range, which covers nearly 750,000 km², has been divided into two regions:

- the Eastern Himalaya, which covers parts of Nepal, Bhutan, the north-east Indian states of West Bengal, Sikkim, Assam, and Arunachal Pradesh, south-east Tibet (China), and northern Burma/Myanmar; and
- the Western Himalaya, covering Kumaon-Garhwal, north-west Kashmir, and northern Pakistan.

While these divisions are largely artificial, the deep defile carved by the antecedent Kali Gandaki River between the Annapurna and Dhaulagiri mountains has been an effective dispersal barrier to many species. The abrupt rise of the Himalayan Mountains from less than 500 m to more than 8,000 m results in a diversity of ecosystems that range, in only a couple of hundred kilometres, from alluvial grasslands (among the highest in the world) and subtropical broadleaf forests along the foothills to temperate broadleaf forests in the mid hills, mixed conifer and conifer forests in the higher hills, and alpine meadows above the tree line.

### b) Indo-Burma

The Indo-Burma hotspot encompasses 2,373,000 km² of tropical Asia east of the Ganges-Brahmaputra lowlands, and largely coincides with Indochina. The hotspot contains the Lower Mekong catchment. It begins in eastern Bangladesh and then extends across north-eastern India, south of the Brahmaputra River, to encompass nearly all of Burma/Myanmar, part of southern and western Yunnan Province in China, all of the Lao PDR, Cambodia and Vietnam, the vast majority of Thailand and a small part of Peninsular Malaysia. In addition, the hotspot covers the coastal lowlands of southern China (in southern Guangxi and Guangdong), as well as several offshore islands, such as Hainan Island (of China) in the South China Sea and the Andaman Islands (of India) in the Andaman Sea. The transition to the Sundaland Hotspot in the south occurs on the Thai-Malay Peninsula, the boundary between the two hotspots being represented by the Kangar-Pattani Line, which cuts across the Thailand-Malaysia border, though some analyses indicate that the phytogeographical and zoogeographical transition between the Sundaland and Indo-Burma biotas may lie just to the north of the Isthmus of Kra, associated with a change from wet seasonal evergreen dipterocarp rainforest to mixed moist deciduous forest.

Much of Indo-Burma is characterized by distinct seasonal weather patterns. During the northern winter months, dry, cool winds blow from the stable continental Asian high-pressure system, resulting in a dry period under clear skies across much of the south, centre, and west of the hotspot (the dry, northeast monsoon). As the continental system weakens in spring, the wind direction reverses and air masses forming the southwest

monsoon pick up moisture from the seas to the southwest and bring abundant rains as they rise over the hills and mountains.

A wide diversity of ecosystems is represented in this hotspot, including mixed wet evergreen, dry evergreen, deciduous, and montane forests. There are also patches of shrublands and woodlands on karst limestone outcrops and, in some coastal areas, scattered heath forests. In addition, a wide variety of distinctive, localized vegetation formations occur in Indo-Burma, including lowland floodplain swamps, mangroves, and seasonally inundated grasslands.

**c) Mountains of South-west China**

The Mountains of South-west China Hotspot stretches over 262,400 km² of temperate to alpine mountains between the easternmost edge of the Tibetan Plateau and the Central Chinese Plain. It lies to the north of the Indo-Burma Hotspot, and to the immediate east of the Himalaya Hotspot, and is bounded in the northwest by the dry Tibetan Plateau, in the north by the Tao River of southern Gansu, and in the east by the Sichuan Basin and the plateau of eastern Yunnan.

The Mountains of South-west China are characterized by extremely complex topography, ranging from less than 2,000 metres in some valley floors to 7,558 metres at the summit of Gongga Shan (Minya Konka) in the Daxue range. The mountain ridges are oriented in a generally north-south direction, perpendicular to the main Himalayan chain. The region includes the Hengduan, Gaoligong, and Nu Shan of western Yunnan; the Nyainqentanglha, Ningjing, Taniantaweng Shan, and others at the south-eastern edge of the Tibetan Plateau; the Shaluli, Daxue, Chola, and Qionglai Shan systems of Sichuan; and the Min Shan on the Sichuan-Gansu border. The Ailao Shan and Wuliang Shan of central Yunnan are not part of this hotspot (both are included in the Indo-Burma Hotspot).

The Mountains of South-west China feed the most species-rich temperate and tropical river systems in Asia. Major river systems that traverse or originate in the hotspot include the Jingshajiang, Yalongjiang, Daduhe, and Minjiang, all branches of the Yangtze River, which empties in the East China Sea. The Lancang (Mekong) river, passes through Yunnan Province, Lao PDR, Cambodia, and Vietnam on its way to the South China Sea. The Nujiang reaches the Indian Ocean through Yunnan Province and Burma.

The complex topography results in a wide range of climatic conditions. Temperatures range from frost-free throughout the year in parts of Yunnan and short, frost-free periods at the northern boundary of the region, to permanent glaciers on the high mountain peaks of Sichuan, Yunnan, and Xizang. Annual average rainfall in the region exceeds 1,000 mm on south-western slopes at higher altitudes in Yunnan, while areas of the north-western part of the region, in the rain shadow of the Tibetan Plateau, rarely receive more than 400 mm annually. Climatic and topographic conditions result in a wide variety of vegetation types across the hotspot, including broad-leaved and coniferous forests, bamboo groves, scrub communities, savannah, meadow, prairie, freshwater wetlands, and alpine scrub and scree communities.

### d) Philippines

The world's second-largest archipelagic country after Indonesia, the Philippines includes more than 7,100 islands covering 297,179 km² in the westernmost Pacific Ocean. The Philippines lies north of Indonesia and directly east of Vietnam. The country is one of the few nations that is, in its entirety, both a hotspot and a megadiversity country, placing it among the top priority hotspots for global conservation.

The archipelago is formed from a series of isolated fragments that have long and complex geological histories, some dating back 30-50 million years. With at least 17 active volcanoes, these islands are part of the "Ring of Fire" of the Pacific Basin. The archipelago stretches over 1,810 kilometres from north to south. Northern Luzon is only 240 kilometres from Taiwan (with which it shares some floristic affinities), and the islands off south-western Palawan are only 40 kilometres from Malaysian Borneo. The island of Palawan, which is separated from Borneo by a channel some 145 metres deep, has floristic affinities with both the Philippines and Borneo in the Sundaland Hotspot, and strong faunal affinities with the Sunda Shelf.

Hundreds of years ago, most of the Philippine islands were covered in rain forest. The bulk of the country was blanketed by lowland rainforests dominated by towering dipterocarps (Dipterocarpaceae), prized for their beautiful and straight hardwood. At higher elevations, the lowland forests are replaced by montane and mossy forests that consist mostly of smaller trees and vegetation. Small regions of seasonal forest, mixed forest and savannah, and pine-dominated cloud forest covered the remaining land area.

### e) Sundaland

The Sundaland hotspot covers the western half of the Indo-Malayan archipelago, an arc of some 17,000 equatorial islands, and is dominated by two of the largest islands in the world: Borneo (725,000 km²) and Sumatra (427,300 km²). More than a million years ago, the islands of Sundaland were connected to mainland Asia. As sea levels changed during the Pleistocene, this connection periodically disappeared, eventually leading to the current isolation of the islands. The topography of the hotspot ranges from the hilly and mountainous regions of Sumatra and Borneo, where Mt Kinabalu rises to 4,101 m, to the fertile volcanic soils of Java and Bali, the former dominated by 23 active volcanoes. Granite and limestone mountains rising to 2,189 m form the backbone of the Malay Peninsula.

Modern Sundaland covers a small portion of southern Thailand (provinces of Pattani, Yala, and Narathiwat); nearly all of Malaysia (nearly all of Peninsular Malaysia and the East Malaysian states of Sarawak and Sabah in Borneo); Singapore at the tip of the Malay Peninsula; all of Brunei Darussalam; and all of the western half of the megadiversity country of Indonesia, including Kalimantan (the Indonesian portion of Borneo), Sumatra, Java, and Bali. The Nicobar Islands, which are under Indian jurisdiction, are also included.

Sundaland is bordered by three hotspots. The boundary between the Sundaland Hotspot and the Indo-Burma Hotspot to the northwest is taken as the Kangar-Pattani Line, which crosses the Thailand-Malaysia border. Wallacea lies immediately to the east of the Sundaland Hotspot, bounded by Wallace's Line, while the 7,100 islands of the Philippines Hotspot lie immediately to the northeast.

Lowland rainforests are dominated by the towering trees of the family Dipterocarpaceae. Sandy and rocky coastlines harbour stands of beach forest, while muddy shores are lined with mangrove forests, replaced inland by large peat swamp forests. In some places, ancient uplifted coral reefs support specialized forests tolerant of the high levels of calcium and magnesium in these soils. Infertile tertiary sandstone ridges support heath forest. Higher elevations boast montane forests thick with moss, lichens, and orchids, while further up, scrubby sub-alpine forests are dominated by rhododendrons. At the very tops of the highest mountain peaks, the land is mostly rocky and without much vegetation.

### f) Wallacea

The Wallacea hotspot encompasses the central islands of the Malay Archipelago east of Java, Bali, and Borneo, and west of New Guinea. The hotspot, which occupies a total land area of 338,494 km², includes Sulawesi (Celebes) and the Indonesian provinces of Maluku (the Moluccas, or Spice Islands) and both East and West Nusa Tenggara (the Lesser Sundas), as well as Timor Leste. Wallacea is divided from Sundaland, the other hotspot found in Indonesia, by Wallace's Line, which separates the Indo-Malayan and Australasian biogeographic realms. The line and the hotspot are both named for the 19th century English explorer and naturalist Alfred Russel Wallace, who identified the distinctiveness of faunas on either side of the line, and co-discovered (with Charles Darwin) the principle of evolution by natural selection.

In terms of vegetation, Sulawesi and the Moluccas were largely covered by tropical rainforest, but in many parts of the Lesser Sundas, rainforest formations are found only at high elevations and in areas facing the rain-bearing winds, while significant areas were covered in savannah woodland, including *Eucalyptus* forests. In some lowland areas, such as in eastern Sulawesi, there are unusual and infertile ultrabasic soils with high concentrations of iron, magnesium, aluminium, and heavy metals. The lowland forests on these nutrient-poor ultrabasic soils have rather short trees, and appear to be dominated by the myrtle family.

### g) Western Ghats and Sri Lanka

The Western Ghats of south-western India and the highlands of south-western Sri Lanka, separated by 400 kilometres, are strikingly similar in their geology, climate and evolutionary history. The Western Ghats, known locally as the Sahyadri Hills, are formed by the Malabar Plains and the chain of mountains running parallel to India's western coast, about 30-50 km inland. They cover an area of about 160,000 km² and stretch for 1,600 km from the country's southern tip to Gujarat in the north, interrupted only by the 30 km Palghat Gap.

Sri Lanka is a continental island separated from southern India by the shallow (ca 20 m deep) Palk Strait. The island, some 67,654 km² in size, has been repeatedly connected with India during high-latitude glaciations, most recently until about 7,000 years ago by a land bridge up to about 140 km wide. The Western Ghats mediates the rainfall regime of peninsular India by intercepting the south-western monsoon winds. The western slopes of the mountains experience heavy annual rainfall (with 80% of it falling during the south-west monsoon from June to September), while the eastern slopes are drier; rainfall also decreases from south to north. Dozens of rivers originate in these mountains, including the peninsula's three major eastward-flowing rivers. Thus, they are important sources of drinking water, irrigation, and hydroelectric power. The wide variation of rainfall patterns in the Western Ghats, coupled with the region's complex geography, produces a great variety of vegetation types. These include scrub forests in the low-lying rain shadow areas and the plains, deciduous and tropical rainforests up to about 1,500 m, and a unique mosaic of montane forests and rolling grasslands above 1,500 m.

Rainfall in Sri Lanka depends on monsoonal winds, resulting in much of the island experiencing relatively low rainfall (less than 2,000 mm per year), except for the south-western "wet zone" quarter, where precipitation ranges to as much as 5,000 mm per year. While dry evergreen forests occupy almost all the "dry zone," dipterocarp-rich rainforests dominated the lowlands of the wet zone, and some 220 km² of tropical montane cloud forest still persist in the central hills, which rise to a maximum altitude of 2,524 m.

## 2. Important Bird Areas

The Asia region includes a great diversity of habitats, ranging from Arctic tundra to tropical forest, and including vast expanses of desert, steppe grassland and boreal forest, as well as the highest mountains in the world. This variety of climates and habitats has resulted in the region being extremely rich in birds and other biodiversity. The Asia region supports more than 2,700 bird species, or more than one quarter of the world's species. As Asia's economies develop and its human population expands, greater demands are being placed on the region's natural ecosystems. Throughout the region, forests, grasslands and wetlands are being degraded or lost as a result of human activities, while bird populations are under pressure from over-exploitation. Additional threats to Asia's birds and their habitats include invasive species and pollution. As a result, 332 of the region's bird species are threatened with global extinction.

If the degradation and loss of natural ecosystems in Asia are to be halted, and the essential services and products they provide are to be maintained, it is vital that the negative impacts of economic development on biodiversity are mitigated, and that proactive measures are taken to conserve the region's highest priority sites. The Important Bird Area (IBA) Programme of BirdLife International is a contribution towards these goals. This Programme has five long-term objectives: (i) to provide a basis for the development of national conservation strategies and protected areas programmes; (ii) to highlight areas that should be safeguarded through wise land-use planning, national policies and regulations, and the grant-giving and lending programmes of international banks and development agencies; (iii) to provide a focus

for the conservation efforts of civil society, including national and regional NGO networks; (iv) to highlight sites that are threatened or inadequately protected, so that urgent remedial measures can be taken; and (v) to guide the implementation of global conservation conventions and migratory bird agreements.

Data on IBAs have been collated by an extensive network of ornithologists and conservation experts across the Asia region. In 17 countries and territories, this work was coordinated by the relevant BirdLife Partner, Affiliate or Country Programme. Elsewhere, the work was carried out by research contacts of the BirdLife Asia Partnership. In many parts of the region, data were collated in collaboration with relevant government and local civil society organisations. There are 1,809 IBAs in the 18 countries relevant to this report, identified under several non-exclusive criteria:

- because of their significance for globally threatened bird species;
- because of their significance for restricted-range bird species (those with a global breeding range of less than 50,000 $km^2$);
- because of their importance for assemblages of bird species restricted to a biome (or major regional ecological community); and
- because they hold globally significant congregations of waterbirds, seabirds and/or migratory raptors or cranes.

IBAs are important for taxa other than birds. Birds have many features that make them good indicators of overall biodiversity, and studies have shown their effectiveness in defining geographical priorities for other taxonomic groups. Analyses of the IBA networks in several Asian countries indicate that protection of the IBA network would also make an important contribution to the conservation of other animals and plants, particularly in those parts of the region where data on other groups are scarce.

Some 43% of Asia's IBAs are wholly included within formal protected areas designated under national law, and a further 14% are partially included. However, the remaining 43% are wholly outside formal protected area networks, although some benefit from non-formal protection, such as community management, or are under land-use designations consistent with biodiversity conservation. In many parts of the Asia region, there is a need to expand national protected area systems to address gaps in coverage of the IBA network.

Given the scale of threats faced by IBAs in Asia, and, in particular, the fact that 43% of the region's IBAs lie wholly outside of formal protected areas, there is a need for a comprehensive, region-wide programme of coordinated conservation action by governments, civil society, donors and the corporate sector. Priority actions include:

- The IBA network should be formally recognised under multilateral environmental agreements, and by national governments, civil society, donors and the corporate sector:
    - by formally recognising the contribution of the IBA network to the conservation of global biodiversity:
    - by designating IBAs under multilateral environmental agreements and other mechanisms; and
    - by incorporating IBAs into National Biodiversity Strategies and Action Plans (NBSAPs) and other national conservation plans.

- Appropriate and effective site-based protection should be put in place at every IBA:
    - by reviewing and, where appropriate and feasible, expand national protected area systems to address gaps in coverage of the IBA network;
    - by strengthening management of formal protected areas that overlap with IBAs; and
    - by developing non-formal approaches to site-based protection of IBAs.
- The IBA network should be integrated into broader socio-political agendas by mainstreaming biodiversity into other policy sectors:
    - by integrating IBAs into safeguard policies of national governments and donors;
    - by reducing subsidies, taxes and other incentives that promote natural resource and land-use practices incompatible with IBA conservation;
    - by promoting natural resource and land-use practices compatible with IBA conservation, through subsidies, incentive schemes, certification and other market mechanisms;
    - by strengthening the legal framework for IBA conservation; and
    - by using IBAs as anchors for landscape-level conservation.
- A constituency for IBA conservation should be built among a broad spectrum of stakeholders:
    - by engaging stakeholders in IBA conservation at the site level;
    - by establish and strengthen networks of stakeholders engaged in IBA conservation;
    - by strengthening capacity for IBA conservation at all levels; and
    - by developing approaches to IBA conservation that deliver significant socio-economic benefits to local communities.
- Raise awareness of the biological and socio-economic values of IBAs, and the threats that they face, among all sections of society.
- A cost-effective, stakeholder-based monitoring system should be put in place for the IBA network:
    - by establishing a region-wide IBA monitoring system, and link to policy, site management and site safeguard; and
    - by developing and adopting indicators of conservation success based on IBAs.
- A strong foundation of scientific knowledge should be put in place for the development and protection of the IBA network:
    - by conducting surveys to fill gaps in coverage of the IBA network and keep the network up to date; and
    - by conducting detailed ecological and socio-economic studies at IBAs.
- An adequate, diverse and sustainable funding base should be put in place to support the long-term conservation of the IBA network:
    - by using IBAs to guide allocation of existing conservation resources;
    - by expanding and developing conservation financing mechanisms;
    - by resourcing IBA conservation via government and donor programmes in the natural resources sector; and
    - by securing corporate support for IBA conservation.

# 8. ADMINISTRATIVE APPENDICES

## I. STUDY METHODOLOGY/WORK PLAN

The assignment commenced with a briefing in Brussels to clarify expectations and priorities for the task, and to obtain the primary reference materials for a review of environmental issues in the Asian region, principally the Country Environmental Profiles (CEPs). Because of the scale of the task, and the need to double-check that it was being addressed correctly, a discussion paper on environmental priorities for Asia was prepared as an input to the second consultation in Brussels. This was based on the CEP material, on prior knowledge, and on an opportunistic tour of three Asian countries (Maldives, Sri Lanka, Indonesia) arranged by UNEP which allowed certain research materials and perspectives from key stakeholders based in these countries and also Malaysia and regionally to be obtained. The discussion paper, while not required in the ToR, proved helpful in dialogue with EC personnel, and contributed to the development of the draft REP which was submitted as required by the end of August 2006.

## II. CONSULTANTS' ITINERARY

| | | |
|---|---|---|
| June | 5-6 | Consultations in Brussels (Caldecott, Pagett) |
| | 7-14 | Home-based review of Asia Countries CEPs |
| | 15-30 | UNEP tour of Maldives, Sri Lanka, Indonesia (Caldecott) |
| July | 3-10 | Prepare discussion paper on Regional Environmental Priorities |
| | 17-18 | Consultations in Brussels (Caldecott, Pagett) |
| August | 1-29 | Prepare Draft Regional Environmental Profile |
| September | 15 | Consultations in Brussels (Caldecott) |
| | 18-30 | UNEP tour of Aceh and West Java, Indonesia (Caldecott) |
| October | 1-5 | UNEP tour of Yogyakarta and West Java, Indonesia (Caldecott) |
| | 9-22 | Prepare Draft Final Regional Environmental Profile |
| November | 24-28 | Prepare Revised Draft Final Regional Environmental Profile |

## III. LIST OF PERSONS/ORGANISATIONS CONSULTED

Georgios ANTONIOU, Gianluca AZZONI, Tamryn BARKER , Peter BRINN, Julia FALCONER, Jon GODSON (UNEP Disaster Management Branch), Jean-Paul LEDANT, Ramon MESTRES-BRUGADA, Joelle NOIRFALISSE, Jens-Kristian NORGAARD, Juan PALERM, Natalie PAUWELS, Alain RUCHE, Ivan SCHROEF, Libuse SOUKUPOVA, Marta SZILAGYI.

## IV. LIST OF DOCUMENTATION CONSULTED

Recent country and project descriptions originating in documentation from donor, NGO and consultancy sources, and web-sites, and:

*Country Environmental Profiles* prepared in 2005 (except India, 2006) for 18 Asian countries (Afghanistan, Bangladesh, Bhutan, Burma/Myanmar, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Maldives, Mongolia, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam).

*Draft All-Asia Strategy paper and Indicative Programme, 2007-2013*. European Commission (Brussels, Belgium).
*Final evaluation of the Asia Pro Eco Programme*. ECORYS-NEI (Rotterdam, Netherlands, 2006).
*TEIN 2 (Trans-Eurasia Information Network 2), Financing Proposal*. European Commission, 2003).
*Sustainable Consumption and Production in Asia-Pacific*. United Nations Environment Programme (2004).
*Global Environmental Outlook 2006*. United Nations Environment Programme (2006).
*Strategic Environmental Assessment (SEA) for the Maldives: Regional Development Plan*. Agrifor Consult (Les Isnes, Belgium, 2006).

See also: REFERENCE LIST

## V. CURRICULA VITAE OF THE CONSULTANTS

**Julian Caldecott, Expert I**. With 25+ years' professional experience, and having undertaken numerous assignments as an independent consultant on biodiversity management and sustainable development, Dr Caldecott has considerable experience in the design and assessment of rainforest ecosystem management projects in Asia. He has been instrumental in the design and assessment of many biodiversity and ecosystem management projects and programmes, especially in Indonesia, Malaysia, Sri Lanka and the Philippines. Since 2003, he has been with UNEP, first as Director of the Early Warning and Assessment Division of the UNEP World Conservation Monitoring Centre, providing strategic leadership for assessing ecosystem and taxon status, trends and emerging issues; then as Environmental Assessment Coordinator for Sri Lanka with the UNEP Asian Tsunami Disaster Task Force; then as Senior Technical Adviser to the UNEP Disaster Management Branch, working in Indonesia, the Maldives, Sri Lanka and Switzerland. His last independent assignment was in Feb-Mar 2006, as Team Leader of the final evaluation of the Illegal Logging Response Centre in Indonesia.

**Dr Richard Pagett, Expert II**. With 20+ years' professional experience, Dr Pagett has undertaken numerous environmental assessments, planned environmental programmes and conducted training and capacity development activities in Africa, the Middle East, Asia and the Caribbean. He has extensive and recent regional experience, and has worked across a wide range of issues in Asia, including industrial sectors (oil and gas, road, rail, air & sea transportation, water resources, waste management, manufacturing, construction, quarrying and land reclamation, telecommunications, and urban re-generation), integrated coastal management, tourism, sustainable livelihoods (social development and poverty reduction), environmental, health and safety planning, and biodiversity and natural resources management. He was Team Leader for Country Environmental Profile preparation studies for Guyana and Uganda in 2005. He also possesses significant knowledge of EC environment and development policies and experience with guidance on programming, country strategies, project management cycle and environmental mainstreaming. His specialist expertise also includes stakeholder participation strategies, sustainable development, capacity-building and institution strengthening.

## VI. TERMS OF REFERENCE FOR THE REGIONAL ENVIRONMENTAL PROFILE.

COMMISSION FRAMEWORK CONTRACT EUROPEAID/116548/C/SV
LOT N° 5 'STUDIES FOR ASIA'
REQUEST FOR SERVICES N° 2006/120662

SPECIFIC TERMS OF REFERENCE
**REGIONAL ENVIRONMENTAL PROFILE OF ASIA**

### 1. BACKGROUND

A Strategy Paper and Indicative Programme for Asia will be prepared for the period 2007-2013. This strategy and programme cover in principle all Asian countries that are eligible under the ALA regulation: Afghanistan, Bangladesh, Bhutan, Burma/Myanmar, Cambodia, China, India, Indonesia, Laos, Malaysia, Maldives, Mongolia, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam. The purpose of the strategy is to provide a framework for programming EC multi-country development assistance for Asia-wide programmes and for programmes addressing specific sub-regions, notably ASEAN (Association of South East Asian Nations) and SAARC (South Asian Association for Regional Cooperation). These multi-country programmes supplement bilateral programmes in areas, where support is more effectively provided on a multi-country basis. The Asian Regional Environmental Profile is an input for the preparation of the Regional Strategy Paper and Regional Indicative Programme.

### 2. DESCRIPTION OF THE ASSIGNMENT

#### 2.1. Global Objective

The main objective of the REP is to identify and assess environmental issues to be considered during the preparation of the Regional Strategy Paper.

#### 2.2. Specific Objectives:

- The REP will provide decision-makers in the Region and in the European Commission with clear information on the key environmental challenges, the current policy, legislative and institutional framework and the strategies and programmes designed to address them at the regional level. The REP will identify those environmental issues that can be best addressed through a regional approach and provide an overview of past and ongoing international (including EC) regional co-operation in the environment sector.

- This information will ensure that the EC co-operation strategy adequately integrates environmental considerations and establish the necessary environment safeguards for co-operation activities undertaken in the Region.

- The Profile will establish the key linkages between the environment and development objectives, especially poverty reduction. It will constitute an important source of baseline information and contribute to focusing political dialogue and co-

operation with the Region on key areas of concern including sustainable development as well as raising awareness among policy-makers.

### 2.3. Beneficiaries

European Commission services, more specifically the Directorate General for External relations (RELEX) and the Commission's Delegations in Asia. By implication, therefore, Member States will benefit and, not least, the Asian's governments and Asian's society at large.

The main contact person for the Study in the Commission is Ramon Mestres Brugada (RELEX/H/1) who will co-ordinate with the other relevant officers from the Asia Directorate and the Commission.

### 2.4. Requested Services, Including Suggested Methodology

The Experts will prepare and follow a methodology which should include but not necessarily be limited to the following activities:

1. Undertake consultations with EC regional and country desk officers and other relevant officials, EC Delegation, representatives of regional institutions and civil society actors operating in the environmental field.

2. They will review existing Country Environmental Profiles of the region and the current Regional Strategy Paper; evaluation reports concerning environmental issues on development and economic co-operation.

3. They will review existing major Strategic Environmental Assessments; environmental literature, evaluation reports, the environmental policy and regulatory framework, legislation, regulations and enforcement relating to environmental issues, action plans and progress in implementation at a regional level; review of existing (regional) environmental performance indicators, and appropriate indicators.

4. On the basis of the outline methodology above and time schedule given in these Terms of Reference, a detailed work plan should be proposed.

### 2.5. Expected Outputs

The Experts will deliver the following results:

1. An assessment of the state of the environment and key environmental factors and trends influencing the Region's development and stability.
2. An assessment of regional environmental policies and legislation, institutional structures and capacity, and the involvement of civil society in environmental issues.
3. An assessment of the integration of environmental concerns in sectors with key linkages with environmental issues.
4. An overview of past and ongoing international (including EC) co-operation in the environment sector.

5. A comparative assessment of existing CEPs in the region.
6. Recommendations concerning those environmental issues that are best addressed on a regional basis as part of a regional or sub-regional strategy.
7. Recommendations and, as far as possible, guidelines or criteria for mainstreaming environmental concerns in priority development areas. These recommendations should support the preparation of the Regional Strategy Paper/Regional Indicative Programme and include guidelines or criteria to be used for environmental mainstreaming in subsequent phases of the cycle of operations.

### 2.5.1. Issues to be assessed

The following issues should be assessed:

1. The state of the environment

1.1. This Chapter should identify the state and trends of key environmental resources or components in the Region, including:
- Urban environment (incl. sanitation, water and waste management),
- Forests and biodiversity,
- Mangroves and coastal ecosystems,
- Climate change.

Other environment issues should be identified and assessed using the Table below as a guiding checklist.

| Themes | Aspects |
|---|---|
| Mineral resources and geology | Mineral resources<br>Geological risks (seismic, volcanic and related risks) |
| Land | Soil erosion and degradation<br>Desertification<br>Land use, arable land, losses due to urbanisation or infrastructure building |
| Water | Water regime<br>Ground water<br>Water quality |
| Air and climate | Air quality<br>Potential climate changes and vulnerability |
| Forest, vegetation, ecosystems | Forest cover and volume<br>Pastureland<br>State of particular ecosystems (mangroves, coral reefs, islands…) |
| Biodiversity, wildlife | Local status of globally threatened species/habitats<br>Alien invasive species<br>Fish stocks<br>Species with special value |
| Landscape | Aesthetic and cultural value of landscape |
| Living conditions in human settlements | Air and water quality<br>Sanitation<br>Slums, urban areas<br>Health |

| | |
|---|---|
| | Vulnerability to disasters |

1.2. Pressures explaining the main negative trends should be identified, as well as pressures contributing to global environmental problems. Those pressures should be identified and assessed using the Table below as a guiding checklist, with a particular attention to be paid to:

- Natural resources exploitation, including fishing, (illegal and legal) logging, wildlife trade;
- Agricultural intensification, irrigation and pest management;
- Urbanization;
- Green House Gas emissions
- Illegal drug production.

| Themes | Possible aspects to consider |
|---|---|
| Mining, extraction of hydrocarbons | Extraction, treatment and transport of minerals and hydrocarbons |
| Water use and management | Water extraction (surface- and ground-water)<br>Waste water discharges<br>Water works<br>Water use |
| Land management | Land use planning |
| Forest exploitation, hunting, fisheries, biodiversity | Forest extraction<br>Forest and fisheries management practices<br>Hunting and fishing activities<br>Capture of protected species<br>Use of NTFP (non-timber forest products)<br>Fires<br>Introduction of alien species |
| Livestock raising | Overgrazing<br>Rangeland management, use of fire, water management |
| Agriculture | Extension of agricultural land<br>Shifting cultivation<br>Intensification<br>Irrigation and water use<br>Pest control<br>Agricultural practices |
| Energy production and use | Sources of energy<br>Energy consumption<br>Energy efficiency |
| Urbanisation, infrastructure and industry | Urban growth and sprawl, urban planning,<br>dams, roads, major infrastructure,<br>polluting industries, tourism |
| Waste disposal and management | Waste production<br>Waste management<br>Public behaviour and practices, existing systems,<br>hazardous waste management |
| Atmospheric emissions | Emissions of greenhouse gases and ozone-depleting substances<br>Air pollutants affecting local or regional air quality (point-source and non-point source emissions) |

As far as possible the driving forces influencing these pressures should be identified, such as economic growth and demographic pressure.

1.3. Environmental trends should be assessed with regard to their social and economic impact, including:

- Declines in economic production or productivity (agriculture, forestry, fisheries …);
- Threats to human health;
- Human exposure to environmental disasters (floods, drought, tsunamis…) and vulnerability to climate change;
- Migrations;
- Conflicts and security;
- Impact on poverty and on vulnerable groups (including women, children and indigenous peoples);
- Sustainability of resource use;
- Cultural values.

This information should be provided at the Regional level with, as far as possible, comparative summary data at the national level, based on existing CEPs and presented in annotated tables. If appropriate, the information could also be organised according to eco-geographical subdivisions.

This Chapter should lead to the identification of problems, which are undesirable situations or trends due to their current socioeconomic consequences (falls in productivity, health problems, natural risks, social crises, conflicts...), their future consequences (decline in natural resources, cumulative pollution...) or contribution to global environmental problems. The consultants should particularly identify those problems that should be preferably tackled at a regional or multi-country level.

If appropriate the consultant should refer to appropriate environmental indicators in order to establish a consistent basis for comparison of environmental and sustainable development performance. Attention should be paid to the MDG 7 indicators, components of the ESI (Environmental Sustainability Index) and specific indicators related to the particular environmental issues of the Region. The indicators selected should facilitate future monitoring and evaluation of the state of the environment and be useful for future environmental assessments.

2. Environmental policy, legislation and institutions

A brief description and review should be provided of the following:

- Environmental policies of the major regional institutions (SAARC, ASEAN),
- Multilateral environmental agreements or regional conventions,
- Institutional arrangements dealing with shared natural resources such as water (e.g. Mekong) and fisheries,
- Regional co-operation on environmental issues,
- Participation to policy dialogue on environmental issues,
- Role of international NGOs.

As far as possible and based on existing CEPs, a comparative overview of the national environmental policy, legislation and institutions should also be provided, using the table below for guidance.

| Aspect | Evaluation criteria |
|---|---|
| Policies | Existence of regional strategies and action plans for the environment;<br>Policy response to environmental issues, especially regional and global issues.<br>Environmental integration in sectoral and macro-economic policies and existence of SEA of policies.<br>Important measures taken by the Governments to solve environmental concerns.<br>Effectiveness in achieving targets. |
| Regulatory framework | Ratification status and implementation of Regional Environment Agreements<br>Adequacy of regional strategies and environmental legislation.<br>Provision and procedures for public participation in regional environmental issues. |
| Institutions with environmental responsibilities | Major institutions with regional mandates (involved in policy making, legislation, planning, environmental protection, monitoring and enforcement).<br>Level of coordination and decentralisation.<br>Good governance practices.<br>Capabilities, means, functioning of regional environmental services.<br>Major NGOs, institutes or other organisations involved in regional environmental management or policy.<br>Level of regional co-ordination and decentralisation. |
| Public participation | Transparency and access to regional environmental information.<br>Role of NGOs and civil society in environmental decision-making.<br>Effective participation.<br>Access to justice in environmental matters. |
| Environmental services and infrastructures | Trans-boundary Protected Areas:, areas, relevance, and effectiveness.<br>Trans-boundary water shed management structures: areas, relevance, and effectiveness.<br>Regional disaster prevention systems.<br>Regional emergency response mechanisms. |
| Environmental monitoring system | Relevance of selected indicators (with reference to MDG7).<br>Measurement of the indicators: periodicity, liability.<br>Integration in the general development indicators. |

The analysis should both identify potential institutional/policy/regulatory causes of environmental pressures and the response by the governments/regional institutions to solve the environmental problems.

3. Integration of environmental concerns into the main sectors

The assessment should examine the integration of environmental concerns by major regional institutions (e.g. SAARC, ASEAN) in sectors/areas that have key linkages with environmental issues, including Trade and Investment.

4. EU co-operation with the Region from an environmental perspective

This section should review the past and current experience relating to development co-operation interventions with specific environmental objectives as well as the integration of environment issues into other sectors/areas. Co-operation with SAARC, ASEAN or within ASEM and major bilateral co-operation programmes (with Asian countries) should be reviewed. Where information is available the environmental impacts or potential risks of EU co-operation should be identified for the benefit of future programmes. The results of existing evaluations/reviews should be incorporated and lessons drawn for the future. The general implications for the environment of budgetary support or sector wide approaches should be reviewed if these have been applied. The review should cover both geographic and thematic programmes.

Actions taken under Asia-URBS, Asia pro-ECO, the Asia Environment Programme, the EC-ASEAN Energy Facility and the Forests and Environment budget line should be considered.

5. Co-operation funded by other donors from an environmental perspective

This section should review the past and current involvement of other donors (including multilateral agencies) and their experience in the Region, and include a list of recent and planned projects/programmes with a regional environmental focus or anticipated impact.
Co-ordination mechanisms between donors and the EC with respect to the environment should be assessed.

6. Conclusions and recommendations

The key aspects of the state and trends of the environment in the Region, including policy/regulatory and institutional constraints and challenges, should be clearly stated.

Based on a comprehensive assessment of the available information, recommendations should be made on how the Commission can better mainstream the environment into the next cycle of Regional Strategy Paper. Recommendations should be formulated taking into account the current Regional Strategy Papers (which will provide general guidance) and any pre-identified options for the next RSP, including the anticipated focal sectors.

Recommendations should address but not be limited to the following:

(1) Recommendations concerning the selection of the focal sectors, main objectives and approaches. These recommendations should show how best to address the main environmental challenges identified in the REP. This might be done by selecting environment as a focal sector and /or more frequently through environmental safeguards in other areas. These may include, for example proposals for regional institutional strengthening and capacity building or recommendations for initiating an appropriate strategic environmental assessment (SEA) process.

(2) Opportunities for coordination at a regional level on environmental issues with other donors, seeking to achieve complementarities and synergies in order to more effectively deliver development objectives.

(3) Recommendations on environmental integration in focal areas.

(4) Proposals for environmentally-relevant indicators to be used in the RIP (Regional Indicative Programme).

Individual recommendations should be clearly articulated and linked to the problems to be solved and grouped according to the sector/area concerned or institutional stakeholder. The relative priority of the recommendations and an indication of the challenges to their implementation should be given.

Any constraints to preparing the profile resulting from limited information should be described.

7. Work plan

See section 2.4. of these TORs.

## 3. EXPERTS PROFILE

### 3.1. Number of requested experts per category and number of man-days per expert:

The proposed mission shall be conducted by a team of two experts: one Expert Category I, and one Expert Category II.

Number of man-days per Expert:

- Expert category I: 30 man-days
- Expert Category II: 28 man-days

### 3.2. Profile required:

- Expert Category I with minimum 15 years with experience in environmental issues, including institutional aspects; international environmental policies and management; environmental assessment techniques and experience in rapidly assessing information and developing recommendations. He/she would be the team leader.
- Expert Category II with minimum 10 years experience and with an environment background complementary to the team leader.

In addition:
- Previous working experience in the Region is requested;
- Experts should have an understanding of the EU environment and development policies;

- Experience in undertaking environmental analyses and preparation of development programmes would be an asset;
- Familiarity with Commission guidance on programming, regional strategies, policy mix and integration of environmental issues into other policy areas is desirable;

For each specialist proposed, a curriculum vitae must be provided of no more than four pages setting out the relevant qualifications and experience.

### 3.3. Working language:

English will be the working language. The final report must be presented in English.

## 4. LOCATION AND DURATION

**4.1. Starting date:** 10 May 2006

**4.2. Foreseen finishing date:** 30 June 2006

### 4.3. Planning

The total duration of this study is estimated to be 8 calendar weeks, including the time for visits to Brussels and preparation of comments by the Commission on the various reports.

Estimate of person-days required for both experts is 58 days. It is expected that the experts will be undertaking three missions to Brussels. One will be at the beginning of their assignment. The other two missions will be timed to coincide with the delivery of activities as described under the requested services so as to organise brainstorming meetings with Commission staff.

Close communication through email and telephone will have to be maintained all along the duration of the work, as a series of briefings, reports and outputs will be provided to the Commission.

The exact planning of the meetings with EC services (briefings, debriefings) will be agreed between consultants and the Commission.

The consultants should propose a time schedule in their offer that respects the above schedule. This can be further defined based on discussions in Brussels at the beginning of the assignment.

### 4.4. Location of Assignment

The assignment will involve desk studies and visits to Brussels (3 times each expert: 6 trips). Regular contacts through email and phone with Commission staff will be also required.

# 5. REPORTING

## 5.1. Content

The results of the study should be presented in the Regional Environmental Profile in the format given in Section 5.4.of these ToR. The draft profile, in 10 hard copies and electronic version (Microsoft Word), should be presented to the Head of Unit of DG RELEX/H1 five weeks after the conclusion of the contract. Within (5) weeks, comments on the draft report will be received from the EC. The consultants will take account of these comments in preparing the final report (maximum 40 pages excluding appendices).

The final report in English and 30 copies is to be submitted within one week of receipt of EC comments on the draft report.

The final REP will be accompanied by a Technical report which includes administrative technical and financial details of the activity.

## 5.2. Time schedule

| | **Expert I** | **Expert II** |
|---|---|---|
| Briefing (Brussels) | *1* | *1* |
| Consultation and data analysis | *21* | *21* |
| Report finalisation | *5* | *5* |
| Debriefing in Brussels-not later than (15 September 2006) | *1* | |
| Final report end (10 October 2006) | *2* | *1* |
| Total days | *30* | *28* |

## 5.3. Report format for a regional environmental profile

Standard Report Format for a Regional Environmental Profile

Maximum length (excluding appendices): 75 pages.

The following text appears on the inside front cover of the report:

This report is financed by the European Commission and is presented by [name of consultant] for the European Commission. It does not necessarily reflect the opinion of the European Commission.

1. Summary
The summary should succinctly and clearly present the key issues described in the profile following the order of headings 2 to 5 given below. The Summary should not exceed 6 pages.

2. State of the environment

3. Environmental policy, legislative and institutional framework

3.1. Environmental policy and legislation
3.2. Environmental legislation and institutional framework
3.3. Integration of environmental concerns into the main sectors

4. EU and other donor co-operation with the Region from an environmental perspective

5. Conclusions and recommendations

6. Regional Strategy Paper - Environmental Annex Summary
Comprising the main issues presented in sections 2 to 4 above (excluding section 5.) in not more than 4 pages.

7. Technical appendices

I. Environmental maps of the Region
II. Reference list of environmental policy documents, statements and action plans, and other relevant technical information.

8. Administrative appendices
I. Study methodology/work plan (1–2 pages)
II. Consultants' Itinerary (1–2 pages)
III. List of persons/organisations consulted with their affiliation and contact details (1–2 pages)
IV. List of documentation consulted (1–2 pages)
V. Curricula vitae of the consultants (1 page per person)
VI. Terms of Reference for the Regional Environmental Profile.

## 6. ADMINISTRATIVE INFORMATION

Other costs to foresee under 'Reimbursable'

- Per diem in Brussels (maximum: 12)
- Travel to Brussels (maximum: 6)
- Publications: production and distribution of several reports and of 20 hardcopies of the final report: up to maximum of € 500.

MAIN REFERENCES

1. Regional Strategy Paper for Asia (Draft)
2. Strategy Paper for multi-country programmes in Asia (2005-2006)
3. Communication from the Commission to the Council and the European Parliament on Thematic Programme for Environment and Sustainable Management of Natural Resources including Energy (COM (2006) 20 final).
4. Individual Country Environment Profiles for Asian countries.