obvious that SPOT data can be used for identifying mangrove and land use objects as nearly similar as those obtained by medium scale aerial photograph.

The rate of mangrove disappearance in the area is 121.5 hectares/year. The mangrove will totally disappear in five years, if the deforestation goes on just like what happens new. For realizing a mangrove reforestation in Surabaya, two proposals of mangrove zonation are given with some trade-off between both. Considering the actual mangrove condition of the area, the second proposals, i.e.: 150 m of mangrove landward from the coastline, is more suitable than the first one.

## ACKNOWLEDGEMENT

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# POPULATION AND ENVIRONMENT IN INDONESIA

by
Ida Bagoes Mantra *

## ABSTRACT

*The present environmental situation is not compatible with our expectations. Pollution, erosion, floods and droughts have hit many parts of the world, and these disasters give us reflections on how serious are the environmental problems that befalls this planet of ours. In meeting its needs, mankind has exploited the environment to the utmost without caring about environmental conservation. Moreover, with the population explosion after the 1950s and the dependency of life upon the natural processes, the cultivated land to be inherited by future generations has gradually become increasingly barren and fertile.*

*Efforts are absolutely necessary to check increasing population growth rates, to raise the standard of living for all people and to arouse and awareness of sustainable development policies so that a compability between development activities and environment can be achieved.*

## INTRODUCTION

Since the 1970s many countries in the world, particularly the industrialised nations, have been confronted with environmental problems. News about pollution, erosion, floods and droughts can always be found in the newspaper, on the radios and televisions, reflecting how serious are the environmental problems that befall nations. So grave is the problem that the United Nations held a special conference on environment (the 1st World Environment Conference in Stockholm) on June 5, 1972, the day which later was established as the Environment day (Salim, 1979).

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Like other nations, Indonesia has also experienced environmental problems. There are several factors that have upset the environmental balance, i.e. the population explosion. A population with a high growth rate in a limited area will bring pressure to bear on the environment, which in turn will finally reduce the sustaining capacity of the environment. As an example, the exploitation of natural resources such as forests as result of the rising demands for food and housing may bring about floods, soil erosion, and the disappearance of water catchment areas.

As the population increased, its demands also increased as well as the area of cultivated land per capita needed. For those regions where the expansion of agricultural land is not an option, the population has make strong efforts to exploit the limited land to obtain the maximum crop. The "take for granted" attitude towards the earth wich is regarded no more than store of energy and at the same time as an unlimited waste dumping ground will surely aggravate the environmental problem.

The unsuitability of certain land-use, the mining of unrenewable natural resources, the use of fertilisers and pasticides, and garbage or waste disposal in the soil, air and water, can change the environment. The population, in general, is incapable of restoring environmental quality, and thus quality cannot be guaranteed for the next generation. Man as a part of the environment can be an important agent capable of either destroying or preserving the environment.

A contribution in the form of an effort to secure the sustainable development, with to containing the negative impacts of human activities, is absolutely necessary. Whether this effort succeeds or not depends primarily on certain parameters of a country's population, including numbers, quality and growth rate. In the following part of this paper we will discuss the present condition of the population in Indonesia, which is one of the determinants of sustainable development.

## CONDITIONS OF THE POPULATION IN INDONESIA

### Population Growth and The Demographic Transition

In Indonesia, the most conspicuous population problem which has caused environmental damage is overpopulation. This is felt all the more on the islands of Java and Madura where more than 60 per cent of the total population of this country clusters on only 6.9 per cent of the entire land area of Indonesia. In 1990, the population density in Java reached almost 9 times the population density in Indonesia as a whole (in the ratio of 690 to 77), 12 times that of Sumatra, and 58 times that of Kalimantan.

The other population problem is that more than 80 per cent of the entire population live in rural areas with the primary means of livelihood being agricultural. However, not all of them have cultivated land of their own, and for those who do, the land area of each of them is, in general, too small to sustain a family. Based on the results of research conducted in several villages in Java (Penny and Singarimbun, 1973; Stoler, 1975; Suharso *et al.*, 1976; and Mantra, 1978), it is estimated that around 50 per cent of the population in the rural areas in Java do not own cultivated land of sawah (wet rice/paddy field), while most of the land-owners (petani pemilik) have only less than 0.2 hectare of sawah each.

Besides the decreasing of plot size of cultivated land as a result of the high population growth rate and limited tillage, some of the agricultural lands are used for nonagricultural necessities. This happens mainly in urban and industrial areas. For example, let us take a look at West Lombok where development has been progressing rapidly. Many people were utilising the fertile cultivated lands. The building of some dams has also caused river valleys, which in general contained fertile agricultural areas to overflow.

The high population growth rate and the lack of fertile agricultural areas due to their being used for the nonagricultural sector's interests have drastically reduced the average farmers' cultivated land area. According to the 1980 Population Census, the number of farmers having no cultivated land in Indonesia had increased from approximately 500,000 household-heads (KK - Kepala Keluarga) in 1973 to 2.6 million in 1980, while the number of farmers with less than 0.5 hectare of tillage had increased from 6.5 million household-heads in 1973 to 11 million in 1980 (Soemarwoto, 1984:84).

The main problem faced by the population at present is population pressure on the cultivated land, which has brought about damage to forests and other vegetation. This has resulted in land-erosion and damage of irrigation. This problem continues to increase since annual population growth rate is still high.

The population growth rate in Indonesia had been rising for 50 years (1930-1980). During the period 1931-1960, the average annual population growth rate was 1.5 per cent, while during the periods of 1961-1970 and 1971-1980 it rose to 2.1 and 2.3 per cent respectively. It was after 1980 the population growth rate began shown a tendency to decrease (Table 1). Table 1 shows that the population growth rate on Outer-Java islands is higher than that on Java islands. The highest population growth rate during the period of 1980-1985 took place in Sumatra (3.1 per cent), followed by Kalimantan and Sulawesi which were 2.8 and 2.1 per cent respectively.

Population growth in Indonesia is essentially influenced by three main factors, namely fertility, mortality and migration. As a whole, it can be said that

the influence of migration is nil; the population growth is influenced by extent of both fertility and mortality.

### TABLE 1. POPULATION GROWTH RATE BY ISLAND (1930-1985)

| Island | 1930-61 | 1961-71 | 1971-80 | 1981-85 |
|---|---|---|---|---|
| Java & Madura | 1.3 | 1.9 | 2.0 | 1.8 |
| Sumatra | 2.1 | 2.9 | 3.3 | 3.1 |
| Kalimantan | 2.1 | 2.4 | 2.8 | 2.8 |
| Sulawesi | 1.7 | 1.8 | 2.2 | 2.1 |
| Other islands | 1.6 | 2.0 | 2.8 | . |
| Indonesia | 1.5 | 2.1 | 2.3 | 2.15 |

Source: Biro Pusat Statistik (1981, 1983, 1986)
 Not included the province of East Timor

By observing the trend of both the birth and the death rates in Indonesia, we should consider the following. First, both the birth and the death rates are decreasing. Second, the death rate is decreasing more rapidly than the birth rate, and finally both the birth and the death rates will be low and the natural population growth rate will be low and relatively stable. The changing process of the birth and death rates mentioned above is called the process of Demographic Transition.

When a country or a region has gone through its demographic transition period, it means that the demographic transition achievement in that country is 100 per cent. To calculate the percentage of the demographic transition achievement one country has gone through, we take the ratio between the Total Fertility Rate (TRF) and the General Fertility Rate (GFR) by means of the maximum TFR or GFR still prevailing in that country or region at the time of calculation. Bouge (1969) use the maximum figures of fertility rate for both TFR and GFR as high as 7500 and 235 respectively, and if the demographic transition process has been passed, the figures of both TFR and GFR become 2200 and 60 respectively. If those figures above are used to calculate the demographic transition in one region, then the formulation is as follows:

$$ PDTA = \frac{1}{2} \left( \frac{7500 - TFR}{5300} + \frac{235 - GFR}{175} \right) \times 100 $$

The percentage of demographic transition achievement (PDTA) for Indonesia by province, based on the 1980 Population Census and the 1985 Intercensal Population Survey (SUPAS 1985) are shown in Table 2.

### TABLE 2. PERCENTAGE OF DEMOGRAPHIC TRANSITION ACHIEVEMENT FOR INDONESIA BY PROVINCE

| No. | Province | 1980 | | | 1985 | | |
|---|---|---|---|---|---|---|---|
| | | Rural | Urban | R+U | Rural | Urban | R+U |
| 1 | Aceh *) | 40.41 | 53.25 | 41.08 | 45.77 | 63.66 | 47.85 |
| 2 | North Sumatra | 21.30 | 52.40 | 29.90 | 33.70 | 60.70 | 42.20 |
| 3 | West Sumatra | 30.55 | 53.25 | 33.60 | 45.80 | 49.00 | 49.40 |
| 4 | Riau | 32.66 | 45.00 | 35.75 | 43.58 | 60.56 | 48.37 |
| 5 | Jambi | 31.69 | 42.30 | 33.06 | 40.83 | 27.60 | 50.02 |
| 6 | South Sumatra | 27.34 | 50.27 | 33.78 | 41.54 | 60.55 | 43.66 |
| 7 | Bengkulu | 21.61 | 42.41 | 23.45 | 39.46 | 50.82 | 40.88 |
| 8 | Lampung | 27.90 | 42.65 | 30.00 | 45.34 | 54.29 | 46.95 |
| 9 | Jakarta *) | - | 62.00 | 62.00 | 56.00 | 77.00 | 75.00 |
| 10 | West Java | 41.08 | 49.46 | 42.64 | 53.63 | 64.15 | 56.43 |
| 11 | Central Java | 56.00 | 65.00 | 58.00 | 64.50 | 73.00 | 66.50 |
| 12 | Yogyakarta *) | 75.45 | 79.90 | 71.50 | 79.13 | 90.98 | 83.40 |
| 13 | East Java | 70.76 | 83.23 | 71.78 | 76.85 | 80.50 | 77.59 |
| 14 | Bali | 66.22 | 73.83 | 63.87 | 78.90 | 85.29 | 79.89 |
| 15 | West Nusa Tenggara | 14.20 | 38.41 | 18.39 | 28.86 | 50.54 | 32.37 |
| 16 | East Nusa Tenggara | 37.50 | 57.50 | 39.50 | 44.50 | 55.50 | 45.50 |
| 17 | West Kalimantan | 40.70 | 61.16 | 35.25 | 37.75 | 65.54 | 44.63 |
| 18 | Central Kalimantan | 25.91 | 44.48 | 38.37 | 43.15 | 65.61 | 46.94 |
| 19 | South Kalimantan | 49.66 | 62.16 | 52.26 | 62.88 | 82.85 | 67.47 |
| 20 | East Kalimantan | 37.80 | 50.68 | 42.80 | 48.49 | 69.28 | 56.91 |
| 21 | North Sulawesi | 40.32 | 75.11 | 50.48 | 66.71 | 89.43 | 70.08 |
| 22 | Central Sulawesi | 25.39 | 56.85 | 27.95 | 43.06 | 71.16 | 45.81 |
| 23 | South Sulawesi | 46.30 | 62.36 | 49.34 | 60.71 | 69.94 | 62.70 |
| 24 | Southeast Sulawesi | 33.62 | 39.18 | 29.85 | 30.56 | 47.10 | 32.22 |
| 25 | Maluku | 23.37 | 53.18 | 54.97 | 28.14 | 70.34 | 33.70 |
| 26 | Irian Jaya | 38.19 | 33.19 | 39.14 | 43.91 | 58.40 | 45.71 |
| | Indonesia | 48.19 | 60.65 | 50.89 | 57.90 | 70.83 | 61.64 |

Source : Biro Pusat Statistik (1988)
 *) Special Region

Table 2 show that the demographic transition achievement in Indonesia in 1985 was 61.64 per cent, while in 1980 was only 50.89 per cent. Thus, within a period of 5 years there was an increase of 10.75 per cent. From Table 2 we can also see that the demographic transition achievement in urban areas increased faster than that in rural areas. This difference is due to the fact that the educational level of population in urban areas is higher, their life is more consistent, there are couples where both the husband and wife have their own livelihoods, and contraceptives are widely used.

If we observe the figures of the demographic transition achievements of the provinces, 8 of them have got higher than the national figure (61.64 per

cent). Out of these 8 provinces, four are located in Java (The Special Region of Jakarta, Central Java, Special Region of Yogyakarta, and East Java) and the other four are outside Java (The island of Bali, South Kalimantan, North Sulawesi, and South Sulawesi). With regard to their level development of these provinces are more developed than the others. This fact also confirms the hypothesis of Zelinsky that the higher the development of a region, the higher the percentage of its demographic transition achievement.

Three provinces (West Nusa Tenggara, Southeast Sulawesi, and Maluku) got a very low percentage of demographic transition achievement in 1985, 32.37 per cent, 32.22 per cent and 33.70 per cent respectively. This means that these three provinces have to strive for a decrease in their birth and death rates.

### The Age Dependency Ratio and Labour Force

As a result of the higher population growth rate, the percentage of population under 15 years of age in 1985 was almost 40 per cent, and this has become the primary indicator of the younger population structure (see Table 3). In this table it is also shown that the percentage of the population of 65 years of age and over is less than 10 per cent. This shows that the death rate in Indonesia is still rather high. It is estimated that in the period of 1985-1990 the Crude Death Rate (CDR) is 11.3 per 1000 population (Kantor Menteri Negara Kependudukan dan Lingkungan Hidup, 1989).

#### TABLE 3. POPULATION STRUCTURE IN INDONESIA BY AGE 1971-1985

| Age Group (year) | Year (per cent) | | |
|---|---|---|---|
| | 1971 | 1980 | 1985 |
| 0 - 14 | 44 | 39 | 38 |
| 15 - 64 | 53 | 57 | 57 |
| 65 + | 3 | 4 | 5 |

If the population groups of 15 years and under and 65 years and over are regarded as unproductive population groups, while the population cohort of 15-64 years of age is considered as the productive group, we can calculate the age dependency ratio [*] in Indonesia in 1971, 1980 and 1985. The age dependency ratio of 1971 was 1987, and this means that in that year every 100 productive population had to bear 87 unproductive persons. In 1980 and 1985 the figure decreased to become 79 and 75 respectively. In spite of this decrease, the age dependency ratio until 1985 was still high.

This high dependency ratio has become an inhibiting factor in the process of economic development, because a part of the acquired income

[*] The Age Dependency Ratio = $\dfrac{(0 - 14) + 65^{+}}{(15 - 64)} \times 100$

(which, actually, must be put into savings so as to be invested later on in economic development) had to be spent for the unproductive population's needs. Thus, the continued high rate of the age dependency ratio caused by the still large number of the unproductive population will reduce the population's productivity.

As the population growth rate increases, the labour force growth rate also increases. In 1985, the population 10 years of age and over (the population of working age) numbered 120.4 million and out of this number the labour force totaled 63.8 million (53.02 per cent). And out of this number, 62.4 million had been employed, while the other 1.4 million were seeking jobs (unemployed and the remaining number of 56.6 milion was classified as non- labour force). Those included in this number are university students, housewives, pensioners, and the like. Compared with the situation in 1980, we can see the increase in percentage of the labour force, from 50.0 per cent to 53.0 per cent. Conversely, the number of those belonging to the non-labour force dropped from 50.0 per cent to 47.0 per cent (Table 4).

#### TABLE 4. POPULATION OF 10 YEARS OF AGE AND OVER, BY THE TYPE OF ACTIVITY, 1980 AND 1985

| Type of Activity | 1980 | | 1985 | |
|---|---|---|---|---|
| | Total (million) | % | Total (million) | % |
| 1. Labour Force: | 52.421 | 50.23 | 63.826 | 53.02 |
|    a. Employed | 51.553 | 49.40 | 62457 | 51.88 |
|    b. Seeking Job | 0.868 | 0.83 | 1.368 | 1.14 |
|      - Ever been employed before | 0.416 | 0.40 | 0.358 | 0.30 |
|      - Never been employed before | 0.452 | 0.43 | 1.010 | 0.84 |
| 2. Non-Labour Force: | 51.931 | 49.77 | 56.554 | 46.98 |
|    a. Attending school | 18.771 | 17.99 | 26.174 | 21.74 |
|    b. Housekeeping | 22.175 | 21.25 | 20.774 | 17.26 |
|    c. Others | 10.985 | 10.53 | 9.606 | 7.98 |
| Total | 104.352 | 100.00 | 120.380 | 100.00 |

Source: - 1980 Population Census
      - 1985 Intercensal Population Survey

The increase in the labour force every year, means that the government is obliged to provide workers with labour opportunities in great larger numbers each year. The disicrepancy between the number of those seeking jobs and the number of labour opportunities has brought about some socio-economic problems. According to N. Iskandar and Docs Sampoerno (1973:87) in

1971, for every four persons who left the labour force because of retirement (pensioners) or of death, 14 young men had been waiting as labour force substitutes. This was an inevitable situation since the population born in the fifties comprised a large cohort in the population of the seventies.

The rapid growth of the labour force in the rural areas gas given rise to a situation in which job opportunities in both agricultural and in non-agricultural sectors were increasingly difficult to find (Mantra, 1985). In Java, at present, it is no longer possible to expand the agricultural land since there is no more forest reserve available for this expansion. On the other hand, high economic activity have been reducing the cultivated land area in the interests of the non-agricultural sector, such as industrial complexes, office buildings and housing. Population pressures on the agricultural land areas have taken in the rural areas in Java (Soemarwoto, 1954:86).

### The Population Quality

Many efforts have been made to find the criteria ofthe population physical quality. Several type of criteria have been given. Each of them has advantages and shortcomings.

The most commonly used criterion is PQLI (the Physical Quality of Life Index), an index which uses three variables: infant mortality, life expectancy, and literacy. PQLI is the composite value of the variable measures. Some of experts regard PQLI as a development output, not as a development input (see Grant and Swell, 1978). Of course, it is not always like that, since the relationship between the input and the output is of a circular nature, both of them are influence an another. If we regard the population quality as capital for development, then PQLI is a representation of the population quality which is an input for development. Both the life expectancy and the infant mortality are useful indicators of development results. Even Goldscheider (1971) said that the infant mortality rate is not merely a criterion of the social and economic, physical quality, but also a criterion of the political will of a government in carrying out national development.

The infant mortality rate (IMR) in Indonesia, based on SUPAS 1985, was estimated 74 per 1000 life-births. This figure was just the same as that achieved in Asia as a whole, but was above the world IMR of other ASEAN countries, Indonesia belonged to those nations having the highest IMR during that period. The lowest IMR was achieved by Singapore which was 9 per 1000 life-births. This situation was also reflected on the mortality rate among the children under five years of age (BALITA), of which Indonesia still had the highest rate, i.e. 117 per 100 life-births. This fact indicates that the health conditions of infants in Indonesia are still om much concern, and efforts must be made to obtain better health conditions for them (Table 5).

Health conditions in Indonesia, in general, shown by the life expectancy indicator, have been steadily improving, i.e. from 52 in 1980 to become 60 in 1985. The population mortality rate in 1985 showed that 7 person died per 1000 population due to diseases, and out of this figure 12 percent died of diarrhea, 9 per cent of tuberculosis, and 5 per cent of accidents (Kantor Menteri Negara Kependudukan dan Lingkungan Hidup, 1989). This reveals that the environmental sanitation facilities and the society's awareness of cleanliness still needs improvement.

**TABLE 5. INFANT AND BALITA MORTALITY RATE AND LIFE EXPECTANCY IN SEVERAL COUNTRIES, 1985 - 1990**

| Country | I M R | Balita [*] Mortality Rate | Life Expectancy |
|---|---|---|---|
| Indonesia 7 | 4 | 117 | 61 |
| The Philippines | 45 | 72 | 64 |
| Thailand | 39 | 49 | 64 |
| Malaysia | 26 | 35 | 69 |
| Singapore | 9 | 11 | 73 |
| A s i a | 74 | 108 | 61 |
| W o r l d | 71 | 106 | 61 |

[*]) Children under 5 years of age
Source: Kantor Menteri Negara Kependudukan dan Lingkungan Hidup 1989.

Based on the PQLI in the seventies, Indonesia obtained the figure of 50 (Grant and Sewell). Indonesia still ranked above India which ranked 41, but still below Thailand which ranked 70 and Srilanka 83. But an increase in PQLI in Indonesia did take place: in 1971, its rate ranking was 51, in 1976 in increased to 55, and in 1980 in reached 59 (Biro Pusat Statistik, 1986).

In addition to those three variables, there are several other indicators used as measure (see Gani, 1984). These indicators are: (1) Physical size, i.e. height and weight. Although physical size is much influenced by genetic elements, a lot of empirical evidence has shown that non-genetic elements, such as social and economic status, have an influence upon physical size. (2) Physical endurance which is relatively difficult to measure, because it needs a rather long observation for its measurements. (3) The morbidity rate which, although it is difficult to measure in a definite way, may become a good criterion if we can increase the accuracy of the measurement in the near future. (4) Mortality rate: besides the "infant mortality rate", the child mortality rate and the crude mortality rate can also become criteria of measurement. Gani (1984) classifies the physical size and the physical endurance into the individual quality. If the average rates of both the physical size and the physical endurance can be obtained, they can also be used as the population quality index. The lower the index rates, the better the physical quality of a population or a nation.

The low quality of the Indonesian population is very closely related to said population characteristics. Overpopulation, the high dependency ratio, and low income have caused many Indonesia to live below the sufficiency or moderate line. This condition results in the high infant mortality rate, the low nutrient quality, and the low educational level of the population.

## CONCLUSION AND THE IMPLICATION OF POLICIES

From the descriptions above we can conclude that the population problems in Indonesia is of much concern. The great number of population and its low quality and rapid growth may upset the environment conservation. To meet their need of food and other needs, they have exploited the existing cultivated land areas without paying any heed to conservation. Efforts made to check the rapid population growth, enhance the population quality, and bring the population to realize the environment oriented development, need to be intensified so as to be able to prevent the environment from being degraded.

The environmentally development oriented concepts, or so-called sustainable development - is development designed to suppress the negative impacts of human activities. Development planning authorities must be capable of arranging or prioritying the landuse proportionally so as to be able to create optimal environmental quality. Attention should also be paid to balancing the number of people to the land area, including the resources contained therein.

In the efforts to make better use of the resources, what we should hold on to formly is this principle: that the need for energy must be compatible with of proportional to available supplies of the particular resource. The balance between supply and demand must be truly maintained so that unlimited exploitation of resources do not take place.

A clean environment is the basic need in human life. It provides us with air to breathe, water to drink, food to eat, and the land where we can live and work (Kantor Menteri Kependudukan dan Lingkungan Hidup, 1989). Man, with all his mind and knowledge must be truly capable to manage as good as possible all of the human material needs so that our earth remains to become a clean environment.

For many years we have tried to stay away from nature. Now is the time for us to become a part of nature again. According to Manuaba (1989), by saving our biosphere and ourselves, we come to a humanistic understanding which did not exist before, namely humans of firm attitude who can say emphatically: "I will maintain and take care of this, our one and only house, that is this one and only one earth". I hope that this awareness will be followed by concrete measure supporting this statement.

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