19-1 Basic Trends in Land Use/Cover Change in Indonesia

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1 Introduction

As the largest archipelago in the world, Indonesia is a dominant country in Southeast Asia in terms of its large territory and population. The nation consists of 5 major islands and about 30 smaller groups. The total number of islands is more than 17 000 according to the Indonesian Naval Hydro-Oceanographic Office[1], stretching from lat 6°08'N to long 11°15'E. The Indonesian sea area is 4 times greater than its land area, which is about 1.9 million km^2.

Indonesia has 144 million ha of tropical forest[1], the second largest forest expanse after Brazil and about 10% of entire tropical forest of the world. However, this refers to lands under the aegis of the Ministry of Forestry, and many of them have had no forest cover at all for a long time. In order to meet the strong demand for wood, forestry production has increased, especially during the last two decades. Forest products are significant in Indonesia's economy. However, the timber trade is widely considered to be responsible for deforestation directly or indirectly. Deforestation causes loss of species diversity and ultimately leads to species extinction, and also to climate change and disruption of the hydrological cycle. It also contributes significantly to global warming and the greenhouse effect.

In the cultivated zone, especially in the areas surrounding the main cities, urbanization has been expanding, mainly by land-use conversion from agriculture to urban uses. Indonesia's urban policy remains closely tied to promoting regional development, which is seen as vital to national integration through developing remote regions. Due to the high contribution to economic growth of urban areas, their development is the top priority for regional development. At the same time, related spatial policies are being wound back. Indonesia has in recent years loosened the guidelines for location of foreign investment. It is also phasing down its transmigration program; the expenditure for transmigration was reduced from 6% in the Fourth Year Plan to 3% in the Fifth, and most priority programs are for maintenance of existing transmigration areas rather than establishment of new ones.

When attempting to construct a model of Indonesian land-use/cover change, as well as constructing a general trend model (at the national level), it is very useful to make a distinction between models of forest-dominant regions and those facing urbanization, especially in the major cities and their surrounding areas.

2 Deforestation

The deforestation process has produced a huge change in national land-use cover. Annual deforestation in Indonesia from 1981 to 1985 was estimated at 6000 km^2 per year (0.5%) (FAO, 1988); another estimate was 10 000 km^2 per year (USAID, 1987); the World Bank (1988) accepts that a `reasonable` estimate of deforestation for the late 1980s was anywhere from 7000 km^2 to 12 000 km^2 per year. It amounts to 1.4% of the remaining forests[2]. It further means that Indonesia is losing more area of forest each year than any other tropical-forest country except Brazil.

Tropical deforestation is a key concern in conservation because tropical forests are the most concentrated repositories of species, and because tropical forests supply both resources and ecological services to humans. Much

of the tropical forest in Indonesia has been converted into other uses, such agriculture and new settlements for the transmigration program. So far, Indonesia has retained more forest than other countries in the world, except some South American countries.

There are many man-made causes of deforestation. Population pressure is often singled out as the prime factor. While this is true in many respects, there is much more to the situation. For instance, while the populations of tropical-forest countries expanded by 15 to 36% during the 1980s, deforestation expanded by 90%[2]. The other main causes of deforestation have been identified as demand for agriculture, logging in natural forests, shifting cultivation, transmigration programs, smallholder tree-crop development and forest fires.

With regard to policy issues, the problem with the deforestation policy in Indonesia in general is not so much the policy of logging, but the conversion of land to other uses, where the other uses have no economic potential. This policy is implicated in leading to unsustainable activities and resulting in land degradation and environmental problems.

3 Land-use conversion during the urbanization process

Urbanization as general physical phenomenon in Indonesia is still progressing at a low rate according to recent data. In 1930, only 7.5%[3] of the total population lived in cities and towns. Urban growth in Indonesia became faster after World War II, mainly caused by the push factor of insecurity in the rural areas. In 1961, 15% of the Indonesian population lived in cities and towns. The share of the urban population of Java increased during the 10 years from 15.6% to 18%. Noticeable is the increasing share of Jakarta in the total urban population[4].

It is significant that, in spite of the increase in urban populations, the built-up surfaces of many cities and towns have hardly been extended since 1945. In fact, this increase has occurred by heavy intensification of the already existing urban areas. The morphological result of this intensification is mainly the irregular *kampongs* (traditional and irregular settlements) in and close to the cities. The most important factor in the economics of urbanization is the transition from a mainly agricultural economy towards an industrialized economy. That means a shifting in employment and income from the primary sector (agriculture) towards the secondary sector (manufacturing, construction, etc.). Such transition is usually attended by physical urbanization, because the much more intensive use of land by industry causes a concentration of population near the industrial areas.

In the early stage of urbanization in Indonesia, the push factor from the rural areas, especially in Java, did not have a complementary pull factor in the urban areas, in the sense of a demand for an industrial labor force. This has led to high unemployment and underemployment in the cities. Nevertheless, these push factors are working and lead to migration into the cities, because many people from villages hope that they will find better opportunities in the cities. The lack of employment in the primary sector (agriculture) in rural areas provides a strong push factor. In the meantime, powerful social pull factors are working from the towns, but still more from the cities.

Since economic reform was introduced in Indonesia, there have been some interesting, and not always anticipated, shifts in urbanization patterns. Indonesia's annual urban population growth rate dropped from 3% between 1971 and 1980 to 2.6% from 1980 to 1990.

The growth rate of Indonesia's largest city, Jakarta, has also slowed somewhat. Jakarta had a population of 9.3 million in 1990. Its annual population growth rate in 1980 to 1990 was 2.4%, down from the 3.9% of 1971 to 1980. The reason is that the urban areas of the BOTABEK (JABOTABEK* minus Jakarta) region are absorbing more than their share of the growth of the city (Jakarta City). This hinterland zone grew by 226% between 1980 and 1990.

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* JABOTABEK is the Jakarta metropolitan region which consists of the following local administrations: Jakarta, Bogor, Tangerang and Bekasi.

The population growth of regions located near large cities has outpaced the growth of the cities themselves. This pattern is not surprising because the economic activities in these *kabupatens* have grown due to inducements from the large metropolitan areas. Industrial activity growth in *kabupatens* Tangerang and Bekasi has been largely supported by the urban facilities and infrastructure of Jakarta. In fact, up to 1985, Jakarta and its neighboring *kabupatens* and *kotamadyas*** produced 31% of the national industrial product, mainly from large and medium industries, including gas and oil[5].

This factor has tremendously affected land-use change in *kabupatens* surrounding major cities. During the last decade, a substantial amount of prime agricultural land has been converted into industrial and large-scale residential areas, including new towns, especially in Jakarta[6,7]. A rough estimate indicates that in *Kabupaten* Bogor, which borders Jakarta, approximately 2000 ha of rice fields of the 23 000 ha that existed in 1986 have now been changed into industrial and residential areas. Likewise, during the last 5 years, *Kabupaten* Bekasi lost annually about 200 ha of prime agricultural land, owing to conversion to non-agricultural uses[8].

The growing concentration of socioeconomic activities in Jakarta and its surrounding areas has attracted many people, particularly from rural areas, to the metropolitan region. All the *kabupaten* have shown population increases. During 1980 to 1990, the population of Bogor increased by 4.13% per year, while the annual population increases in Bekasi and Karawang were 6.29 and 6.10%, respectively[10].

Planners have attempted to give some shape to the rapid expansion of the city. Agreement has centered on a "t" plan for Jakarta's growth to the year 2005. This would induce urban expansion along an east-west corridor of the coastal strip adjacent to Jakarta Bay. These coastal areas in North Java have been the prime agricultural areas for rice production. This expansion plan has been facing a conflict of interest with the policy of regional development, between the expansion of urban areas and maintenance of rice production regions. In the west, the city is to develop along the corridor leading to the international airport at Cengkareng (and the town of Tangerang), and in the east along the corridor towards the satellite town of Bekasi. Expansion to the south along the road to Bogor and Bandung has been curtailed, due to the environmental sensitivity of the region.

At present, one of the agricultural development problems in Java is the intensive conversion of prime agricultural land into industrial and residential areas, especially in Botabek.

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** Kabupaten and kotamadya are administrative units of the same hirarchy. A kabupaten (normally translated as district) normally covers a wider area than a kotamadya and rural areas dominate the region. A kotamadya (normally translated as municipality) is dominated by urban areas, and corresponds with the status of *shi* in Japan.