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**Sectoral Change, Urbanisation and
South Asia's Environment
in Global Context**

by

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Sectoral Change, Urbanisation and South Asia's Environment in Global Context

1. Introduction

Energy production and consumption in South Asia have expanded substantially. This is partly a consequence of expanding populations, rising incomes, and increased industrialisation and urbanisation. The purpose of this paper is to consider the nature of sectoral change and urbanisation on the Indian subcontinent and the implications of these for sustainable development and the state of the environment. Consideration of these matters is followed by a discussion of the global environmental impacts of economic change in South Asia and conversely possible consequences of global environmental change on South Asia.

As countries develop economically, the relative size of their agricultural sector declines and their manufacturing (industrial) and service sectors grow (Clark, 1940). Before economic development begins, the agricultural sector is the dominant sector, but once high incomes are obtained, it becomes a relatively minor sector in terms of its contribution to GDP and aggregate employment. After economic development, both the manufacturing and service sectors are much greater in size and eventually the service sector becomes dominant.

This structural change stimulates urbanisation because manufacturing and service industries tend to be *urban-centric*. They usually prosper where there are concentrations of people and an agglomeration of industries and services. They may gravitate towards existing urban centres, but new growth centres may also arise which become nuclei for urbanisation. While there may be strong attractions of industry and migrants to existing urban centres (Tisdell, 1975), new urban growth centres do rise and in due course often become substantial in size. Examples in Asia in the last 200 years or so include Calcutta, Shanghai and Singapore.

The urban centrality of the economic sectors which grow most with economic development has several environmental and sustainability implications. Wastes associated with human populations and economic activity become geographically concentrated and often exceed the capacity of natural environments to assimilate these and concentrations of pollutants can reach levels that are injurious to human health. Public action is required to dispose of, or manage, such wastes. Pollution becomes a serious issue. In addition, public action is required to deal with traffic congestion. Traffic congestion has become a major problem in many Asian cities, many of which lack adequate means of mass transit.

It is possible for growing pollution problems in metropolitan areas to threaten sustainable economic development. However, a more important consideration for the sustainable development of urban areas is the state of the infrastructure for their economic interdependence with surrounding areas and more distant communities. No large urban community is able to be self-sufficient. The wealth and survival of urban communities is very dependent on exchanges with other communities, urban and non-urban. These are facilitated by appropriate infrastructures for communication and by freedom of trade.

As a rule, urban communities depend upon their peripheries for water, waste disposal and supplies of food and raw materials, and for markets for part of their production. However, they can also depend on more distant markets. In a few cases, links with their hinterland can be small and their major links may be through foreign trade, as in the case of Singapore, for example.

Given the nature of urban areas, their growth is likely to favour the expansion of market systems and greater division of labour and specialization in production. Market-making is favoured as are changes which reduce market transaction costs, such as infrastructures which reduce transport costs and/or improve the reliability of transport. All these changes bring with them environmental change. Rural areas become more closely connected to urban areas for their economic well being and both urban and rural communities see mutual advantages in the improvement of transport and communication systems.

With the growth of cities, supplies of public utilities, such as water, electricity and sewage disposal works assume increasing importance. The large investment in infrastructure occurring in Asia, especially East Asia, partly reflects growing demand for public utilities. The supply of such infrastructure has substantial environmental impact.

Urbanisation brings with it new health problems and hazards. However, incomes in urban areas, although unequally distributed, tend to be higher than in rural areas. Furthermore, length of life is often higher in urban areas and morbidity lower than in rural areas (cf. World Resources Institute, 1996). Nevertheless, environmental health problems occur in urban areas which are absent in the countryside.

Rates of population growth are normally lower in urban areas than in rural ones. This is partly due to changed lifestyles and greater individual freedom in cities. A contributing factor is the fact that the economic costs of raising children in urban areas is higher and the economic benefits of having them are lower than in rural areas. Therefore, on the basis of Becker's theory (Becker, 1960) one would expect family sizes to be smaller in cities than in rural areas. Thus, urbanisation reduces the rate of population growth in a country and lowers this potential demand on its natural resources and the environment. It can, therefore, favour sustainable development.

2. The Relative Decline of Agriculture and the Expansion of Manufacturing and Service Sectors in South Asia

From Table 1, a substantial decline in the proportion of the labour force employed in agriculture in South Asia is evident in recent decades. Employment in industry has risen in relative terms with the increases being greatest for Bangladesh, India and Sri Lanka. The service sector has also grown substantially in relative importance.

Table 1 Labour force distribution in selected South Asian economies

Countries	Percentage of labour force in								
	Agriculture			Industry			Services		
	1960	1985-88	1990	1960	1985-88	1990	1960	1985-88	1990
Bangladesh	86	56.5	65	5	9.8	16	9	33.7	18
India	74	62.6	64	11	10.8	16	15	26.6	20
Pakistan	61	41.3	52	18	10.2	19	21	48.5	30
Sri Lanka	57	42.6	48	13	11.7	21	30	45.7	31

Source: Based on UNDP (1991, 1996) *Human Development Report 1991 and 1996*, New York: Oxford University Press

Similar trends are apparent in the distribution of GDP by sectors. However, on this measure of sectoral size, agriculture's relative contribution to GDP is much lower than its proportionate employment of the labour force and the opposite is the case for the other sectors. Note the relatively large size of the service sector in these low income countries.

If the structure of industry, say by the distribution of labour force, happened to be the sole determinant of urbanisation, we would expect about one-third to a half of the population in South Asia to live in urban areas. In fact, the proportion of urban population is considerably lower. Nevertheless, there appears to be a positive, but not perfect, correlation between the relative size of the non-agricultural sector of economies and the degree of their urbanisation.

Table 2 Structure of production in selected South Asian countries

Countries	Distribution of GDP(%)											
	Agriculture			Industry			Manufacturing			Services		
	1970	1980	1994	1970	1980	1994	1970	1980	1994	1970	1980	1994
Bangladesh	55	50	30	9	16	18	6	11	10	37	34	52
India	45	38	30	22	26	28	15	18	18	33	36	42
Pakistan	37	30	25	22	25	25	16	16	18	41	46	50
Sri Lanka	28	28	24	24	30	25	17	18	16	48	43	51

Source: Based on World Bank (1995, 1996) *World Development Report 1995 and 1996*, New York: Oxford University Press

3. Urbanisation in South Asia

Table 3 provides information on urbanisation for selected South Asian countries and comparisons with low income countries as a whole. It can be seen that, except for Pakistan, the percentage of the urban population to total population is lower for South Asian countries than for low income countries as a whole, but in the case of India the difference is small. Compared to low income countries as a group, the rate of urbanisation in India and Sri Lanka is slower, but it is faster in Bangladesh, Pakistan and Nepal. A faster rate of urbanisation usually results in an increase in the seriousness of urban environmental problems because it is difficult to expand the urban infrastructure at a rate matching the urban influx of population.

In addition, it is not only the broad rate of growth of urban populations that likely to be significant from an environmental point of view, but also the concentration of that urbanisation. Even if the overall rate of urbanisation is low, the growth may, for example, be concentrated in a few very large cities and these may experience very high rates of population growth and an inability to expand infrastructure fast enough to avoid serious environmental problems. This appears to be the case in a number of South Asia's larger cities, for example, Calcutta.

Table 3 Urbanization statistics for selected South Asian countries

Country	Urban population		% of total population in cities of 1 million or more
	As % of total 1994	By rate of growth 1990-94	
Bangladesh	18	4.9	8
India	27	2.9	9
Pakistan	34	4.7	18
Nepal	13	7.4	0
Sri Lanka	22	2.2	0
Low income countries	28	3.8	10

Source: Based on World Bank (1996), Table 9, p.204

The extent of urban agglomeration can also have environment consequences. In 1994, 8 per cent of the population of Bangladesh was located in cities of 1 million or more. The comparable figures are 9 per cent in India and 18 per cent in Pakistan. However, South Asia is home to five of the world's twenty-five largest cities. Bombay, Calcutta, Delhi, Karachi and Dhaka are all megacities. Their comparative size is indicated in Table 4. Many of these cities, for example Dhaka, continue to grow at a rapid rate.

Views differ about the economic advantages and disadvantages of very large urban agglomerations. Nevertheless, the following observation by Jones (1991, pp.24-25) is pertinent:

“Even if it is true that national economic growth would be maximized by allowing the larger metropolises to grow to vast size, planners might nevertheless opt for slower national growth if faster metropolitan growth meant seriously widened regional income disparities, or that the quality of life would be lowered in ways not captured by income measures, or that clear problems of governance and political instability might result, or that the environmental sustainability of megacities is suspect in the longer run.”

According to *World Resources 1996-97* (World Resources Institute, 1996), cities account for a disproportionate share of national income. Furthermore “urbanization is associated with higher incomes, improved health, higher literacy, and improved quality of life. Other benefits of urban life are less tangible, but no less real: access to information,

diversity, creativity and innovation”. The main reasons why there is migration from rural to urban areas including cities is that overall socio-economic conditions are judged by the migrants to be better in the urban areas.

Table 4 The World’s Twenty-Five Largest Cities, 1995

City	Population (millions)
Tokyo, Japan	26.8
Sao Paulo, Brazil	16.4
New York, United States of America	16.3
MexicoCity, Mexico	15.6
*Bombay, India	15.1
Shanghai, China	15.1
Los Angeles, United States of America	12.4
Beijing, China	12.4
*Calcutta, India	11.7
Seoul, Republic of Korea	11.6
Jakarta, Indonesia	11.5
Buenos Aires, Argentina	11.0
Tianjin, China	10.7
Osaka, Japan	10.6
Lagos, Nigeria	10.3
Rio de Janeiro, Brazil	9.9
*Delhi, India	9.9
*Karachi, Pakistan	9.9
Cairo, Egypt	9.7
Paris, France	9.5
Metro Manila, Philippines	9.3
Moscow, Russian Federation	7.5
*Dhaka, Bangladesh	7.8
Istanbul, Turkey	7.8
Lima, Peru	

*South Asian city

Source: Based on UN Population Division, *World Urbanisation Prospects 1994 Revision*, United Nations, New York.

Nevertheless, most of the cities in low income countries experience severe environmental problems, particularly in South Asia. The general observation made in *World Resources 1996-97* applies to most South Asian cities. It observes that:

“Especially where population growth is rapid, local governments are unable to provide for even the most basic needs of their citizens. Throughout the developing world, the urban poor live in life-threatening conditions. At least 220 million urban dwellers lack access to clean drinking water; more than 420 million do not have access to the simplest latrines. Between one and two-thirds of the solid waste

generated is not collected. It piles up on streets and in drains, contributing to flooding and the spread of disease. The problems of urban poverty exact an enormous toll in largely preventable deaths and diseases.” (*World Resources Institute, 1996*)

A feature of South Asian cities is that air pollution is well in excess of health standards and domestic and industrial effluents are released to waterways with little or no treatment. Water quality is therefore very poor and a threat to human health and aquatic life. In most cases there are also vast squatter settlements and these are often located in areas experiencing the most environmental problems. Therefore, the poor in cities not only have very low incomes, but also live in the worst environmental conditions, often on land that no one wants because of the environmental hazards associated with it.

In India, only about a quarter of all wastewater generated in major river basins is collected and even less is given any treatment at all (cf. Bowonder, 1995, p. 161). In the case of the Ganges Basin which receives more than half of waste water generated in India in major basins and contains 80 cities, less than a quarter of the wastewater is collected and treated. While India has extensive pollution control measures, compliance with these measures is poor. Up to a half of industrial firms may fail to comply with environmental standards (Bowonder, 1995, p. 158).

The Hindu Survey of the Environment reports that:

“The city of Calcutta is suffering from serious environmental disorder. Collapsing sewer lines, stagnant canals, obsolete pumping stations, waterlogging, heaps of garbage, increasing noise, air and water pollution, rise in malaria and gastro-enteric diseases and shrinking wet lands are just a few problems plaguing the city” (Battacharya 1995, p. 146).

Cholera has become endemic due to water pollution.

Urban waste management (or lack of it) is a serious problem throughout India. Even hospital waste is not disposed of in a safe manner. *The Hindu Survey of the Environment 1995* (Ravi, 1995) provides general evidence and case studies for 25 towns and cities throughout India showing the appalling state of most urban environments.

Not only is the availability of sewerage in Calcutta low and Calcutta’s drainage problems severe due to human-induced environmental changes, its air quality is very poor. On average, the particulate matter in its air exceeds the standards set by the World Health Organization on 268 days of the year. In this respect, its air quality is worse than that of Bangkok, Jakarta, Manila or Shanghai (Stubbs and Clarke, 1996, Vol. 1, p. 533). Particulate matter is a major contributor to respiratory diseases. The main source of such particulate matter in Calcutta is the burning of coal for industrial and domestic purposes. Furthermore, significant emissions of sulphur dioxide and nitrous oxide occur. Although these emissions are lower than in major Chinese cities or Bangkok, they are a cause for concern.

4. Urbanisation in Bangladesh and Associated Environmental Problems

Although urban environmental problems in South Asia could be illustrated by taking any country in South Asia, or any of its major cities, Bangladesh is taken as an example here. It has a rapid rate of urbanization and its major city, Dhaka, is already a megacity. With a population of around 8 million, Dhaka accounts for almost a quarter of Bangladesh's urban population. Bangladesh's second largest city, Chittagong, has a population of around 3 million. Its other two large cities are Khulna and Rajshahi.

According to Khan and Hasam (1996), only 16% of houses in urban areas in Bangladesh are durable. Many are built with bamboo posts and use bamboo mats for walls. These mats and walls require repair and renovation after one or two monsoons. They constitute a serious fire hazard, especially in slum areas where extreme crowding may occur. For instance, it is reported that up to 6,000 people live on a hectare in the Islambad slum area of Dhaka. Basic sewers and amenities are lacking in many of these areas.

Water and sanitation facilities in Bangladesh's urban areas are poorly developed. Only about 10% of its urban population have access to piped water and sanitation. As poor as the sanitation is in Dhaka, it is even worse in Chittagong and in smaller urban centres, as can be seen from Tables 5 and 6. Concerning sewerage, it is clear, given the larger 'Other' category, that many people use open spaces to defecate and urinate. Khan and Hasan (1996, p. 215) note:

“Due to unplanned growth and illegal settlements, the urban centres in Bangladesh have grown with miserably poor and primitive sanitation systems. The built drainage system is faulty, further, the natural drainage system and flood retention areas have been choked by water weeds or encroached upon by building construction. The result is excessive flooding even with moderate rainfall.”

Table 5 Coverage of Urban Water Supply in Bangladesh (per cent of population)

Urban Centre	House Connection	Public Standpost	Hand Tube Well	Unspecified Sources
Dhaka	49	10	-	41
Chittagong	29	8	10	53
District towns	14	9	29	48
Thana centre	4	-	25	71

Source: Based on Khan and Hasan (1996) p. 223

Table 6 Coverage of Sewerage Disposal in Bangladesh (per cent of population)

Urban Centre	Sewerage	Septic Tank	Bucket Latrine	Pit Latrine	Others
Dhaka	15	40	-	15	30
Chittagong	-	31	15	5	49
District towns	-	22	26	16	16
Thana Centre	-	6	*n/a	16	78

*n/a = statistic not available

Source: Based on Khan and Hasan (1996), p.223

Given lack of adequate sanitation and safe water in Bangladesh, water borne diseases are common.

Virtually no provision exists for the removal of solid wastes (garbage) in urban Bangladesh. It is therefore commonly dumped on streets where recyclers, scavengers and vermin of various kinds reduce its volume.

In Dhaka, the municipal authority only has the capacity to collect about half of the solid wastes generated every day. In slum areas, little or no municipal collection of garbage occurs. A major part of the garbage left in the streets is not collected by the city and is “left behind either to rot or to be collected by informal groups [or to be eaten by scavenging animals and vermin]. However, scavengers, rag pickers, and *tokais* (young street children who work as collectors of waste and throw away pieces) reduce the quantity of waste for collection and disposal” (Islam, 1996, Vol. 2, p. 71).

Most of the solid waste is organic material, unlike in high income countries, but the quality of inorganic material is increasing. Polyethylene bags, for instance, are becoming more common and often block drains when disposed of. Hasan and Mulamsottil (1994, p. 196) report that “In some areas, the residents throw their garbage into open drains. The garbage decomposes in these blocked drains and provides breeding grounds for mosquitoes and flies.” In fact, garbage may be thrown into any open space including ponds and watercourses. Hasan and Mulamsottil (1994) also report poor air quality in Dhaka and that Dhaka has a high incidence of bronchitis and other respiratory disease (United Nations, 1987).

While average incomes in cities such as Dhaka are higher than for the remainder of the country, income is very unevenly distributed. A recent study found that around 50 per cent of the population of Dhaka is below the poverty line and that 30 per cent is in extreme poverty (Islam, 1996). Most of this latter group live in slum and squatter settlements which house about 3 million people, or approximately one-third of the population of Dhaka. These

are also the groups most likely to be without public utilities and municipal services. Apart from inadequate water supplies and facilities for sanitation, they are likely to be without access to electricity. In Dhaka 64 per cent of households are located in areas which do not have electricity supply.

Furthermore, traffic congestion and noise are increasing problems in Dhaka and are likely to become worse.

Co-ordination of the planning and development of Dhaka leaves much to be desired. Different public agencies are overseeing different aspects of Dhaka's development and maintenance of its infrastructure. Their activities are not co-ordinated and personnel are lacking in required skills. There is considerable inefficiency in use of funds set aside for development of Dhaka. Governance problems, including corruption, add to the inefficiency with which public funds are used in developing Dhaka. It may be possible to increase the efficiency of Dhaka's development by privatising supply of some municipal services, or contracting out their supply. In addition, greater participation by local communities in taking care of their local environment could help. At least a side-by-side approach would be preferable to a complete top down system in improving some local environments in Dhaka. Since cities involve a high degree of interdependence in living conditions and a high degree of externalities, the quality of governance of cities is a major influence on the quality of living conditions and the supply of urban services within them. Unfortunately, low levels of economic development and poor governance often go hand in hand.

5. Transboundary and Global Aspects of Environmental Change in South Asia

Transboundary and global aspects of environmental change are assuming growing importance in South Asia, but a number of transboundary environmental issues have been of importance in South Asia for several decades. In particular, shared water resources have been a bone of contention.

For instance, a number of rivers are shared between more than one country, for example, the Indus between India and Pakistan, the Ganges/Padma between India and Bangladesh, and the Bhramaputra between China, India and Bangladesh. Agreement was reached between India and Pakistan on sharing the water of the Indus in 1960 (The Indus River Treaty) and after years of acrimony, India and Bangladesh have reached agreement on sharing of the waters of the Ganges. While agreement extends to sharing of the waterflows, there does not appear to be any agreement on the control of pollution emissions to these rivers. Consequently, the waters of the Indus, for example, are becoming increasingly polluted. The Bhramaputra does not appear to have been the source of international agreement, presumably because its waterflows are adequate to meet current needs. Nevertheless, deforestation in its headwaters appears to be increasing its sediment load and

this has potential international environmental effects, for example, siltation and deforestation in its headwaters may be increasing the seasonal variability of the Bhramaputra's flow.

The treaty between India and Bangladesh (entered into December 1996) on the sharing of the waters of the Ganges at Farakka, involves sharing on a 50/50 basis if the flow at Farakka of the Ganges is 70,000 cusecs or less in a ten day period, 35,000 cusecs to Bangladesh if the flow is 70,000-75,000 cusecs with India's maximum off-take being 40,000 cusecs in a ten day period with excess water being available to Bangladesh. It makes no provision for the quality of the water entering Bangladesh. As pointed out above, the Ganges is seriously polluted. Nevertheless, the Treaty represents progress in the sharing of a transboundary natural resource.

Substantial biodiversity loss has occurred in South Asia and is continuing. Nevertheless, India, in relation to other low income countries, has a relatively high proportion of its land in protected areas, whereas Bangladesh is poorly served in this regard.

To the extent that the international community values biodiversity, loss of biodiversity in South Asia has global consequences. The preservation of biodiversity can, however, impose high costs on low-income countries, although there can be circumstances where they themselves benefit economically from the conservation of natural environments. Each case must be assessed individually. Where a local community would be disadvantaged economically by engaging in nature conservation, but the international community's gain from conservation would exceed the loss of the locals, all could gain if the international community were to compensate locals adequately for any loss from engaging in nature conservation. However, it is sometimes difficult to devise suitable income transfer mechanisms. Furthermore, such transfers involve transaction costs which have to be offset against any benefits otherwise obtained.

In relation to air pollution, South Asian countries are rapidly increasing their use of fossil fuels. In particular, India's use of fossil fuels is now substantial by world standards. Consequently, acid rain occurs in parts of India and there is increasing potential for their transport internationally (Foell, 1994). Furthermore, India's use of fossil fuels is making a significant global contribution to greenhouse gas emissions and that is expected to grow as its fossil fuel consumption expands.

In the period 1990-96, commercial energy use in Nepal expanded on average at 16.4% per annum, in Bangladesh at 5.8%, in India at 4.8%, in Pakistan at 6.4% and in Sri Lanka at 7.5% (World Bank, 1996, p. 202). These are rates of increase significantly higher than those for low income countries as a whole.

In 1992, India emitted 769 million tonnes of carbon dioxide from its use of commercial energy. This is about one-third of the level for China, but it exceeded that of many high income countries, for example, the United Kingdom (566.2 million tonnes).

However, the emissions of the U.S. at 4,625 million tonnes were much higher and the emissions of Japan were somewhat higher (World Bank, 1996). Nevertheless, on a per capita basis, the carbon dioxide emissions of India were only a fraction of those of all high income countries.

At the same time as South Asia is becoming an increasingly important source of greenhouse gas emissions, it is likely to be seriously affected by a rise in the sea level. For example, Buchdal (1996) reports that “a rise in the sea level of 1.5 metres would flood one fifth of all farmland of Bangladesh, equivalent to a 21.3% loss in agricultural production.”

6. Concluding Comments

There is widespread support for Kuznets’ hypothesis concerning the state of the environment and economic development. This hypothesis is that pollution and environmental degradation intensities at first rise with economic development, but eventually decline as income levels reach higher levels. This, therefore, suggests that broadly speaking, economic growth is the eventual solution to increased economic welfare and improved environmental conditions. The historical experience of many high income countries today supports this view. It indicates that South Asian countries should try to emulate the growth patterns that were adopted by Western countries. These involve polluting now and cleaning up later and converting the ‘maximum’ amount of natural resource capital into man-made capital.

However, there are a number of possible difficulties for this approach which involves very weak conditions for sustainable development. These are:

- (1) The global environmental impact of *all* countries following this strategy could be disastrous given that it will result in a rapid accumulation of greenhouse gases. With economic growth, South Asia, like China, will become a major contributor to greenhouse gas emissions.
- (2) Even if pollution intensities fall, total pollution levels may continue to rise. The *flow* of total pollution emissions may continue to rise because, even though the level of emission per unit of output falls, the marginal increase remains positive. Furthermore, for those pollutants where levels depend on their *stocks* rather than their *flows*, any current emissions will increase their accumulation.
- (3) Some environmental impacts can be irreversible and this needs to be taken into account.
- (4) Environmental and natural resources provide economic services and an appropriate balance must be struck between these and other resources such as man-made capital. The appropriate composition can vary from country to country. It may be that it would be economically advantageous to South Asia, for example, to retain a higher

ratio of natural resources and environmental capital in proportion to other resources than in Europe.

- (5) It cannot be assumed that low income countries will all be able to sustain sufficient development to achieve high income status. Premature attempts to do so involving depletion of natural and environmental resources, while initially raising incomes, may prove unsustainable. Economic growth and development can then be attenuated. The country then ends up with a poorer environment and little prospect for achieving high income levels. It is caught in a low-level income equilibrium trap (Leibenstein, 1957) and the possibility of ever escaping from the trap is made harder as a result of natural resource depletion. Thus, the strategy of depleting natural resource capital for a great economic leap forward proves to be abortive. While this may not occur in South Asia, it is always a risk. South Asian countries can ill afford to engage in profligate and unsustainable uses of their natural resources.

The sustainable development of a country does not require sustainable development in every region of it (if migration is possible and economic), but if development is not ecologically sustainable in most regions, the sustainability of national development is likely to be jeopardized. Regional development in several parts of India and Bangladesh are unsustainable and there is little doubt that other cases could be added for South Asia.

While urbanisation and the growth of urban-centric industries may seem to be the answer to sustainable development problems in areas such as South Asia, one must be careful not to be too glib about this. Urban areas depend upon rural ones for their economic sustainability. Economic and ecological systems are interdependent and becoming more so as market systems expand and economic globalization occurs. Thus the economic and ecological problems of South Asian economic development are interdependent and the welfare of this region as a whole depends on the sustainability of its parts and is becoming increasingly linked with that of the whole world. Growing regional and global interdependence is occurring.

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