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**Sustainable development and Environmental
Conservation: Major Regional Issues with Asian
Illustration**

by

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**Sustainable Development and Environmental Conservation:
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Sustainable Development and Environmental Conservation: Major Regional Issues with Asian Illustrations

Abstract

This paper emphasizes (in the Asian context) the fact that sustainable development and environmental conservation require simultaneous consideration to be given to the economic, social, political and environmental aspects of policy formulation. Governance, centralization and decentralization of economic decision-making and property rights must be taken into account in considering such issues. There is at present a strong focus (partly on environmental grounds) on decentralization of economic decision-making and the empowerment of local communities. There is much evidence of such decentralization in Asia, especially China. However, we have to evaluate this trend against the adage "think globally, act locally". Because of global international and interregional ramifications of local or regional decisions, mechanisms have to be sought to reconcile local and regional interests with the interests of the wider community, especially in environmental matters. Major environmental externalities from local and regional economic activities to wider communities exist. These are illustrated in the Asian context concentrating on China. Environmental concerns raised by China's energy sector are given particular consideration because coal use in China has many serious consequences for air pollution, often over wide geographical areas. In conclusion, some environmental policy initiatives for Asia, many of which require international and interregional co-operation, are canvassed.

1. Introduction

While there are many definitions of sustainable development, most individuals are agreed that it is development designed to attain and maintain the things that we desire whether these be in the economic, social, political or environmental spheres. It is sometimes however difficult, if not impossible, to get complete agreement about what it is desirable and in addition satisfy *simultaneously* our aspirations in all the above spheres. Nevertheless, we can try and we can expect to reach a better solution than would be possible in the absence of our sincere efforts to accommodate divergent views and deal with the real constraints of this world.

The question has arisen of whether the economic, social, political or environmental spheres should have primacy in the quest for sustainable development. Some writers suggest that environmental conservation should have primacy. This is mostly because the continuing existence of mankind depends on the preservation of the biosphere (Tisdell, 1991, Ch.1). Through the food chain, mankind depends on other living things for life and cannot survive without adequate air and water supplies. This is the bottom line, so to speak. Unless the biosphere is appropriately conserved, the welfare and very existence of mankind is imperiled.

While the above relationship is undoubtedly very important, it does not entitle us to neglect the other spheres. This is because all these spheres or systems are interdependent. For example, economic systems impact heavily on the environment or the biosphere, and social and political systems influence the operation of economic systems. However, this interdependence is not one-way nor linear. Interconnections are numerous and these systems often evolve or change together; co-evolution occurs (Gowdy, 1994).

In order to amplify the above, consider governance and property rights. Forms of governance of societies and resources and types of property rights have altered with the passage of time and show some variation from country to country (Tisdell and Roy, 1991). They belong to

the political and social spheres and form part of the institutional and cultural framework of any society. Nevertheless, they are of fundamental significance for economic performance of a society and its conservation of the environment. This is being increasingly emphasized by development agencies such as the World Bank (1992, 1994).

It is well recognized that inappropriate sets of property rights, such as in some cases open-access to natural resources and the use of the environment, can have deleterious economic and environmental consequences. Uncertainty about actual property rights adds to these problems. In general, the way in which the use of resources is governed (of which systems of property rights are a part) are of crucial importance for their beneficial use and conservation of resources. This includes the matter of whether resource-use is controlled or governed by local communities at the regional level, centrally at the national level, or even internationally.

Let us discuss the matter of centralized versus decentralized government, or centralized versus regional or local governance in relation to the environment and resource-use paying particular attention to Asia especially China and then touch on significant environmental issues in Asia involving air, water, marine resources biodiversity and energy, before briefly discussing environmental policy possibilities, including global and trade aspects of the environment.

2. Empowerment of Local Communities — The Environment and Regions in Context

It is not infrequently claimed that it is important to empower local communities and regional bodies in order to ensure sustainable development and environmental conservation. This raises many questions. How is a local community to be determined? How local should it be? Also exactly what is a region? In reality these are man-made classifications and the appropriateness of any particular one of these entities is liable to change from problem to problem. For example, the size of regions and characteristics used to determine regions can

vary considerably. Sometimes countries or groupings of countries are treated as regions of the world but on other occasions provinces of countries may be the regions considered. Classifications may not be based purely on political boundaries but on physical or human geographical characteristics. Usually a region is characterised by spatial connectivity and is part of a larger geographical unit. As a rule a local community, such as a village, is part (often a small part) of a region but the concept of a local community also has fluidity.

Empowerment of local communities has to do with forms of governance. As mentioned earlier, the World Bank (1992, 1994) and many other development agencies are stressing the importance of good governance as a factor making for sustainable development. This has been interpreted to mean smaller central government, greater devolution of power to local government and communities and more scope for individual decisions about resource-use. The latter can be achieved by extending market systems and private property rights, either legally or in practice. The emphasis is therefore on decentralization of decision-making about resource-use. Such a 'vision' is closely connected to the structural adjustment policies (SAPs) advocated by bodies such as the World Bank. Nevertheless, some advocates of decentralization advocate greater control of resource-use by local communities on a *communal* basis than do SAPs. Advocates of SAPs appear to put more emphasis on *private decisions* and on *private property* as a desirable development.

For whatever reason, changes along the above lines can be observed in Asia. In China, following the market reforms from 1978, onwards the relative power of provincial governments over resource-use have increased in comparison to the central government (Jia and Tisdell, 1995/96, 1996). Greater decentralization has been evident. Furthermore, within the provinces, increasing economic empowerment has occurred at the township, village and local level, as witnessed by the impressive economic growth of township and village enterprises which in recent years have 'outshone' state enterprises in their economic performance (Tisdell, 1993). In addition, private property rights of a type are evolving as

under "The Household Responsibility System" for the allocation of agricultural land and the "Two Mountains System" for the allocation of other rural land introduced in 1982 (Zhuge and Tisdell, 1996), and the market system has been greatly extended in China since 1978.

In other parts of Asia, there are also trends towards decentralization of decision-making about resource-use, not only in transitional economics but in nation states which have not embraced communism e.g. India and the Philippines. Furthermore, it seems that most governments have become more prepared to consult with local communities before making decisions that affect local environments and livelihoods. For example, there is greater application of Rapid Rural Appraisal techniques and consultative methods which involve interaction with local communities. They are for example being increasingly used in Yunnan (Zhu, 1995).

3. Think Globally, Act Locally

It is sometimes said in relation to environmental issues and sustainable development that we should think globally and act locally. While this statement is open to a variety of interpretations, it brings attention to a range of important issues. These include the following:

- (1) All resource-use takes place at local and regional levels. The real actors are present at these levels. Although central bodies may think that they are actually carrying out decisions about resource-use, it is at the local level that the plans of any central bodies must be executed. This means in many cases that central bodies are highly dependent on local communities to fulfill plans or carry out regulations. Local bodies often have considerable leeway in determining whether and how to realize central plans or objectives.
- (2) Actions about resource-use at the local or regional level often have consequences for other localities or regions and can have global impacts when considered in combination. A problem is how to permit beneficial local and regional decision-making about resource-use and at the same time control

unfavourable environmental spillovers or externalities imposed on other localities and regions, or even globally. If spillovers and market failures of this type are present, some central or global regulation or control over local decision-making about resource-use is usually called for. *Complete* decentralization in such cases is not really a sensible policy option. However, in some circumstances *bargaining* between regional groups or local communities experiencing environmental interdependence *may* enable agreement to be reached on rectifying environmental spillovers.

- (3) Cooperation between different regional groups, and cooperation between centralized and localized bodies in sharing knowledge and technologies with favourable environmental consequences needs to be encouraged. Furthermore, discussion between these bodies can result in better understanding of motives and aspirations of the parties involved and this is likely to make for greater likelihood of success in policies to achieve sustainable development and environmental conservation.

While thinking globally and acting locally seems an admirable objective, many individuals and communities are not prepared to make economic sacrifices for others, especially if they do not belong to their local community. Individuals and communities are strongly influenced in their choices by their own self-interest. When this self-interest conflicts with the broader interest of the community, means may have to be devised to bring the former into line with the collective interest, however it is determined. Mere admonition to individuals to think of the global or wider community interest when determining their own actions is usually not enough to promote the common good. Specific government or global policies to influence individual choices and those of local communities may be required. But in adopting such regulations care is needed not to stifle beneficial local and private initiatives and actions. In this respect, policy design is very important. In designing environmental policy, the

environmental problem must be approached as a whole: its biophysical aspects must be determined and its socio-economic dimensions must also be taken into account.

The main reason why all decisions about resource-use affecting the environment cannot as a rule be left to the free will of individuals or local communities is the presence of environmental spillovers or externalities impacting on individuals and communities beyond those generating these. However, the patterns of these effects can vary greatly. Let us just consider a few possibilities.

One possibility is that environmental impacts occur in a serial one-way pattern. For example, consider three communities (A, B and C) located along a river with A being towards its headwaters, B at an intermediate point and C being located further downstream. Water withdrawals by the upstream community A, will have a serial impact on B and C. Pollutants entering the water will show a similar pattern. The externalities are all one way -- in the direction of the flow of the river. This simple linear case is illustrated in Figure 1.

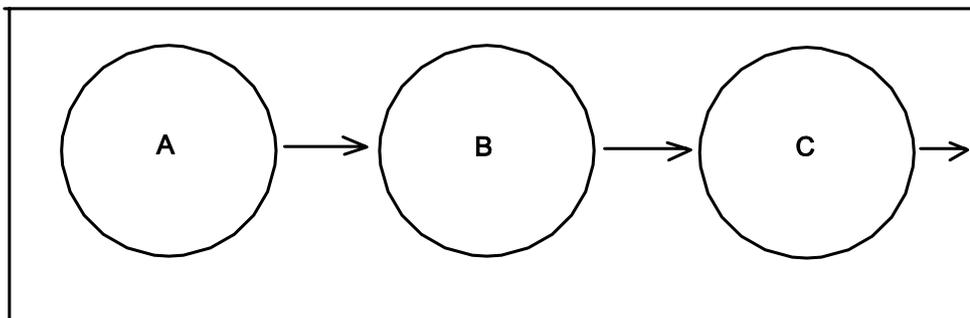


Figure 1: Direction of environmental impacts in three interconnected communities

In Asia, this type of problem is quite common for waters of rivers shared between regions or countries e.g. the Lancang/Mekong River. If air flows continually in a particular direction and the air is polluted by sources on the way, externalities will also be of this nature. In the

case of air flows, however, the predominant flows often change by *season* as in parts of Asia. Consequently mutual interdependence in pollution or environmental impacts occur, the geographical direction of these impacts varying seasonally. In this case, the direction of impacts are linear but their direction varies with time. However, diffused environmental processes also occur such as in cases where pollutants enter large water bodies such as lakes and in some cases in underground water bodies. In this case, all polluters are liable to be directly affected by the pollution of others, whereas this is not so in the case illustrated in Figure 1. The different patterns of interdependence have some bearing on the willingness of polluters or users of natural resources to change their behaviour in a bargaining situation or to accept controls on their behaviour. It may be more difficult to get agreement in the type of case illustrated in Figure 1 than when *all* parties are being damaged by their collective action.

One method of trying to reconcile global or wider community environmental demands with actions of regions and local communities is to allocate regional pollution or environmental targets to regions or local communities, and then leave it to local communities to devise their preferred way of meeting these. At the regional level for example, pollution taxes or charges may be used to control the level of pollution from enterprises or in certain circumstances, marketable pollution permits or transferable rights to use natural resources, such as water, could be employed. For example, in the case of a river flowing through several regions, quotas for water withdrawals may be allocated to each region and each region may be left to allocate its quota within its region. This could be done for example by means of transferable water rights in each region. Air pollutants can also be controlled in a similar manner, even on a global scale. Nevertheless, it is not easy to devise ideal environmental policies and even the above policies may not always be ideal. Furthermore, the workability of different environmental policies depends on the socio-economic context in which they are to be applied.

4. Strains on Natural Resources and the Environment in Asia, especially East Asia - General Issues

Rapid economic growth has been experienced in East Asia in recent decades and this has resulted in rapid environmental changes. Air quality has declined in many developing countries in Asia, and furthermore water quality has deteriorated. In addition, water is becoming scarcer (relative to demands) and in some river systems, water is more variable in its availability, partly as a result of increased deforestation. Significant deforestation has occurred in Asia in recent decades and increased loss of biodiversity has occurred. Marine areas in Asia are also experiencing environmental stress, e.g. the frequency of red tides in the China Sea appears to have increased and fish catches in the Northwest Pacific have peaked, indicating that the limits of sustainable harvest has been reached or even exceeded. The issues involved are of major importance to all countries in the Asia-Pacific (and even globally) but especially to countries in East Asia.

All countries in the East Asia region have high aspirations for economic growth. China, for example, hopes to become a medium-income country in the 21st century. Yet environmental problems and natural resource constraints could make it very difficult for China to achieve its income targets and sustain its higher levels of income once achieved. Environmental impacts between countries in the region, e.g. on water availability and water and air quality may grow in magnitude and result in deteriorating international relations unless better means of regional cooperation can be achieved. Problems may arise not only for the developing countries in Asia but for other countries utilising resources in this region.

The connections between economic growth and the state of the natural environment are still subject to debate, as are the limits to economic growth. However, there is widespread belief that as economic growth proceeds, environmental quality initially deteriorates and subsequently improves, so that the relationship between environmental quality and per capita income levels forms a U-shaped curve, sometimes described as a Kuznets environmental

curve. For some environmental characteristics this appears to be so, but it is less clear that it is so for all. For instance, loss of biodiversity may show a positive relationship with income levels. Nevertheless, it seems likely that environmental quality will deteriorate further in a number of Asian countries before it improves.

Despite the above debate, it is becoming increasingly difficult to ignore the interdependence between economic systems and the natural environment. The natural environment provides a large number of resources of value to the economic system. It is a receptor and in many cases an assimilator of wastes from economic systems. It provides inputs to economic systems. For example, air and water are used in productive processes and in human consumption, outdoor recreational facilities are provided by natural environments and natural raw materials, such as minerals, are used by industry.

The way in which one economic system operates and evolves is influenced by the social, political and institutional framework of a country. This however evolves with and is influenced by the economic system. The economic system cannot be sensibly assessed in isolation from the social framework of a country and the state of its natural environment as indicated by the interrelationship shown in Figure 2 (*Cf.* Braat and van Lierop; 1987).

China's economic reforms commenced in 1978, have provided considerable stimulus for its economic growth but has placed extra strain on its stock of natural resources and its natural environment. However, to the extent that China's market reforms have improved economic efficiency and stimulated investment in new machinery, they may have lowered the intensity of pollution in China relative to its production. Under central command systems of economic organization, pollution intensities tended to be larger than in the market economies (Tisdell

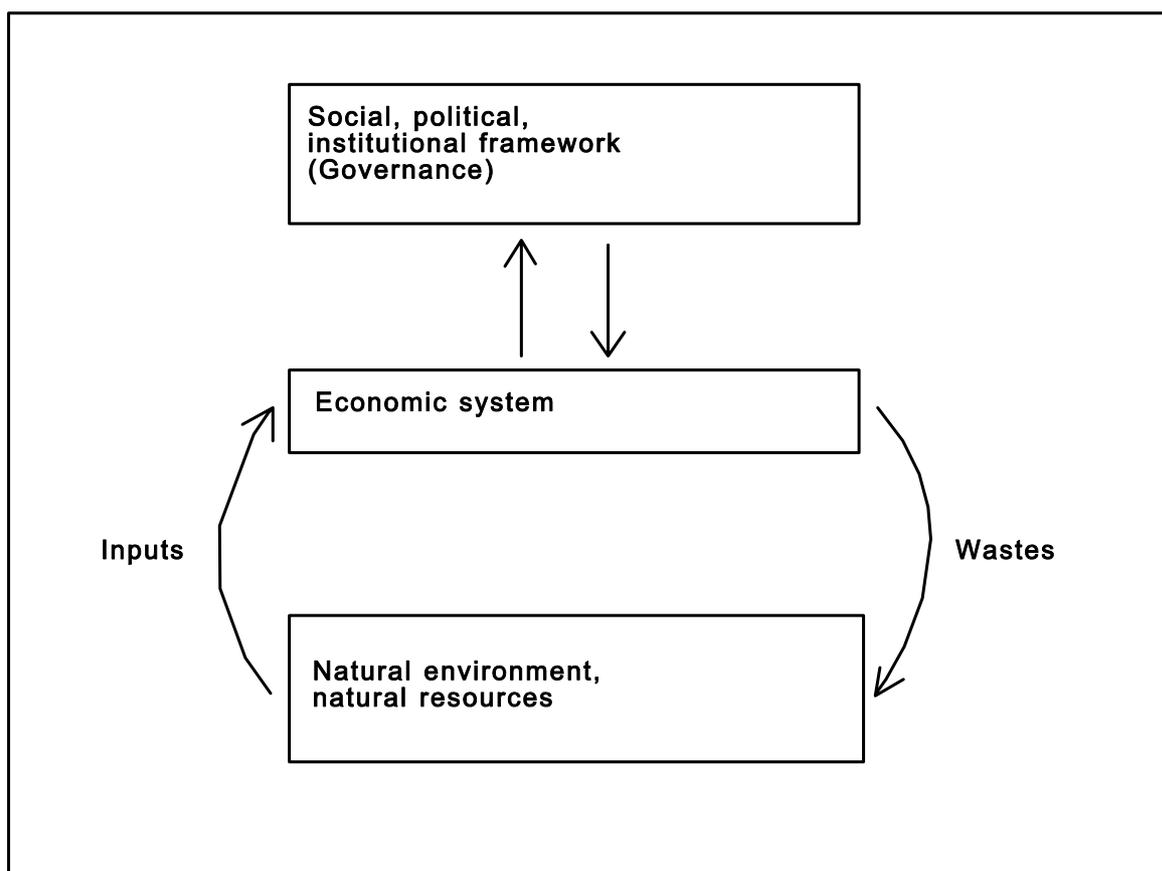


Figure 2: Sustainable development and environmental conservation needs to be pursued in a holistic context. Economic systems are not independent entities.

1996 Zylicz, 1994). Nevertheless, many indications exist that *absolute* levels of pollution have continued to rise in China. Wu and Flynn (1995, p.4) indicate that sulphur dioxide emissions in China increased by more than one third in the period 1982 - 1993 and that many air pollutants more than doubled. About 26 percent of deaths in China are attributed to poor air quality (Bingham, 1993, p.12). Chinese authorities estimate that almost 7% of China's

GDP is lost due to pollution. The largest loss is believed to be due to water pollution followed by air pollution and then pollution from solid wastes and pesticides.

Moreover there has been a decrease in the area of forest and woodland in China in recent years. On the basis of the statistics of the World Resource Institute *et al.* (1994, Table 17.1), the area of China covered by forest and woodland decreased by 6.5% between 1979 and 1991, and in 1992 only 13.6% of China was covered by forest and woodland. Deforestation in some parts of China as in Yunnan, has been accompanied by increased soil erosion and by loss of biodiversity.

China faces serious water shortages (World Bank, 1992); not only is its per capita availability of water low, this is expected to decrease as China's population increases. Seasonal shortages of water are severe in some regions of China e.g. in parts of its northeast such as Tianjin. In fact, China's shortage of water is more severe than indicated by its per capita availability because its largest supply of fresh water is in the south so there is considerable regional imbalance between supply and demand. Moreover, this is the case with China's energy resources. China relies heavily on coal to produce energy and most of its coal deposits are located in its north and west whereas China's population is concentrated in the east and south which are short of coal reserves which are inexpensive to extract. Given the importance of energy resources for modernisation and the state of the environment, let us consider some aspects of China's energy sector.

5. China's Energy Sector and Environmental Concerns.

Although China has the world's largest known reserves of coal, much of its coal is high in sulphur. According to Haugland and Roland (1994, p.212), "China faces two main challenges in its energy policy: 1) to provide adequate energy supplies to foster economic growth, and 2) to limit environmental damage from energy production and consumption".

China is now the world's leading coal producer having overtaken the United States in 1983. Both China's GDP and energy production and consumption have increased remarkably since the establishment of the People's Republic. Between 1953 and 1980 China's GDP grew at an average rate of 6% p.a. and its energy use expanded at 9.8% p.a.. After China's market reforms, its GDP grew at an even faster rate averaging 9% p.a. in the 1980s and its energy use expanded at 5.5% p.a. in the 1980s. China's rate of growth of GDP is now even larger than in the 1980s.

From the above figures, it is clear that China's intensity of energy use in relation to its GDP rose in the 27-year period prior to 1980 and declined during the 1980s. This reflects both restructuring of China's economy and China's improving economic efficiency. Consequently, although absolute emission of pollutants increased in China in the 1980s, the intensity of this emission in relation to GDP may have declined. Nevertheless, because aggregate pollution levels in China have continued to rise, dangers to human health from pollutants have grown.

Although the intensity of China's use of energy has fallen, its energy consumption in relation to its GDP appears to be very high by world standards. In 1989, it was almost three times that of a comparable country, India, over two times that of Japan and more than four times that of the United States (Haugland and Roland, 1994, p.217). There may be many reasons for this: (1) China's GDP may be underestimated. (2) The economy may not have fully restructured following its forced emphasis on high-energy using industries during the pre-reform era (Tisdell, 1993). (3) Technology used in its power generation industry and technology employed in industry using energy may be relatively inefficient. (4) Proper procedures may not be in place to encourage users to economize in energy and more demand management is needed.

While China's production of coal will show expansion throughout the 1990s, its rate of growth (about 2.8% p.a.) will be less than in the 1980s and so China will record a further fall in its intensity of energy use because of the much higher rate of growth of its GDP in the 1990s. China still has a long way to go to reach the levels of per capita energy consumption of high income countries. Its energy consumption would need to increase more than five times to reach per capita levels comparable to those of Japan and more than twelve times to reach a similar per capita level to the United States. In many parts of China electricity is still considered to be in very short supply by local communities e.g. in parts of Yunnan.

It is interesting to note that the bulk of the expansion in China's coal production in the 1980s came from local mines operated by township and village enterprises rather than from state mines (Haugland and Roland, 1994). Whether or not this has meant less attention to environmental externalities in mining activities is not known.

Not only does the high sulphur content of Chinese coal constitute an environmental problem, but only a very low proportion of it is washed because of the shortage of water in major mining areas. This adds to the burden of transporting coal to powerstations and elsewhere and significantly increases emissions of particulate matter when the coal is burnt. Particles in the air are a significant source of respiratory diseases. Because of inadequate water supplies in areas where most of China's coal is mined, it has to be transported long distances to its power stations. This adds to cost and transport constraints cause bottlenecks in energy supply.

Sulphur dioxide emissions, with other compounds such as nitrogen oxides, from coal combustion are a serious source of air pollution in China and result in acid rains in several parts of China. The effects are pervasive. They are not confined to the locality or province where fuel combustion occurs and international impacts are occurring. For example, prevailing winds from China's industrial Northwest bring acid rains to Japan (*cf.* Foell, 1994, p.229, Fig 2) and to and from Korea. India's emissions of SO₂ are also rising. As growth in

use of coal and other fossil fuels increases in Asia, acid rain problems can be expected to become more serious, and will call for greater interregional co-operation to deal with the problems. The interregional dimensions of this problem (and many other environmental problems) in Asia should not be neglected.

As is well known, developing countries in Asia such as India and China are predicted to increase substantially their consumption of fossil fuels thereby becoming major contributors to greenhouse gas emissions. How best to deal with the threat of the greenhouse problem still remains a major issue (Tisdell, 1995). It is one that will require both regional and global co-operation.

Naturally, China has considered the question of whether it can use 'cleaner' means of generating electricity than from coal. In its *Agenda 21 - White Paper on China's Population, Environment and Development in the 21st Century* (State Council, 1994) alternatives to using coal for energy generation are given particular attention.

Hydro-electricity is given particular emphasis in this respect. While China has significant potential for expanding its production of hydro-electricity, there are some problems. The greatest potential is in the southern inland of China. This area is not well located for supplying northern areas and coastal areas of China with electricity where there is the greatest demand for electricity because of the regional location of China's population and industry. Large amounts of investment are required. Furthermore, dams associated with hydro-electricity generation are not without environmental costs and risks. For example, they may flood areas of value for biodiversity conservation and for nature-based tourism, flood productive farmlands, interfere with waterflows especially if there is associated irrigation and result in increased salting of rivers and in navigation problems in rivers. The list could be extended.

In Xishuangbanna Prefecture of Yunnan, for example, there is a perceived shortage of electricity. Some local authorities favour the construction of a dam on the Lancang (Mekong) river to generate electricity and provide for irrigation. However, the dam would flood a large portion of Xishuangbanna State Nature Resource and could have effects on water supplies to Thailand, Laos, Cambodia and Vietnam. Furthermore risks from earthquakes can never be ruled out.¹

Decisions involving trade-offs are never easy, and there are many other dimensions to these problems which cannot be covered here because of space limitations. In any case it seems that China will remain heavily dependent on coal for most of its energy requirements for a long time to come² (Cf. Haugland and Roland, 1994).

6. Concluding Observations on Environmental Policy in a Regional Context.

That environmental interdependence occurs between regions and countries is now well established and a significant policy consideration (Cf. WCED, 1987). As the world becomes more like a global village as a result of growing levels of economic activity and trade, and as awareness of environmental issues is enhanced partly by research and partly as a result of improved systems of communications and travel, the importance of these issues grows. The importance of these issues is probably greater in East and South Asia than elsewhere due to the very large human population in this area, the rapid economic growth experienced by many Asian countries in recent decades, and the fact that such growth is expected to continue and become widespread in this area.

There is both a need for regional co-operation to deal with these problems and for action at the level of individual countries, regions and localities. To address these issues calls for a wide agenda. This agenda should include international and interregional research and sharing of information about environmental issues, environmental education, attention to the design and application of appropriate economic and other instruments for implementing

environmental policy, reconsideration and modification (where required) of governance and property structures affecting care of the environment and natural resource conservation. Particular attention needs to be given to developing and transferring technologies, e.g. from higher income countries, which are relatively efficient and environmentally friendly. This can promote sustainable resource-use or the more efficient use of non-renewable resources. We need also to become more aware that physical (material) production and consumption are not the sole or main purposes of human existence. Attitudes of individuals and governments towards material production and support for accumulation of capital for accumulation's sake needs to be modified. Otherwise there is a risk in the long term that real poverty will result (that is, unsustainable development) as well as intellectual and spiritual poverty because of the destruction of nature. Asia must play its role in the re-evaluation of development and in charting new directions for socio-economic development. Nevertheless the rest of the world must in addition play its part given the global dimensions of the issues involved. At the same time, Asia would be unwise to wait on the rest of the world to act before addressing its own regional environment problems, many of which primarily affect those living in Asia or nearby.

Notes

1. The Three Gorges Dam to be completed in the Yangzte (Changjiang) River provides another example. On the one hand, it will add significantly to electricity generation, provide for irrigation and flood control. On the other hand, it involves loss of cultural and natural assets, massive relocation of communities due to flooding from the water body, deterioration in important wetlands below the dam, and loss of valuable additions to silt on agricultural land below the dam. There are also some concerns about the risks to the dam from earthquakes. In addition, disease-patterns in environments affected by the dam are liable to alter. The parasitic disease schistosomiasis (Mahmoud, 1987; Sleigh and Mott, 1986), in which water snails are an important host (Sobhon and Upatham, 1990) may well increase in prevalence as has

occurred in parts of Africa following the construction of large dams. The dam is expected to link two populations of snails which are carriers of *Schistosoma japonicum*. One population is located in Hubei province and the other in Sichuan. Schistosomiasis is a serious water-borne disease which in humans is debilitating and in some cases fatal. The economic costs of the disease are as yet poorly known (Huang and Manderson, 1992).

2. Nuclear energy is still not an economical alternative to the generation of electricity by the use of coal. While nuclear power stations avoid many of the pollution problems associated with the use of coal for electricity generation, there are still concerns about the environmental radiation hazards associated with nuclear plants.

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