This paper was commissioned for the ADB-JBIC-World Bank East Asia Pacific Infrastructure Flagship Study. The views expressed are those of the author only.
Abstract

Despite significant improvements in policy and practice in countries in East Asia and the Pacific in recent years, investment in large scale infrastructure projects and programs has been constrained by the perception, and often the reality, that their adverse environmental and social impacts make them at odds with the achievement of a sustainable pattern of economic growth. Uncertainties about the costs and causality of environmental and social damage, and thus of the magnitude and type of remedial measures present an obstacle to efficient and equitable decision making. Externalities, conflicts of interest, and distributional effects mean that value judgments are inescapable, making it difficult to identify precise and universally acceptable solutions to many of the problems encountered, which works to the advantage of the politically powerful and to the detriment of the poor, and invites corruption in the manipulation of data and information.

The potential environmental and social impacts of investment in infrastructure – for good or ill - are considerable, whether measured in terms of GNP or of various indicators of human well-being. Actions to improve the social and environmental performance of infrastructure development programs should therefore be of major concern to national level economic policy makers whose responsibilities transcend the concerns of the infrastructure sectors themselves. Moreover, while large scale projects receive the greatest public scrutiny, a wide range of circumstances and policies that influence the design and implementation of a myriad of small scale infrastructure projects may in aggregate be of even greater environmental and social significance. The underlying causes of environmental or social problems often cannot be handled at the project – or even sectoral – level. Consequently due diligence relating to environmental and social aspects of infrastructure development should be exercised at a level far earlier in the development process than is typically the case.

The feasibility of achieving this goal essentially revolves around the issue of governance, with an infinite range of political, institutional and cultural arrangements potentially yielding satisfactory outcomes. Varying enormously from country to country, a variety of actions may need to be taken to enhance prospects for sustainable infrastructure development, the impacts of which may have very different time horizons. For example:

(a) Short term measures including adoption of adequate environmental legislation and capacity building related to traditional responsibilities of social and environmental agencies, such as project level EIA, monitoring, and enforcement of economic incentives, regulations and standards. Improved information and transparency about the magnitude and incidence of damage costs associated with infrastructure projects, their direct and underlying causes, and of remedial measures. Environmental education for communities, and training and awareness in infrastructure-related agencies and enterprises about cost-effective technologies. Identification of potential “win-win” strategies. (b) Medium term measures including systematic use of SEA procedures, factoring environmental and social objectives and costs into pricing and other policies in key sectors such as energy, water agriculture, and transportation, i.e. “mainstreaming” environmental and social objectives in country-wide economic planning. Creation of incentives within government agencies and development institutions so that environmental and social costs associated with infrastructure projects and activities are internalized in their own decision making. (c) Longer term measures resulting in empowerment of those adversely affected by infrastructure projects to participate effectively in decision making processes by addressing the “building blocks” that are essential if the foregoing improvements are to be sustained.
independently of the prevailing political fashion. These include the basic elements of a
democratic system, such as technical education; freedom of expression, decentralization of
political authority, and free and transparent electoral systems. These longer term measures are
fundamental to the achievement of virtually all development objectives, but indispensable for
environmental and social goals, due to the need to reconcile inherent conflicts of interest that are
invariably present.

1. Introduction

In the East Asia and Pacific Region as elsewhere in the world, large scale infrastructure
projects and programs, in particular those requiring financial assistance from major
bilateral and multilateral agencies, are constrained by the perception, and often the
reality, that they are inimical to the achievement of sustainable development or
Millennium Development Goals, due to their adverse environmental and social impacts.
In addition to the concern of aid agencies about these issues, private financing may also
be constrained as, with growing public awareness, damage costs are increasingly
becoming the basis for litigation and demands for compensation.

Despite significant improvements in policy and practice throughout the region in recent
years, much still needs to be done to ensure that infrastructure development is – and is
seen to be – not merely sensitive to its potentially adverse consequences, but indeed
makes a significant positive contribution to environmental and social well-being.

In practice, serious obstacles to the achievement of this goal are created by sometimes
genuine, sometimes self-serving differences of opinion about the costs and causality of
environmental and social damage, and thus of the magnitude and type of remedial
measures. Externalities, conflicts of interest, and distributional effects abound, and value
judgments are inescapable, making it difficult to identify precise and universally
acceptable solutions to many of the problems encountered.

This paper illustrates these issues with some examples from the East Asia and Pacific
region, but cannot of course do justice to the enormous variety of conditions encountered
in countries which range from China to the small island nations of the Pacific.
Nevertheless, generic obstacles to improvement are considered and suggestions made
about key aspects such as the measurement of the costs of environmental degradation and
their incidence; identification of proximate and underlying causes and responsibilities;
and potential policy measures.

2. Environmental and Social Impacts

Among the environmental concerns associated with infrastructure projects are direct and
indirect health impacts from air and water pollution; impacts on water quantity and flow
patterns; and contribution to climate change. They also include indirect impacts of
opening access to environmentally sensitive areas, leading to potential deforestation and
disruption of terrestrial and aquatic ecosystems. Social concerns include equitable access to services by poor and disadvantaged groups, affordability of services, disruption of social fabric (inclusiveness and cohesion of communities), involuntary land acquisition and displacement of people, and impacts on ethnic minorities and indigenous peoples.

It is important at the outset however to emphasize that large scale infrastructure projects, if properly planned and executed, can be a positive force in addressing environmental and social objectives. This may be illustrated with regard to investments in road networks, which may contribute to land degradation, deforestation, uncontrolled settlements, and destruction of traditional lifestyles, and, depending upon a host of related policies, additional traffic generated may result in environmental and social costs due mainly to increased fuel consumption, traffic congestion, and accidents. However, with sensitive project preparation and the systematic involvement of key stakeholders, they may have favorable effects. Thus, they may provide access to basic health and education facilities, encourage sustainable agricultural practices, create financially viable alternatives to exploitation of natural forests, and help to alleviate rural poverty. To some extent offsetting the environmental damage associated with generated traffic may be increased efficiency and thus financial and environmental costs savings imposed by the overall transportation system. And improved traffic management components of transportation projects may reduce accidents and traffic congestion.

There is in addition a wide range of infrastructure projects the justification for which depends heavily upon environmental and social factors. Mini hydro schemes for example, which may benefit remote communities for whom access to major grid systems is impracticable, may also avoid some of the ecological and social problems inherent in large scale projects. The growing concern as to their environmental impacts has also stimulated recent initiatives to encourage investment and research in renewable sources of energy such as biomass, wind, solar and geothermal power. Thus at the Renewables 2004 Conference in Bonn, the Chinese government announced its objective of meeting 10 percent of the country’s electric power needs by such sources (mini-hydro accounting for over 80 percent of this amount) by the year 2010.

A further class of environmentally-related infrastructure projects is comprised of measures to respond to natural disasters or man-made environmental threats. These include measures to provide alternative employment for people who occupy ecologically fragile areas such as flood plains and steep hills. Other projects may be designed to mitigate the impact of earthquakes, or to build sea defenses or move populations as a result of global warming and sea level rise, the latter of course being of particular concern to the island nations.

However, as in the case of other infrastructure projects, it should be observed that, if improperly designed or executed, the net environmental or social consequences of projects aimed explicitly at improvement in these areas may possibly be adverse. Even urban infrastructure projects which may essentially be justified in terms of environmental health and provision of service to low income communities, may not be entirely unambiguous in terms of their net environmental and social effects. Thus building of
reservoirs and water supply pipelines may involve ecological concerns as well as disrupting human settlements, while the generation of additional waste water requires complementary investment in collection and disposal if increased waterborne disease is not to be the result.

**Box 1: The Xiaolangdi Multipurpose Project, China**

The Xiaolangdi Multipurpose Dam on the Yellow River in China was completed in early 2000. Total project costs were estimated at US$3,039 million, of which resettlement accounted for nearly one fifth. The total area inundated by the reservoir was about 272 sq. km of which 45% was cultivated land; 42% was sloped land, wasteland and river water surface area; and 13% represented village and settlement areas. Total population affected and resettled was about 180,000 people. Altogether, the Xiaolangdi reservoir flooded 179 villages, 11 government towns, 93 industrial and mining enterprises, 12 small power stations, 267 irrigation pumps, 658 km of irrigation canals, 688 km of roads and 548 km of communication lines. Almost 4 million m2 of housing were inundated of which about 65% were essentially caves.

On the benefit side, the Xiaolangdi Multipurpose Project provides flood and ice-jam protection to 103 million people, and prevents the further silting up of the lower reaches of the river for at least the next 20 years. In addition there are two significant environmental benefits. First, the water downstream of the reservoir is silt-free and does not need any sedimentation basins that would reduce the costs of water treatment for municipal supplies and the costs of silt removal in irrigation canals. Second, the hydropower component will displace many coal-burning power thermal stations using about 1.9 million tons of coal per year. This will save on emissions that produce 4.6 million tons of carbon dioxide, 33,000 tons of sulfur oxides (SOx) and 18,700 tons of nitrogen oxide (NOx) gases. The damage by SOx and NOx gases vary from $400 to $500/ton through acid rain and health impacts. Reduction of burning will also reduce PM10 (10 microns and less) particulate, which also reduce health impacts of those suffering from pulmonary diseases.

The resettlement objective, to provide the affected people with a better standard of living than before the project, and prospects for longer-term economic development is going very well. Both from an environmental, as well as a social point of view, the project is outstanding. Key factors for this success were: a very comprehensive resettlement plan and separate project and budget in place, and an effective monitoring system with participation of an independent agency.

Potential impacts for good or ill can similarly be identified for other types of infrastructure development, with positive outcomes typically requiring considerable analytical, political and institutional efforts at all stages of the policy and project cycle, and involving a wide range of actors in both public and private sectors. The Xiaolangdi multipurpose project in China (Box 1) is a good example.

Special problems involved in defining and taking account of damage costs arise when environmental and social damages are due to physical spillovers from one jurisdiction – local or international - to another, and when, as is typical, there are conflicts of interest between the objectives of the private or public sector actors involved. Indeed, conflicts of interest tend to characterize the environmental issue. And while it is important to recognize that there are in principle many instances in which so-called “win-win” policies can be developed to achieve both economic and environmental goals, it remains the case
that while such actions may be deemed to be in the interest of society as a whole, they often founder on the grounds that the status quo typically tends to favor the wealthy and politically powerful, at the expense of slum dwellers, indigenous tribes, and, in general, the poor and disadvantaged. In practice powerful incentives often exist to manipulate data and information for selfish ends; in this sense, corruption is endemic in the practical development of environmental policy. This of course but one aspect - albeit a major one – of the more pervasive issue of accountability (Castalia 2004).

While a generic obstacle faced by those concerned with socially sustainable development, the issue is of dominant importance in the case of environment, in which damage costs are passed on to someone else, rather than being internalized. Moreover, even where strenuous efforts are made by the project developer to handle social issues in a participatory and sensitive manner, perceptions of inequality, and impossibility of adequately quantifying cultural or social values in economic terms may frustrate the achievement of acceptable solutions. Illustrative of the political difficulties inherent in efforts to achieve an equitable solution to such problems has been the history of resettlement disputes resulting from the Pak Mun Dam project in Thailand (Box 2).

Box 2: Pak Mun Dam, Thailand

The 136 MW Pak Mun Dam, which was completed in 1994, was built by the Electricity Generating Authority of Thailand (EGAT). Well before any construction started or issues arose, EGAT had established resettlement and compensation committees, and had stated a commitment to improve the living standards of affected households, to provide a range of options, and to implement resettlement with the participation of the affected people. Nonetheless, the subsequent history of the project has been dominated by an ongoing struggle over fair compensation for resettled people, and for the loss of fishery income.

Land was initially compensated for at prevailing land prices, and people could choose replacement land. However, in response to protests from resettled households and NGOs, substantial increases in compensation for land and lost fishery income were granted in succeeding years.

Despite the generous compensation for houses and land and many other social infrastructure and service benefits, many people claim they are not satisfied, that they are worse off. There is such a culture of complaint, of trying to win sympathy for even greater compensation claims and assistance, that it is difficult to get affected people to be balanced about their resettlement experience. People are reluctant to mention how their lives have improved, but when directly asked about improvements, readily acknowledge them. Nonetheless, there have been undeniable forced changes in their lives, only partly attributable to the dam. People claim to dislike the development or modernization process, of which the dam looms large in their mind, but that is only one small part of a process sweeping rural northeastern Thailand. People have lost their simpler, more self-sufficient life based on fishing, paddy, forest products, and livestock. They are being integrated into the modern economy, with its competitive, wage-based forms of income. People have to travel farther for employment, often migrating to Ubon or Bangkok for months at a time where they have to work fixed hours, are not their own boss, endure the higher expenses of city living, and usually are separated from their family. They claim to strongly prefer their old, more casual lifestyle, and return home to friends and family as soon as they have met their financial needs. Perceptions are profoundly psychological and emotional, not primarily economic or readily expressed in financial terms.
3. Valuation Issues

Damage Cost Estimation

Environmental issues, characterized as they typically are by externalities or spillover effects, or “commons” problems, imply the existence of complex linkages, and considerable uncertainty often surrounds the quantification of environmental and social impacts in physical terms, e.g. the impact of changes in forest policy on water resource management, or of air quality on human health. Sometimes it is fairly straightforward to identify a market that can be used to evaluate environmental costs or the impacts of remedial measures. Where changes in productivity can be measured, as in the case of soil erosion measures that increase agricultural yields, conventional valuation methodologies apply. The key skills required in such analysis are in such cases to be found in technical, rather than economic expertise.

There remains however a wide range of environmental and social issues that defy monetary quantification – these include, notably, the cost of ill health, the value of an endangered species, and the well-being of future generations or of disadvantaged groups. Even where it is possible to estimate physical effects of environmental change, the next step in the valuation procedure – i.e. quantification in monetary terms - is equally daunting, due to the difficulty of identifying - directly or indirectly - a market for the environmental resource or service in question. And clearly, monetary values are inadequate measures of the social costs of involuntary resettlement and destruction of traditional habitats of indigenous peoples, and cultural heritage.

Market failure implies that willingness to pay and therefore economic benefits are difficult to demonstrate, and quantification of social costs or benefits in monetary terms is often not feasible. In practice, recent developments in valuation methodology (i.e. estimation of "existence" or "option" values, and the use of contingent valuation methods) promoted by environmental economists offer little improvement, and indeed are rarely used to assist major investment or policy decisions in developing or industrialized countries.

Distributional issues pose special problems of valuation where limited substitutability of man-made for natural capital implies the potential for irreversible effects. Compounding controversy over the extent to which technological change may be sufficient to compensate for the drawing down of natural capital is the debate over the weight that should be given to the welfare of future generations where conventional discounting methods offer insufficient guidance.

Transboundary environmental effects also involve complex issues, not only about estimating the impact of such effects, but equally important, allocation of responsibility for taking remedial measures. While emission of greenhouse gases and threats to the
biodiversity are primarily of global concern, generation of acid rain and pollution and interference with the flows of international rivers (Mekong River developments being a classic case) also are of major inter-regional importance.

The foregoing means that value judgments inevitably play a dominant role in investment and policy decision-making, and multi-criteria analysis, involving systematic and transparent assessment of such impacts is required. This is not to downplay the role of conventional cost-benefit analysis however; where economic values can be assessed with some confidence, i.e. where some market for the environmental goods or services can be identified, they should be used to narrow down the range of value judgments to be made by decision-makers. The cost-benefit framework, setting out the pros and cons of alternative actions, is a means of harnessing the skills of a wide range of technical experts, such as soils scientists, epidemiologists, engineers, sociologists, anthropologists, so that what are essentially political decisions can be made in a collaborative, transparent, and well informed way, with due recognition to all constituents involved, whether domestic or international.

Despite limitations in our ability to precisely measure environmental and social costs, rough estimates of the damages associated with infrastructure projects indicate that they are often sufficiently high to warrant the serious attention of planning and finance ministries, and not just those responsible for the sectors concerned. Many of the studies of environmental damage costs in the region are based upon Chinese experience, a range of indicators being shown in Box 3. There is enormous variation in the results of the many studies which have been conducted, but even the lowest estimates indicate significant impacts of environmental degradation upon GNP. A major World Bank study estimates environmental damage from environmental pollution alone at between 3.5 and 7.7 percent of GNP (World Bank 1997a).

Many efforts have been made to assess the cost of ecosystem damage in the country, and most of them estimate such costs to be much higher than those for pollution alone. The range of estimates is however even greater than those for pollution, and the results are not particularly useful in light of ambiguity in the definition of what constitutes ecological damage. Physical measurements are at the present time the best indicators we have.

**Box 3: Costs of Environmental Damage in China**

- Each year 110,000 people, mostly in rural areas, die prematurely due to indoor air pollution caused by coal and biomass burning for cooking and heating.
- 178,000 people in major cities suffer premature deaths, and 6.4 million work years are lost annually due to air pollution, primarily generated by the emission of high sulfur coal.
- Fifty-two urban river sections are contaminated to such an extent that they are not suitable even for irrigation, and they threaten the drinking water supply for millions of people.
- Ten percent of land area is threatened by acid rain resulting from the burning of high sulfur coal.
Blood-lead levels of children in major cities average eighty percent above safe levels and constitute a threat to their mental development.

Over 1.5 million square kilometers are affected by soil erosion, losing five billion tons of soil a year and organic matter, equivalent to twice the national production of fertilizers.

Ten million cubic meters of sediment is accumulated annually in reservoirs resulting in the loss of storage capacity, hydroelectric output, irrigation water, flood control potential and navigability of waterways.

Nearly twenty million hectares (one fifth of the total) on average are declared disaster areas each year (meaning over thirty percent of crop yield loss) due to floods and droughts, whose frequency and severity has been increasing in recent years.

Direct economic costs (nationwide) of the 1991 floods were estimated by the Chinese authorities at 72.5 billion yuan.

In the summer of 1998 alone the Yangtze floods killed 3,656 people, damaged 5.6 million houses and caused more than US$36 billion, reducing the country’s economic growth by about one percent in that year.

Source: Primarily World Bank 1997 as reported in Panayotou and Zhang, 2000

As noted, even greater difficulties are faced in assessing the value, and hence the priority, that should be given to major social issues associated with infrastructure projects, with involuntary resettlement perhaps being the clearest example. Large scale projects throughout the region have displaced millions of people against their will, often with totally inadequate compensation. However, worldwide expression of concern has led to an ever increasing sensitivity of governments to this issue: an indication both of this growing sensitivity as well as of the magnitude of the issue is that, while debate still surrounds its adequacy, the resettlement program associated with China’s Three Gorges Dam accounts for 40 per cent of total project costs.

Water Supply and Sanitation

Water supply and sanitation projects occupy a special place in any discussion of environment and infrastructure, as they are typically designed explicitly to provide environmental services (for more details, see Ehrhardt, 2004). Indeed, improved water and sanitation is very high on the list of environmental and social priorities in virtually all countries in the East Asia and Pacific Region, and, worldwide, one of the key Millennium Development Goals. The potential health benefits of expanding access to water and sanitation in the region are enormous: to take but one indicator, it has been estimated that more than 500,000 infants die each year in the region as a result of waterborne diseases linked to dirty water; about 60 percent of these deaths are as a due to insufficient rural water supplies, the remaining 40 percent due to lack of sanitation in urban areas. Overall, the total cost of waterborne diseases in the region is estimated at $US 30 billion per year, and clearly, it is the poor who suffer most (World Bank 1997b).

Unfortunately, traditional resistance to efficient utility practice, which essentially requires full cost recovery from beneficiaries, or subsidies to compensate for shortfalls, has, often in the name of protecting the poor, had perverse effects. The consequence has been that financially deprived utilities have been unable to generate sufficient funds to expand
service to low income areas, typically leaving the poor with inadequate volume and quality of water even for their basic needs. And – as demonstrated by many studies in the East Asia and Pacific region - the cost of the supplies they do have, whether in terms of their own labor or the prices they have to pay for inferior quality water from private vendors, typically exceeds the cost of public supply by a considerable margin.

The increasing cost of water supply is becoming a major issue throughout the world, as demand grows and as sources further and further away from consumption centers have to be exploited; in other words, long run marginal costs of supply exceed average costs. An economically efficient price is one that equals long run marginal production costs including any environmental costs that may be incurred in the production process: valuation of incremental production is demonstrated by consumers’ observed willingness to pay. Such a price would also yield financial surpluses; since invariably the bulk of the water consumed in a municipal system is consumed by a relatively small number of wealthy households, commerce and industry, there is generally considerable scope to generate enough funds to provide basic requirements to the poor at little cost to them. While in principle it is desirable that subsidy programs should be explicitly targeted and controlled by a central agency such as the Ministry of Finance (Irwin 2004), in practice inadequate fiscal administrative mechanisms mean that it will generally be more practical for the water authority to directly cross-subsidize the poor by a system of increasing block rates.

4. Causality and Responsibility

Despite lack of precision in valuation techniques, the estimates in the previous section suggest that damage costs and social impacts are important enough to justify effort by agencies whose responsibilities at first sight have nothing to do with environmental or social policy. This applies not only to physical spillover effects from adjacent or distant jurisdictions, but also to the policies and actions of other agencies that have no environmental or social objectives, but may in fact have a far greater impact in these areas than overt policies such as conventional environmental impact assessment (EIA) at the project or sector level. These might include ministries of finance or planning, or others whose responsibilities or actions have inter-agency relevance.

A fundamental concern is that even if agencies with responsibility for infrastructure are sensitive to environmental and social issues, and willing to address them, it is often the case that the underlying causes of environmental and social problems lie outside of their control. In addition to the range of global issues addressed by the Global Environmental facility and the Montreal Protocol, there is an infinite variety of circumstances and policies at the national or regional level which directly or indirectly may have profound environmental consequences. For example, forest policy (or lack of) may be an underlying cause of siltation of reservoirs used for hydroelectric power. Industry ministry efforts to encourage clean production technologies may be hampered by energy or water pricing policies that encourage wasteful use. And the pervasive impacts of country-wide policies relating to such diverse areas as energy, education, and political
decentralization all illustrate the need to “mainstream” environmental concerns in a way that is sensitive to social objectives.

**Box 4: Philippines: Intersectoral Linkages**

The potentially important but complex and indirect nature of the linkages between various sectors, and the social and environmental impact of sector-and country-wide economic policies are illustrated by a World Bank study of Philippine government policies in the 1970s and 1980’s. The study sought to determine the policy determinants of long term changes in rural poverty and unemployment that motivated increasing lowland to upland migration, resulting in large scale deforestation and unsustainable agriculture in the newly populated areas. While the inability of the government to manage forest resources was an important direct cause of deforestation, it was found that economic policies aimed at other sectors or country-wide economic objectives were also major contributors to the population movements.

The study found that direct sectoral interventions through agricultural taxation, price controls, subsidies and marketing restrictions, combined with indirect measures, working through exchange rate policies and industrial protection, encouraged the above environmentally and socially undesirable effects. In general, government policies tended to penalize agriculture in the 1970’s and early 80’s, implicitly taxing it by an average of about 20%), and discriminate particularly heavily against lowland agriculture in favor of industrial sectors.

Policies for rice production, the dominant lowland crop were governed primarily by the goal of maintaining low consumer prices rather than assuring price incentives for producers, which resulted, among other things, in widespread unemployment in the sector. Meanwhile, trade and exchange policies contributed to such a degree of inefficiency in the industrial sector that it was unable to absorb surplus labor from the lowland agriculture labor force. These factors combined to provide a strong incentive for unemployed workers to migrate to the uplands. Environmental problems were further compounded by the different treatment accorded corn and coconut production, which together accounted for the main activities on sloping land. Corn was encouraged by favorable protection measures, while the coconut levy discouraged production, the net result being a shift from a more to a less environmentally stable crop, causing soil erosion and loss of downstream productivity.

Source: World Bank, 1994

There is now increasing evidence that while large scale development projects are invariably the primary focus of public attention, the vast numbers of inadequately designed and implemented small scale projects in any particular country or region in aggregate frequently pose a much greater environmental and social threat. Indeed, countries in the region and the concerned international development institutions have for many years recognized the inadequacy of a purely project-by-project approach to addressing environmental problems, and recognized the massive leverage on social and environmental issues that may be exerted by macro-level economic or other country-wide polices, as well as those of certain key sectors – with energy pricing being perhaps the clearest example (Development Committee, 1987). Consequently, making these issues integral components of the programs of ministries of trade, finance, planning, energy, industry, agriculture has become a conventional development objective.
In practice, however, rhetoric is well in advance of reality. It is rare for example that environmental issues are seriously factored into the country assistance strategies of international development institutions, although invariably there are statements – often quite elaborate - which avow this concern. There are of course important exceptions: it is clear that collaboration between the World Bank and China in developing the 1992 Environmental Strategy Report set the scene not only for a series of environmental policy reforms, but also for a series of major projects in which environmental objectives were of paramount importance. More recently, the Country Development Partnership program between the World Bank and Thailand attempts explicitly to integrate environmental issues into mainstream development policy in that country.

It is clear that required reforms at the sector or ministry level are unlikely to take place without a clear long term vision and active leadership from the highest levels of government, and, within development institutions, from the highest levels of management. Much remains to be done not only to promote awareness of the underlying policy and other causes of social and environmental impacts, but also to create systems of incentives that in effect internalize these impacts into the activities of all concerned agencies and other actors. The complexity of the relationships involved is immense; the underlying causes of environmental and social problems associated with infrastructure development, and appropriate remedies, can be expected to be influenced by the most fundamental societal factors, as Japanese experience has demonstrated (Box 5).

**Box 5: Growth and the Environment in Post-War Japan**

In the years immediately following the Second World War, Japan embarked upon a period of extremely rapid industrial growth, which while highly successful in conventional economic terms, resulted in major environmental problems. The need to reconcile the twin objectives of economic growth and environmental protection meant that Japan faced, in principle, the same kind of problems currently being encountered by newly industrializing countries today. Japan in effect followed a policy of “grow now, clean up later”, which in retrospect can be seen to have been very costly in both human and economic terms. The consequences of air and water pollution were exemplified in the 1960’s by the well documented cases of Yokkaichi Asthma and Minamata Disease.

The Japanese response to such environmental problems originated at the municipal and local levels, where citizens exerted pressure on elected officials to take measures against offending industrial enterprises. A series of voluntary agreements were made between industrial enterprises and local governments, which in many cases did not have any explicit environmental jurisdiction or responsibility. National legislation tended to follow later, and national standards for air and water quality invariably remain lower than those contained in the approximately 40,000 voluntary agreements now in place in Japan.

As far as domestic air and water quality is concerned, there is universal agreement that Japan has been an exemplary case, and a number of factors are widely cited as reasons for this. These include: a free press which publicized environmental issues; universal literacy, with a strong emphasis upon technical education, which enabled citizens to understand the impact of environmental degradation on their own health and wellbeing; and a democratic system in which local officials were compelled to take citizens complaints seriously, yet were powerful and efficient enough to address complex technical issues and take measures to address pollution.
It follows that while improvements, as noted above, are required at the sector and project level, these must often be complemented by improvements in policy and practice of other agencies. In this way infrastructure projects can then be designed to have positive effects, and not seen as competitors with apparently more socially and environmentally desirable activities. Moreover, “mainstreaming” is also required within the infrastructure sector itself: thus social and environmental concerns should be integrated into all other aspects of infrastructure policy, rather than being treated as “add-ons”.

Having identified costs of environmental and social damage of infrastructure projects and the chain of causality, the next step is to identify cost-effective and socially sensitive measures for remediation or abatement. Some remedial measures are traditionally under the control of environmental agencies, while others, which may be equally or even more important, fall within the responsibility of entirely different agencies or actors. It is thus appropriate to distinguish between (a) measures that are aimed explicitly at addressing environmental and social aspects of infrastructure projects, and are conventionally defined as such, and (b) a host of strategic issues that lie outside of the control of agencies with specific environmental or social mandates, but which play an important role in determining environmental and social outcomes.

5. Conventional Environmental and Social Measures

A range of policy, regulatory and institutional measures is at the disposal of agencies with responsibility for addressing environmental and social aspects of infrastructure projects. Assessment of the capacity of these agencies, and providing appropriate technical assistance is an on-going preoccupation with development agencies working in the region. While an adequate summary is not feasible here, key areas in which progress has been made, but where, in most cases, much remains to be done, are referred to briefly below.

The Polluter Pays Principle

Much still needs to be done to make the polluter-pays principle a reality, whether by means of directly levied economic instruments, or by indirect forms of taxation based upon the cost of environmental damage that is caused. For example, while a number of major improvements have been made in the region in recent years (such as reform of the pollution levy system in China), environmental taxes and charges remain typically well below damage costs. Monitoring and enforcement mechanisms are typically weak and widespread evasion the norm, this problem applying whether economic incentives or regulatory measures are employed. Paralleling this is the failure to systematically build income distributional or social considerations into economic or regulatory measures. A classic illustration of this general issue is the case of urban road pricing (Schipper 2004).
Constraints to improvement of this situation include the relatively low importance given to environmental and social consequences of projects by important actors. This is explained in part by lack of clear definition of responsibility and accountability for these matters, resulting in inadequate coordination and cooperation between different ministries and jurisdictions, particularly where – as is often the case - spillover effects are present.

Disposition of revenues from pollution taxes remains a controversial issue. Political realities often dictate that such revenues are earmarked for environmental improvements, or channeled back to the polluting sectors via a myriad of subsidy programs. Indeed, OECD experience indicates that the use of economic instruments for pollution control in the industrialized countries is small, but subsidies of one form or another are by far the dominant type of economic instrument observed in practice. Clearly inconsistent with the polluter pays principle, subsidies impose a fiscal burden, invite corruption, and once established they are difficult to remove. Indeed, rather than subsidizing environmentally degrading activities, the trend should be to introduce “green taxation” to make a positive fiscal contribution, and to establish a “level playing field” in which, as far as possible, true costs are reflected in the prices charged for environmentally-related resources.

There may however be instances in which carefully targeted subsidies may be required, the case of urban mass transit or access to clean water by the poor being cases in point (Schipper 2004, Erhardt 2004). Efforts to stimulate an adequate rate of progress in renewable energy may also warrant support for research and development to encourage technological innovation or possibly to take advantage of economies of scale in start-up periods. Where subsidies are deemed to be required for some overriding social or economic purpose, they should be allocated by a central agency, such as the Ministry of Finance, based upon technical advice from the concerned line agency.

**Information and Participation**

Many countries in the region have legally adopted the use of environmental impact assessment (EIA) as a tool for examination of potential environmental and social impacts of projects, and engaging stakeholders in a dialogue on the implications of infrastructure development. There are numerous examples in the region of legally mandated EIA aiming to achieve better project design and more sustainable outcomes. Strategic and Regional EIAs are also being introduced, as are Poverty and Social Impact Assessments (PSIA). However, although adequate laws and regulations may exist on paper, the willingness and capacity to use these and other methods for assessment, monitoring and evaluation of environmental and social aspects of infrastructure investments typically leaves much to be desired.

Special problems arise where inter-agency cooperation is required as well as to public awareness and education campaigns, participation in decision-making, oversight of proposed mitigation/compensation action plans during implementation and beyond, and disclosure of information throughout the project. In addition, integrating environmental and social aspects in strategic development planning and the analysis of project alternatives early in the planning and design phases, have been challenging areas.
There are nevertheless some grounds for optimism; recent experience indicates that community-driven initiatives and participation at all stages of the project cycle are feasible, and likely to lead to satisfactory outcomes. In Thailand, civic forums, introduced with the support of the World Bank, have become the norm in urban areas before infrastructure projects are approved, and this appears to have been a successful innovation. However, sometimes such measures are successful in the short term, but in the absence of a basic educational and governance structure, they remain dependent upon continued top-down support if they are to yield sustainable results. This may or may not be forthcoming, such support being particularly vulnerable to changes in prevailing political philosophy. Moreover, while encouragement of NGOs is widely believed to be indispensable to the evolution of democratic processes, this is not invariably the case. In the Philippines for example, NGO’s are highly conspicuous, but in many cases are primarily the representatives of special – and often powerful – interests.

In conducting EIA, the issue of project size frequently arises. The “small is beautiful” argument is still used, while in opposition economies of scale are cited as justification for large scale projects. Choices between alternatives based on scale, phasing and timing are to some degree susceptible to traditional cost-effectiveness tests, using appropriate discount rates. But the issue is clouded where environmental and social issues are present. While, as noted above, there have been some good examples of effective participatory processes, it is not clear that stakeholder involvement has been as effective for large scale activities as for carefully selected small scale and explicitly social development projects, so project design might be adversely affected by increasing size.

Moreover, a fundamental assumption distinguishing environmental optimists from pessimists concerns the role of technological change, in particular the feasibility of substituting man-made from natural capital, and the degree of risk associated with alternatives. Offsetting to some degree the economies of scale derived from projects designed to last a long time may be the opportunities for technological change that may be associated with phased development. Particularly relevant for infrastructure projects, such concerns should be key elements of the project appraisal process.

**Involuntary Resettlement**

Involuntary resettlement is the most widely observed and controversial direct social consequence of infrastructure projects. There are cases in which no amount of compensation can satisfy persons uprooted from traditional homelands due to the construction of large dams, highways or urban development schemes. But policies can be developed to significantly improve compensation policies for those adversely affected by such schemes.

Evidence of growing sensitivity to this issue is to be found in the summary findings of a workshop on urban resettlement issues that took place recently in Guangzhou, China (Guangzhou Provincial Government 2004). A key recommendation was that efforts should be taken to avoid or minimize land acquisition and structural demolition wherever
possible, and that urban planning should also include measures for in situ resettlement of affected households instead of relying solely on relocation to more distant suburban areas. In this process, while effective valuation and compensation procedures are necessary ingredients for successful urban resettlement, policymakers and practitioners should look beyond narrow technical criteria and bring a “people-centered approach” to resettlement planning. In particular, the special needs of poor or vulnerable households should be considered, special rehabilitation measures (in addition to compensation for assets) may be needed to restore livelihoods, and relocation alternatives should be provided so that those losing housing can choose new living circumstances that best fit their needs or preferences.

The workshop also proposed that regulations should include attention to organizational arrangements and responsibilities to improve implementation and public accountability. This should include clear procedures for full payment of compensation to those entitled to receive it, arrangements for effective monitoring by project entities or oversight agencies of implementation in progress, and full and prior disclosure of information regarding resettlement arrangements to people to be affected. Procedures also should require consultation regarding proposed resettlement arrangements with people to be affected before plans are finalized, and methods affected people can use to register complaints during or after implementation.

Perhaps most fundamental of all, the property rights and interests of the people affected by loss of land or structures should be clearly defined. This should include lessees as well as owners, and should include the interests of those using structures for business purposes as well as those using structures for residence.

While developed with regard to the special problems associated with urban development, these principles remain of general applicability in other sectoral and country contexts.

Private Sector Role

In recent years there has been growing recognition within the private sector that it must be – and, even more important be seen to be – concerned with environmental and social aspects of its activity. Improved public awareness has stimulated the growth of green consumerism, and the potential impact on sales, investors’ attitudes, legal liability, and labor relations, combined with increasingly strict governmental interventions have resulted in substantial changes in private sector attitudes. Hence the rapid embrace of voluntary disclosure and ISO 14000 certification that has taken place in the region. This positive trend requires continued encouragement, which will primarily be achieved by the other measures advocated in this paper. The role of the banking sector is particularly important, adherence to the “Equator Principles” introduced recently by the IFC, which sets standards for private banks with regard to environmental and social impacts of their lending operations, being an important indicator.
Introduced by the national pollution control agency, BAPEDAL, in 1995, the Program for Pollution Control, Evaluation and Rating (PROPER) is a means of encouraging compliance with environmental standards by industry based upon sanctions of public disclosure and peer pressure. Color ratings (from gold to black), were initially assigned to about 180 firms based upon their performance in meeting effluent emission standards in several river basins. The first review showed that about two thirds of the industries were not in compliance with the required standards. The government adopted a careful strategy for releasing results, starting with private communication with concerned companies, giving non-compliant ones time to make improvements before full public disclosure. One year later, there was clear evidence of improvement, with non-compliance down to fifty percent. While the long term effectiveness of the program has still to be demonstrated, subsequent evidence indicates that the program has continued to exert an important impact, with about 2,000 plants being rated annually, and the program being extended beyond water emissions to air pollutants and toxic waste as well. Moreover, other developing countries are applying this approach, with similar success (for example, the Eco-watch program in the Philippines). The keys to its effectiveness appears to be i) accurate evaluation and monitoring of facilities, ii) the simplicity of the color ratings, compared to the unintelligible details (for the public) of chemical and volume statistics, iii) the very public nature of the awards (announced by the Minister on television), and iv) the chance for firms to clean up before disclosure (in a number of cases the owners were not aware of their factory’s pollution, or the rating was concealed from them by their management).

Where the foregoing types of incentive do not work and where the inspection and monitoring system is unreliable, so-called voluntary agreements, based upon the Japanese model, may be a possible route to take. Another approach – as in the case of voluntary agreements, largely based upon the importance of image – is the grading and publicity system exemplified by Indonesia’s PROPER.

In general it has to be assumed that privatized operations are less sensitive to the environmental damage they cause than to the prospect of financial reward. Strengthening the ability of oversight agencies to monitor and regulate environmental and social aspects on an on-going basis through management contracts that effectively recognize these concerns must be an integral component of the privatization process. It does not follow however that the emphasis upon adversarial processes and litigation as exemplified by the United States example is the desired route. Japanese experience, which emphasizes collaboration and consensus, involving not only voluntary agreements but also readily transferable innovations such as the mandatory role of pollution control officers in major industrial operations, has been highly successful in ensuring compliance with agreed standards. This is in marked contrast to litigation-based systems in which non-compliance is endemic. Other countries in the East Asia and Pacific region may find the Japanese model more culturally and practically appropriate than the United States model in this regard.

**Public Expenditure**

Definition of what constitutes environmental and social expenditure related to infrastructure development is unavoidably ambiguous. Expenditures on the traditional
functions of environmental agencies, such as monitoring and inspection would fall into this category, as would funding of solid waste and sewerage, particularly if such services are directed toward the poorest communities. Many other investments however – for example, in afforestation or natural gas development - may have a strong, but not a sole or even primary, environmental or social rationale, and may or may not be defined as such in official statistics.

Concern is often expressed that environmental and social expenditures are cut disproportionately during periods of budget tightening, and it has been estimated that total environmental expenditures amount to about 0.3% of GNP in several major Asian countries, giving the impression that these expenditures are unduly small. However, this is not an adequate reflection of the effort being put into the solution of environmental or social problems: there are many examples of major investments that, while they have no environmental or social objective, may in fact have massive effect (for good or ill) on the environment, often with particular impacts on the poor – investment in natural gas for power generation may be a positive example. Even more important are changes in policies that have profound environmental or social consequences, but involve virtually no public expenditure. Some of these are considered in the following section.

Implementation

Training and capacity building for concerned environmental and social agencies will remain a major preoccupation of the development community for the foreseeable future with regard to the effective use of incentives and regulations, environmental and social impact assessment, information and participation, as well as creation of a framework within which the private sector can function most efficiently. Systematic use of indicators to monitor trends in damages and cause-effect relationships is an important component of environmental management, particularly when applied to the more fundamental determinants of environmental behavior, as outlined below. Such improvements are however in practice constrained by the factors noted earlier in this paper; namely the asymmetry in the distribution of economic and political power.

6. Strategic Issues

General Market Reform

In general, market reforms, in which prices increasingly reflect true costs, provide incentives for efficiency in resource use and access to modern technology, and as such tend to be environmentally beneficial at the sector level. Banking reforms, where financial intermediaries share responsibility for environmental performance with borrowers, elimination of soft budget constraints which remove incentives to respond
efficiently to environmental taxes or other costs, and trade liberalization, can all be expected to have a positive impact on the efficiency of resource use.

**Box 7: Trade Liberalization and Industrial Pollution in Indonesia**

A study performed for the World Bank showed that the trade liberalization policies carried out in Indonesia in the 1970’s and 1980’s had a traceable, and significant, impact upon industrial pollution. The study addressed industrial pollution in three dimensions, namely pollution intensity of output; location relative to human populations and fragile ecosystems; and the increase in pollutant levels due to expansion of industrial output. Sectoral characteristics of pollution-intensive activities were examined, classifying them according to indicators of air, water, and toxic pollution per unit of output. The impact of liberalization on all three dimensions of pollution and on the pollution characteristics of different industrial sectors were assessed. Results showed that liberalization in the 1980’s promoted a surge in relatively clean assembly processes, reversing the pattern in the previous decade in which the more polluting sectors showed the most rapid growth. In addition to changes in the composition of output, the cleaner industries that grew fastest due to liberalization were primarily in the most densely populated part of Indonesia, namely Java, thereby reducing the adverse health and productivity impacts of population in major population centers.

A major finding of the study was that although reforms contributed to mitigating the impact of pollution due to its encouragement of cleaner industries in major population centers, industrial growth was so rapid that the scale effect dominated trends in industrial pollution. In response to liberalization, manufacturing output doubled in volume every six to seven years in the 1970’s and 80s, thereby undermining the positive impacts of liberalization on pollution intensity. The study showed that efforts to complement the reform program with institutional support and regulation were necessary to avoid growing pollution problems in the future.

Source: World Bank, 1994

However, in most cases, the complexity of the interrelationships involved will preclude precise identification of the environmental impacts of macro-level reforms, a necessary condition to do so requiring the ability to trace sector-specific responses, and the consequent implications for resource use. Successful efforts, necessarily involving considerable data collection and analysis, have been applied with regard to the impact of the adjustment process in countries in the region. General findings from Thailand and Indonesia have shown that the very success of such reforms in generating economic growth has placed excessive demands on the environment (Box 7) and often resulted in growing disparities in incomes.

An implication of the foregoing is that in order to meet the challenges posed by economic growth, the failure of market forces to adequately handle the interrelated issues of environmental and income distribution requires a parallel strengthening of regulatory capacity. Reduction in government budgets, combined with the difficulty of retaining technical staff in public regulatory agencies in view of the better paying jobs in the private sector, has posed a problem in this regard. In China, major progress has been made in development of regulatory institutions for environmental protection. However, traditional responsibilities of municipal bureaus for promotion and for regulation of industry have tended to emphasize the former at the expense of the latter.
Infrastructure Sector Policies

The environmental and social impacts of sector-wide policies may often be far greater than the impacts attributable to any one project. In many cases, environmental and social considerations provide further arguments for public intervention and policy reforms that are justified in their own right. It remains the case that opportunities for “win-win” policies and actions abound. These are most clearly evident with regard to the existence of perverse subsidies, with energy and water price reform being high on the list of priorities.

In principle, prices of environmental or natural resources, including the basis for pollution taxes, should cover marginal production and environmental costs, and, where appropriate, depletion costs. In practice, after years of heavy subsidization, tariff structures are beginning to approximate historic accounting costs, which are typically still well below the theoretically desirable level. The consequence is that wasteful use is encouraged, with the concomitant adverse environmental implications. One particular effect is frustration of efforts to introduce cleaner production technologies.

As noted earlier with reference to water supply and sanitation, extending facilities to those currently unserved is not necessarily incompatible with more cost-reflecting and financially viable tariff policies (see Ehrhardt 2004). Indeed, whether or not a privatization route is used, stricter financial discipline is typically a necessary condition for universal access to water and electricity supply. Pricing policies that reflect increasing marginal costs combined with recovery of environmental damage costs would yield financial surpluses which may become a source of general revenues. Rather more complex considerations arise in addressing pricing and financing issues for transportation, where there may be – as in the case of urban mass transit – a legitimate case for subsidization of certain transport modes.

Privatization efforts should be as sensitive to the need for socially efficient resource allocation and equity as to service delivery targets and profitability. Regulators should ensure that EIA is properly carried out and implemented, and that social aspects of tariff levels and structures should not be overlooked in the haste to achieve the fiscal and corporate benefits of privatization. The danger is that services which can easily be financially profitable may develop at a more rapid rate than those – possibly of equal value in a social sense – that cannot. Thus, for example, care should be taken to ensure that water supply development does not outpace the complementary facilities that may be required for adequate collection and disposal of waste water.

Box 8: Water Supply Pricing in China

Studies commissioned by the China Council for International Co-operation on Environment and Development during the late 1990’s addressed pricing policies for municipal water supply, in light of the large regional variations in the availability and cost of water in China, with, roughly, the north of China being water-short and the south relatively water-abundant. Comparison of pricing
policies for Beijing and Shanghai is instructive. In the case of Beijing, where water was in short supply and expensive, prices for non-agricultural use were probably less than between one sixth and one tenth of what they should be (with agricultural use being almost free of charge), there were potentially huge savings to be achieved from price reform. In Shanghai on the other hand, where costs were low and not rising rapidly, prices roughly approximated the economic cost of supply. Pricing policies which adequately reflect real production and environmental costs and in which regional variations would be reflected, would tend to encourage large water-using industries to shift to where water supplies are cheapest. Improved pricing would also encourage careful consideration of the regional water demands of agriculture, and the scope for meeting future food requirements by means of less water-intensive land use in water-scarce regions.

In general, the studies confirmed that there was large scope for water price reform in China that could satisfy social and economic, as well as environmental objectives. That is, there are many "win-win" opportunities. As overall market mechanisms become more efficient, such opportunities will become fewer. However, during the transition period in which the country moves from an administered system in which natural resources are in many cases priced at even less than financial cost, price reform, by discouraging wasteful use of resources, will yield economic, financial, social and environmental benefits. However, obstacles to immediate price reform are apparent. These obstacles take several forms, one of which is a pervasive problem: price reform in any sector of the economy may not be justified - or indeed may be unworkable - if non-optimal conditions, including inadequate pricing, prevail elsewhere. This is illustrated in the case of water where farmers would not respond in an economically efficient manner to higher water prices because the prices they receive for their own outputs are subject to controls, or because information or marketing inefficiencies hamper an effective response. Similarly, industrial users may not react in an optimal way to pricing based upon the full economic costs of supply if they face other constraints, such as inadequate access to credit, or have to meet unprofitable mandated production quotas.

It was also noted that the need for parallel reforms do not only apply to strictly economic policies; a wide range of institutional and legal reforms may also be required to create the conditions under which price reform can be effective. In practice, therefore, an interdisciplinary approach may be required, with reforms in any one of the sectors being adjusted as necessary to reflect overall trends in market liberalization in China. Inter alia, such a policy might involve gradual - and possibly pre-announced - increases in utility charges, prices of natural resources, or pollution fees.

Source: Warford and Li, 2002

Intersectoral Environmental Linkages

Examples of intersectoral effects at the project or regional level are well known. The linkages between forest management, soil erosion, siltation, energy and agricultural production and flood control are possibly the best documented, the existence of vast numbers of multipurpose river basis projects being testimony to this awareness. Intersectoral effects may however be equally or even more important at the country or policy level, but their environmental and social consequences are typically much more difficult to anticipate or manage. The complexity and potential leverage exerted by intersectoral linkages – in this case between industrial and agricultural sectors – is illustrated by the Philippines study referred to earlier.
Social Policies

The importance of improved governance – broadly defined to include greater transparency of public and large scale private operations, universal education, decentralization, effective participation, and indigenous rights – has been extensively documented as essential to the goal of sustainable economic and social development. While true of any development objective, these enabling conditions are particularly essential for environment, where externalities and conflicts of interest are the rule.

While “win-win” opportunities remain, equitable resolution of conflicting goals, including the allocation of the net benefits of economically and environmentally desirable actions is often the central issue in environmental policy making. Provision of urban highways to meet the needs of relatively wealthy car owners, at the expense of poorer people whose homes and bicycle routes are demolished (Schipper 2004) is but one of innumerable examples of this problem. And partial improvements in governance may be counter-productive. Thus community-driven initiatives may work efficiently at the project level in a technical sense, but outcomes may be socially undesirable if other elements of the social structure – such as local inequities in the distribution of political and economic power - are inadequate.

The experience of Japan, referred to above, shows that a wide-ranging and comprehensive set of social factors comes into play in determining the effectiveness of local environmental initiatives. Decentralization itself, for example, requires adequate educational and technical capacity at the local level if it is to be viable. Indeed, the importance of technical education cannot be over-emphasized. Japanese experience shows that in order to form the basis for substantial improvement in environmental management, countries should place high priority on technical education in general. This will facilitate a flexible response to as yet unknown challenges in environmental and other areas in future years. Such assistance, justified in its own right, would clearly fall within the “win-win” category of environmental interventions, i.e. being justified not only in terms of environmental objectives, but also of more general development requirements.

In contrast to most of the other measures referred to in this paper, many of which may be introduced effectively in the fairly short term, the critically important underlying factors referred to here involve more far-reaching, fundamental, and more contentious issues. Because the requisite social conditions are often not in place, national governments in most developing countries in the region have to operate on a dual track. They have no alternative but to carry out short and medium term technical measures to address urgent environmental and social priorities while at the same time laying the foundation of a social framework that is required for such measures to become really effective and sustainable. A major contribution toward this goal is being made by the Indonesian Government through its Kecamatan Development Program (KDP) which is aimed at alleviating poverty in rural communities and improving local governance. Central to this effort is empowerment of local people in decision making, with a considerable investment program in small scale infrastructure projects being the result.
Strategic Environmental and Social Assessment

Concern with strategic issues and underlying factors, and effective “mainstreaming” of environmental policy revolves to a large degree around the feasibility of Strategic Environmental Assessment (SEA), which is defined here as any environmental impact assessment over and above the individual project level. At the most ambitious level this may range from consideration of the implications of country-wide policies which may be as diverse as trade and exchange rate policies, to sector-specific actions in key areas such as agriculture, transport and energy, or regional assessment of development plans. Recently enacted legislation in China is a major step in the right direction: for all authorities at or above the municipal level, EIA is now required for land-use plans and construction and exploitation plans for regions, river basins and sea areas.

Parallel considerations apply to social issues, where increasing efforts are being made throughout the region to address root causes of social issues and to address them at source. Clearly the bulk of this effort should be devoted to income distributional and poverty issues, the relevant tool being known as Poverty Social Impact Assessment. The specific linkages between infrastructure development projects and policies and poverty have been explored elsewhere (Jones 2004).

In most cases environmental and social implications may not be important enough to change the macro level or adjustment policies themselves, but measures should be built in to compensate for adverse effects or build upon positive ones. Whatever the case, in view of their potential importance, it is necessary to improve understanding and transparency of the host of underlying factors that influence the environmental and social performance of infrastructure projects. Mechanisms should be established whereby the economic and social constraints to improved performance imposed by external forces on infrastructure sector managers can be articulated by them and conveyed to responsible authorities.

The importance of such efforts warrants continued research on the consequences of country level and regional policies. A good example is a current research effort in China conducted by the China Council for International Cooperation on Environment and development (CCICED) on the impact of WTO accession on the environmental impact of changes in agricultural production patterns, and the associated implications for farm incomes, rural development, population movements and rural and urban infrastructure requirements.

Box 9: Strategic Environmental Assessment: Bali Urban Infrastructure Project

This project was designed to improve urban infrastructure services throughout the island of Bali, with major subprojects in urban roads and traffic management, water supply and sanitation, drainage and flood control. Although it was not a legal requirement, SEA was carried out in order to help address the most critical environmental issues in Bali, with water catchments,
forests, and cultural property all being threatened by population growth, industrial development, and tourism. The SEA was designed to ensure that urban infrastructure development would take place in the context of, and be sensitive to, this overriding concern. The SEA involved extensive public consultation at local levels, which led to several concrete recommendations about implementation of the sub-projects as well as selection of priorities, which included the importance of maintaining cultural and historic heritage. The SEA also included detailed recommendations for institutional capacity building required to ensure proper execution of the investment program.

The SEA produced a comprehensive environmental profile of Bali, and in particular a set of maps defining environmental zones, placing sub-projects and their potential impacts in relation to the different zones, such information being indispensable for determining appropriate land uses in different zones, and to help avoid adverse environmental and social consequences of urban infrastructure development programs.

A recent review of SEA in World Bank operations (Kjorven and Lindhjem 2002) found that despite a stated Bank policy which dated back about 15 years (Development Committee, 1987) of integrating environment into the mainstream of development planning, little progress had actually been made. Nevertheless, the relatively few cases, exemplified by a number of “best practice” case studies (see Box 9), provided sufficient evidence of the value of this approach to warrant increased efforts in the future. The review also noted the desirability of integrating social concerns into SEA, observing that the policy and institutional analysis involved would need a different set of skills from those required for conventional EIA at the project level. It is also clear that SEA is infinitely more complex than project level EIA, and could take many forms. Even more than in the case of project level analysis, no one model fits all circumstances. Flexibility and imagination are core requirements in determining the appropriate approach to be used in any given situation (Mercier 2003).

While in principle environmental and social agencies may have responsibility for conducting such activities, in practice they may be ineffective due to inadequate intersectoral cooperation or indeed – as exemplified by the studies referred to in Section 3 above - the sheer complexity of disentangling environmental and social consequences of policies and actions that at first sight may have no relevance for these issues. It is proposed here therefore that SEA should become a far more important tool than in the past in addressing environmental and consequential social issues associated with infrastructure development. This will require improved information about impacts and causality, and the complex linkages that may be involved, as well as the willingness and ability of responsible agencies to take appropriate measures. The latter requires the presence of institutional incentives within agencies to recognize and deal adequately with environmental and social matters and act cooperatively in this regard with other public and private sector actors. Clearly, however, while environmental and social concerns represent the extreme case, the need for close cooperation between agencies is a more generic issue, and requires leadership from the highest levels of government. This is effectively illustrated in the cases of China and Philippines (Liu 2004, Medalla 2004).

7. Role of External Agencies
In view of their economic importance, and the magnitude – for good or ill - of the potential impacts of large scale infrastructure projects, it is clear that active involvement in such projects should be a primary concern of development agencies that claim to place high priority upon environmental and social concerns. Such involvement may not be highly controversial when net effects of the project are favorable. However, it also follows that in those cases where a country will go ahead with a major infrastructure development program irrespective of whether external support is available, and which contains the potential of a major adverse environmental or social impact – the Three Gorges Project in China immediately comes to mind - the donor community should not turn its back upon the project, but do its best to make it better than it otherwise would be.

Clearly, sensitive issues arise: the political or public relations imperative of avoiding association with an unpopular project may in such cases be at odds with the development objective of passing “with and without” tests. In such cases, the development institution should ensure that its motives for association with the project are transparent.

Another issue concerns the list of “safeguards” that has to be checked off by task managers in the major development banks. It is important that the development institutions take these issues seriously and address them in a systematic manner. However, in one respect, the current requirement that safeguards be strictly addressed at the project level is counterproductive, in that it may divert attention from potentially far more cost-effective interventions (addressing similar objectives) at the policy level. This may require considerable effort. Upstream opportunities for relevant policy and/or institutional reform vary considerably from situation to situation; linkages are complex, and systematic efforts at due diligence at this level are difficult to achieve.

Nonetheless, while due diligence will always be required at the project level, greater attention should be paid to the overall institutional policy framework, thereby making such work at the project level both more straightforward and less critical. There are of course other considerable pressures that prevent the achievement of cost-effective solutions that may result from substituting policy reforms for actual investment projects. Among them, clearly, are the incentive systems at work within the multilateral development banks and other external financing agencies, in which the banking function is often in conflict with the development function.

It follows from the above that where it is likely that effects are traceable through sectoral activities, those responsible for adjustment lending activities should be aware of and prepared if necessary to take measures to compensate for adverse environmental or social effects or to build upon positive ones.

8. Conclusion: Sequencing Reform

As illustrated by the admittedly crude estimates referred to earlier in this paper, the potential environmental and social impacts of investment in infrastructure are considerable, whether measured in terms of GNP or of various indicators of human well-
being. Actions to improve the social and environmental performance of infrastructure development programs should therefore be of major concern to national level economic policy makers – and indeed senior management of development institutions - whose responsibilities transcend the concerns of environmental agencies or departments and the infrastructure sectors themselves. This is particularly evident due to the fact that while large scale projects receive the greatest public scrutiny, a wide range of public policies influence the design and implementation of vast numbers of small scale infrastructure projects that in aggregate may be of even greater environmental and social significance.

An implication of the foregoing is that due diligence relating to environmental and social aspects of infrastructure development should increasingly be exercised at a level far earlier in the development process than is typically the case. This will require the active participation of authorities that have jurisdictional responsibility, adequate information, and political weight to insist upon cooperation between different departments, government agencies or private sector interests involved. A special aspect of this is that highest levels of government should be adequately informed about the extent to which transboundary environmental and social consequences stem from actions within their own borders.

The means and feasibility of achieving this goal essentially revolve around the issue of governance, and will vary enormously from country to country, particularly in a region as diverse as East Asia and the Pacific. An infinite range of political, institutional and cultural arrangements may result in satisfactory outcomes. Moreover, comparative studies of institutional performance have shown time and again that in practice the vision, energy and political power of the person in charge is a primary determinant of success or failure. Nonetheless, it is possible to identify a variety of generic actions that may need to be taken to enhance prospects for sustainable infrastructure development, the impacts of which will typically have very different time horizons. For example:

- **Short Term:** Adoption of adequate environmental legislation and capacity building related to traditional responsibilities of social and environmental agencies, such as project level EIA, monitoring, and enforcement of economic incentives, regulations and standards. Improve information and transparency about the magnitude and incidence of damage costs associated with infrastructure projects, their direct and underlying causes, and of remedial measures. Environmental education for communities, and training and awareness in infrastructure-related agencies and enterprises about cost-effective technologies. Identification of potential “win-win” strategies.

- **Medium Term:** Systematic use of SEA procedures; factoring environmental and social objectives and costs into pricing and other policies in key sectors such as energy, water agriculture, and transportation, i.e. “mainstreaming” environmental and social objectives in country-wide economic planning. Creation of incentives within government agencies and development institutions so that environmental and social costs associated with infrastructure projects and activities are internalized in their own decision making.
• Longer Term: Empowerment of those adversely affected by infrastructure projects to participate effectively in decision making processes by addressing the “building blocks” that are essential if the foregoing improvements are to be sustained independently of the prevailing political fashion. These include the basic elements of a democratic system, such as technical education; freedom of expression, decentralization of political authority, and free and transparent electoral systems. These requirements are fundamental to the achievement of virtually all development objectives, but indispensable for environmental and social goals, due to the need to reconcile inherent conflicts of interest that are invariably present.

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