NATIONAL REPORT FOR THE UNCCD IMPLEMENTATION: COMBATING LAND DEGRADATION AND PROMOTING SUSTAINABLE LAND MANAGEMENT IN MALAYSIA

INTRODUCTION

UNCCD defines desertification as land degradation occurring in arid, semi-arid, dry subhumid areas where the ratio of the annual precipitation to the evapotranspiration falls within the range of 0.005 to 0.65. Malaysia does not fall into this definition except for the small northern the State of Perlis and the northern part of State of Kedah which lies immediately to the south, where a short dry period of 3 months is present. The dry period occurs in the months of January to March when evapotranspiration exceeds precipitation and satisfies the definition of the above-mentioned ratio. However, despite meeting the climatic requirement for arid, semiarid and dry subhumid areas, desertification is not a problem in these two states even during the short dry period as there is sufficient soil moisture to sustain the growth of most vegetation. In fact, the short dry spell is an advantage to these states which are major fruit and paddy producing areas in the country, as it induces flowering of the fruit trees and creates favourable conditions for the ripening and harvesting of paddy.

Notwithstanding what has just been said, Malaysia is not free of land degradation problems. There are real and constant threats from land degradation in Malaysia although they differ from those of the arid or semiarid countries. Unlike dry regimes where land degradation is attributed to a lack of rainfall, the threats of land degradation in Malaysia are caused by excessive amounts of rain which can badly damage unprotected sites, especially sloping hill land, resulting in severe soil erosion and other associated problems such as siltation, water pollution, and frequent flash floods, and bringing about misery and huge financial losses in places situated far from the source of degradation. In some situations, large sums of money have been spent on mitigation measures to alleviate problems caused by poor land utilization and management.

Land degradation in Malaysia is most eminent in fragile ecosystems such as steepland, mountainous areas. land with shallow soils, mined land, peat land, land with acid sulphate soils and the impoverished sandy beach BRIS (Beach Ridges Interspersed with Swales) soils and areas under shifting agriculture. Degradation in these ecosystems occur either as direct damage to the land due to land clearing activities and earth movements, or as deterioration to the physical and chemical properties of the soils which may require amelioration measures to restore the soil conditions. Although land degradation is not a serious problem in these ecosystems, the scenario will change with increasing demand from a growing population for more land for urban use and food production. Land development will invariably encroach into the fragile ecosystems such as the steepland and mountains which are presently spared from massive development because of difficult terrain conditions and strict regulations governing their use.

Malaysia enjoys considerable success in the rehabilitation of the severely degraded ex-tin mining land for productive and economic use. Ex-tin mining land has now been ameliorated for agricultural production, and converted for housing, holiday resorts and golf courses. In fact, such land is very much sought after for the production of certain quality fruit production.

The ability of Malaysia to keep land degradation to a minimum can be attributed to the fact that Malaysia is a strong advocate of sustainable development. The country is mindful of the dangers indiscriminate use of the land especially land with the fragile ecosystems and the serious consequences that can occur due to lack of vigilance in the management of its land resources. Policy guidelines are in place to guide the land use planning, utilization and management of land on a sustainable basis. Technical guidelines for various types of development have also been drawn to ensure the use of environment-friendly on-site operations. Legislation is enacted as a deterrent against land mismanagement and abuses.

PHYSICAL ENVIRONMENT

Malaysia is located between latitudes 0^0 and 8^0 and longitudes 99^0 and 120^0 East. The country has three major component territories viz., Peninsular Malaysia, Sabah and Sarawak. The total land area is approximately 32.89 million ha with Peninsular Malaysia covering 13.16 million ha, Sabah 71.19 million ha and Sarawak 12.45 million ha.

The climate is equatorial and with mean temperatures around 27^0 C throughout the year, the country typifies the hot, humid tropics. In the highlands, temperatures are lower and range from 16^0 C to 20^0 C. Rain precipitates from the northeast (November to March) and southwest (May to August) monsoons. The lowest annual rainfall is approximately 1500 mm and the highest is in excess of 5000 mm. The eastern parts of Peninsular Malaysia and Sabah receive heavy rain (exceeding 2,500 mm annually) during the northeast monsoon and light to moderate rain during the inter-monsoonal periods.

Along the western coast of Peninsular Malaysia, the annual rainfall is below 2500 mm and markedly less in places. Most of the rain comes during the latter parts of the inter-monsoonal periods. The whole of Sarawak has heavy rainfall (exceeding 3000 mm annually) throughout the year. In spite of the generally high rainfall, there are regions in Malaysia with marked dry spells where evotranspiration exceeds precipitation for 3 months each year. Areas around Malacca and the extreme northwestern areas in Peninsular Malaysia are examples. Dry spells in Malaysia are comparatively much less severe than those prevailing in the arid or semiarid regions of the world where there may be hardly any rain at all for years.

The topography of Peninsular Malaysia is dominated by a mountainous range which traverses the peninsula almost centrally and rises to elevations of approximately 2000 masl. Marine alluvial deposits are found extensively along the west coast plains while riverine deposits and sandy beach ridges dominate the landscape of the east coast

plains. Sabah and Sarawak are generally hilly to mountainous. The interior of Sabah is predominantly mountain ranges and hills with Mount Kinabalu (4101 masl and the highest in South East Asia) being the highest point. Sarawak is characterized by a coastal plain (approximately 18%), central lowlands (34%) and hilly and mountainous interior (47%).

LAND USE CHARACTERISTICS AND TRENDS

Land development in Malaysia is well planned and implemented in phase according to the country's needs and affordability from year to year. By 1990, it was estimated that 5.09 million ha of land in Peninsular Malaysia had been developed, out of which approximately 5.56 million ha (36%) was under agriculture with 58% still under forest. In 1997, approximately 6.08 million ha were developed; agriculture land increased to 40% while forest decline to 54%. In Sabah, an estimated 0.6 million ha were developed for agriculture by 1990. In Sarawak, approximately, 0.5ha were under agricultural use by 1990 and an estimated 0.08 million ha (or 2.7 million ha fallow inclusive) of the usage was for shifting cultivation on steep to very steep land.

Forest and swamps remain the single biggest user of the land but the area occupied by them has declined by 2.6 million ha from 9.64 million ha in 1966 to 7.08 million ha in 1997. The forest resources have been depleted largely because of the implementation of the country's New Economic Policy and the National Agriculture Policy which emphasized the eradication of poverty and restructuring of society through the development of new land for agriculture and the promotion of commerce and industries based on agricultural and forest produce. The successful implementation of these policies in the last two decades enabled the country to achieve significant socio-economic progress and laid the foundation for further industrialization and diversification of the economy. The National Agricultural Policy was subsequently revised to include strategies for optimizing land use for agriculture and forestry and systematic utilization of abandoned and idle, among other things.

In the agricultural sector, oil palm and rubber together occupy more than 70% of the land used for agricultural production from 1966 to 1997. Oil palm shows the most significant increase in the last 31 years, commencing with only 99,579 ha (4%) in 1966 and increasing to 2.2 million ha (42%) in 1997. Rubber covered 1.77 million ha in 1966, increased to 1.93 million ha in 1974 and 2.0 million ha in 1984 but decreased gradually to 1.9 million ha in 1990 and 1.85 million ha in 1997. The paddy land is quite constant and occupies slightly more than 400,000 ha since 1966. No further expansion is expected in view of the Government's policy to maintain the self-sufficiency level at 65%.

ARABLE LAND

In Malaysia, land for agricultural use is classifies into five suitability classes. Land belonging to Classes 1 to 3 is recommended for agricultural development. Class 4 land consists of marginal soils, which are only recommended for agricultural

development after adequate land improvement, and conservation works are carried out and a high level of management applied. Class 5 land is not recommended for agricultural development because of the risk of soil erosion and land degradation (subsidence, stoniness and extreme acidity).

There are approximately 10.14 million ha of suitable land (31%), 4.03 million ha (12%) of marginal and 18.5 million ha (57%) of unsuitable land for agricultural development in Malaysia. In Peninsular Malaysia, the total arable (suitable and marginal) is 7.5 million ha or 57% of the peninsula of which the suitable land (Soil Suitability Classes 1 to 3) accounts for 6.2 million ha or 47% while the marginal land occupies 1.3 million ha or 9.5% of the peninsula. In the Sarawak, the total suitable land is 1.8 million ha land (14% of the State) and marginal land, 2 million ha (16 % of the State). Sabah has 2.2 million ha of suitable (30%) and 4.3 million ha of marginal land (11%).

Land not suitable agriculture falls into Class 5. There are 18.5 million ha or 57% of such land in Malaysia out of which 5.6 million ha (17% of Malaysia and 46% of the peninsula) are in Peninsular Malaysia, 8.5 million ha (26% of Malaysia and 70% of the state) in Sarawak and 4.3 million ha (13% of Malaysia and 60% of the state) in Sabah.

FRAGILE ECOSYSTEMS

Class 5 land and some of Class 4 land consist of predominantly fragile ecosystems such as steepland, peat, acid sulphate and BRIS soils. The steepland and the mountains together are the largest fragile ecosystem and occupy 15.7 million ha of land (78% of the total fragile land or 48% of the nation). Peat takes up 2.6 million ha of land (13% of the fragile land or 8% of the nation). This is followed by potential acid sulphate and acid sulphate soils which cover 1.31 million ha (7% of the fragile land or 4% of the nation). BRIS and tin tailings together take up approximately 0.5 million ha (3% of the fragile land and 2% of the nation).

Steepland and Mountains

Steepland refers to land with slopes greater than 25^0. Such land occurs in both the lowland (< 300 masl) and highlands (>300 masl) while mountains are found in the highlands. In general, slope increases with elevation although there are plateaus and inter-montane valleys with gentle slopes which are potentially suitable for agricultural development. These are few and far apart, extremely expensive to develop and highly susceptible to soil erosion.

Peat

Peat is a low potential, non-renewable resource, which diminishes with use. It suffers from waterlogging and hyperacid conditions; poor trafficability; acute major and minor nutrient deficiencies; subsides irreversibly and disappears when drained; and is prone to fire hazards. Nevertheless, more than 432,350 ha (46%) of peat land in

Peninsular Malaysia have been drained, mostly for agricultural activities which occupy 376,005 ha (41%). Oil palm is the dominant crop and covers 247,034 ha or 57% of the cleared land on peat**.**
Upon drainage and cultivation, peat decomposes and shrinks, resulting in subsidence and lowering of the ground surface. In the first 2 years of draining the peat, the rate of subsidence is drastic and reaches as much as 50 cm. In subsequent years, because of the consolidation, the rate of subsidence is only 2 to 3 cm per annum

Acid Sulphate

Acid sulphate soils are only found along the coastal areas of the country. Under natural conditions, they are present as potential acid sulphate soils which are subjected to tidal influence and are frequently inundated by seawater. Land with acid sulphate soils must first be reclaimed before it can be put into effective use for agricultural production. Reclamation is time-consuming, tedious, costly, delicate and complex, and requires multidisciplinary expertise. Major engineering works involving the construction of coastal bunds and tidal gates to prevent seawater ingression, and a complex network of drains to remove the excess water and salts from within the polder, are needed to make the land suitable for crop production. However, reclamation results in the formation of acid sulphate soils which can render the reclaimed land unproductive if amelioration measures are not implemented to improve the soil conditions. With proper agronomic and water management and liming, such soils can be converted into highly productive soils for the cultivation of many crops.

BRIS

The term **BRIS** is the abbreviation for **B**each **R**idges **I**nterspersed with **S**wales and refers to the alternating parallel sandy beach ridges and low depressional areas which are commonly found in the coastal region of Malaysia. The BRIS landscape is common in Peninsular Malaysia, Sabah and Sarawak. In Peninsular Malaysia, it forms the dominant landscape in the coastal areas of the East Coast stretching from Kelantan in the north to Johore in the south. The alternating sandy beach ridges and swales are found as far inland as 10 km from the present-day coastline. The BRIS landscape is not extensive and is not well developed along the west coast of Peninsular Malaysia and is poorly expressed except on the Island of Langkawi where it is an epitome of its larger landscape on the east coast of Peninsular Malaysia.

The BRIS areas contain infertile soils which are composed predominantly of inert sand particles. The sandy nature of these soils results in low inherent soil status, poor nutrient and water holding capacities, excessive drainage, high surface temperatures and evapotranspiration and a very high moisture stress. The lowlying swales are prone to flooding during the monsoon. Although some of the BRIS areas have been cultivated successfully for tobacco, cashewnut, roselle and other annual crops, they constitute some of the most under-utilized land in the country.

In the BRIS areas, land degradation occurs when the sparse natural vegetation is cleared for agricultural activities. Farming systems which do not pay special attention

to already impoverished sandy soils will cause further deterioration to the soil fertility rendering the soils even more difficult for crop cultivation...

Mined Land

By far, the most damaging activity to land degradation is mining. Approximately 200,000 ha of land have been mined for tin ore in 1960s and 1970s. The main methods of mining tin are open-cast, gravel pump and dredging. The tin tailings left behind by these activities are highly impoverished by the washing process to extract the tin ore. In all cases, the sand and clay fraction of the soil were separated and dumped separately as sand and slime (mixture of sand and clay). The depth of the disturbed sediment varies from 10 m for dredging to ½ km for open-cast mining.

Ex-tin mined land has been rehabilitated successfully for many uses such as agriculture, aquaculture, and urban uses including housing estates, golf courses and holiday resorts.

Shifting Cultivation

Shifting cultivation especially in Sarawak is a potential source of land degradation. Approximately 2.7 million hectares or 22% of its land area is under shifting cultivation. In the early years, shifting cultivation, mainly involving hill paddy, was not considered a threat to land degradation due to the long fallow period of more than 10 years. However, over time, as the population of the hill cultivators increased, the fallow period had to be shortened in order produce more food feed the increasing population. This has given rise to anxiety that soil erosion and land degradation could become a serious problem as the hill farmers do not practice soil conservation. However, such fears proved unfounded due to rural-urban migration especially among the young people, resulting in a decline in the land under shifting cultivation.

LAND DEGRADATION MITIGATION MEASURES

A national programme to combat land degradation is non-existent in Malaysia as land degradation is not widespread in the country. One reason for this is that Malaysia is a strong advocate of sustainable development. The individual sectors which are involved in land development are implementing stringent mitigation measures to minimize land degradation. The mitigation measures are present in the form of policies, guidelines, Environment Impact Assessment (EIA) requirements and legislation.

Two major policies that ensure the sustainable use of land for agricultural and forestry development are the National Agricultural Policy and the Forestry Policy. These two policies together with the other mitigation measures have contributed significantly to the mitigation of land degradation.

In the National Agriculture Policy (NAP), emphasis is given to increasing productivity through the efficient use of resources. The opening of new land is

discouraged and concerted efforts are made to increase the efficient use of under-utilized land, idle land and even marginal land such as acid sulphate and BRIS (Beach Ridges Interspersed with Swales) soils and ex-mining land. For optimal land use, mixed farming involving the planting of crops, aquaculture and livestock production is encouraged. Integration of livestock in rubber and oil palm plantations is also actively promoted. By discouraging the opening of new land, the NAP contributes to the preservation of forest land and protection of the environment.

Guidelines are available for developing sloping land. In these guidelines, land with slopes more than 25^0 is classified as steepland and is not recommended for agricultural development. For land below 25^0, conservation measures are recommended including the construction of terraces, silt traps, contour ditches and proper drainage system, and planting of cover crops. These implementation of these measures have effectively controlled soil erosion, thereby minimizing land degradation which is most susceptible and prevalent on such terrain.

Land with peat and acid sulphate soils have been reclaimed effectively on a sustainable basis by controlled drainage involving a gradual lowering of the ground water table; appropriate agronomic measures such as liming to overcome the hyperacid conditions; and suitable fertilizer applications to correct macro- and micronutrient imbalances land. With these measures, land with such soils has been transformed into productive agricultural land. Nevertheless, large scale exploitation of such land especially peat swamps is not encouraged as in the natural state, they serve a special function in flood control, being able to absorb large quantities of water. Furthermore, peat is non-renewable resource which disappears with use.

In BRIS soils, the restoration is accomplished by cultural and agronomic practices. The use of large quantities of organic matter, discriminatory fertilizer use, irrigation and intensive farming systems are among some the measures used to rehabilitate such land.

In forestry, the National Forest Policy introduced in 1978 and revised in 1992, and the National Forestry Act enacted in 1984 provide guidelines for the management, conservation, utilization, development and protection of forest. The cornerstone of the National Forest Policy is the establishment of Permanent Reserved Forest (PRF) to ensure sustainable forest management. About 4.84 million hectares of forested land are designated as Permanent Reserved Forest to be managed sustainably for the benefit of both the present and future generations. This comprises 36.8% of the total land area in Peninsular Malaysia. These forest lands are secured in their tenure as they are gazetted in accordance with the National Forestry Act 1984.

The PRF could be classified into functional classes to promote sustainable forest management and taking into account the multiple role of the forest, vis a vis timber production forest under sustained yield; soil protection forest; flood control forest; water catchments; forestry sanctuary for wildlife; virgin jungle reserves; amenity forest; education forest and research forest. Out of the 4.84 million hectares of Permanent Reserved Forest, 1.90 million hectares or 39.2% of the total PRF are

classified as protection forest and the remaining 2.94 million hectares being classified as production forest.

A recent national forestry decision prohibits the opening of land above 1000 metres above sea level for any form of development. This decision will protect all land above 1000 masl from any man made land degradation and preserve the unique fragile ecosystem at this elevation.

Legislation is also in place to combat land degradation. The laws enacted for this purpose include the Land Conservation Act, 1960, the Environment Quality Act, 1974 and the National Forestry Act, 1984. In Environment Quality Act 1974, 19 land-based development activities including agriculture, forestry, housing and infrastructures are required provide an EIA report on the development impact on the environment. For instance, land development schemes covering an area of at least 500 hectares that will bring forest land into agriculture production requires an EIA report prior to development.

With implementation of national policies, sectoral technical guidelines and laws, Malaysia has enjoyed some measure of success in controlling land degradation and ensuring sustainable land development.

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