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**THE EFFECTS OF URBAN SPRAWL ON  
AGRICULTURAL LAND USE IN SRI LANKA:  
A CASE STUDY ON GAMPAHA DISTRICT**

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I would like to dedicate this thesis to my Appa (father) and Mama (uncle). Were it not for them, this thesis would never have been possible. They are the ones who brought me up to this stage and have found happiness in my progress. Although they are no longer physically present to see the completed thesis, they have both remained with me spiritually throughout, and I know that they will be happy to accept this thesis. I know also that they will continue to be with me throughout the rest of my life.

## ABSTRACT

Sri Lanka is an island nation situated in the Indian Ocean to the South-west of the Indian sub-continent. In 1977, Sri Lanka adopted free market economic policies to overcome the economic problems and poverty of the country and its people. Although the new policy changes have brought some improvement to the economy, many of the changes were achieved at the cost of the environment and the agricultural sector. As the agricultural sector still plays, and will continue to play, a major role in the national economy, especially in terms of food security, export earnings, employment opportunities and income generation, and as a source of raw material for many industries, it is necessary to minimize the adverse effects on the agricultural sector and the resources used by this sector from the urban and industrial development encouraged under the free market policies.

This thesis has focused on land degradation and land conversion in peri-urban areas. Special attention has been focused on the case study area of Gampaha district, situated next to the capital city of Colombo. Questionnaire surveys were carried out with former and present farmers in various areas of the district. 135 former farmers, who had sold their lands for non-agricultural uses, were interviewed in the first questionnaire survey to identify the reasons they sold their lands. The second questionnaire survey interviewed 195 present farmers, to identify the problems they have been facing in the agricultural sector, especially since the introduction of the free market policies. Further, a grid survey was undertaken to identify the land use changes in the district. The present land uses identified through the grid survey were compared with the land use data prepared in 1981 by the Land Use Planning Unit, Gampaha district. Data were also collected relating to the discharge of effluent and waste in the peri-urban areas of the district.

The results showed that urban and built-up land has increased from 1.6 percent in 1981 to 14.9 percent in 1996. The total agricultural land under production in the district declined from 90.41 percent in 1981 to 56.85 percent in 1996. Paddy land decreased from 16.12 percent to 10.48 percent, coconut land decreased from 17.51 percent to 10.94 percent, and the homestead lands decreased from 49.9 percent to 30.84 percent. This study further found that urban and industrial effluent discharged, even after treatment, was still of unacceptable levels. The study also identified that much of the land converted to non-agricultural uses was under-utilised or used extensively, due to a lack of essential infrastructure development. This has created large expanses of waste land which are not used productively by either sector.

The farmers in the study were found to be suffering problems in cultivation due to a number of factors, including the withdrawal or limitation of subsidies, flooding due to poor irrigation, and pollution from the industrial sector. They were thus attracted by increasing land prices which were manipulated by the private property developers in the free market environment. This has led to fertile agricultural land being rapidly converted on the urban fringes and along the main roads of the district.

To solve the problems related to premature land conversion, and land degradation, this thesis identifies a number of policy changes and programmes which need to be adopted. These include the adoption of agricultural zoning to prevent urban expansion onto agricultural land, measures to control the activities of private property developers, and consequently the rising cost of land, and pollution control measures. There is also a need to intensify agriculture in areas still under cultivation, through measures such as intercropping and increased fertilizer input. Immediate attention must be given to slow land conversion in peri-urban areas, and to prevent land degradation. An appropriate land use management plan is urgently required in order to ensure sustainable development in Gampaha district and Sri Lanka as a whole.



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# CHAPTER ONE

## INTRODUCTION

### 1.1 SUSTAINABLE DEVELOPMENT AND LAND RESOURCES IN SRI LANKA

Sri Lanka is an island economy with a population of 17.4 million (in 1994), and is situated in the Indian Ocean, Southwest of the Indian sub-continent. It has an area of 66 thousand sq. km, and is a tropical country. The per capita income of Sri Lanka in 1994 was US\$640 (Central Bank of Sri Lanka, 1995). Thus, in terms of the World Bank classification of income-based countries, Sri Lanka is classified as a low-income country (LIC).

Population growth, rapid structural changes, and development activities to increase per capita income and alleviate poverty, have placed great stress on the environment. Even though some of the above changes have brought economic growth, this may not be sustainable, i.e., all these stresses have led to questions about the sustainability of these developments.

As David Pearce explains,

“...development subject to a set of constraints which set resource harvest rates at no higher than managed or natural regeneration rates; and use of environment as a waste sink on the basis that waste disposal rates should not exceed rates of (natural or managed) assimilation by the counterpart ecosystems...These are self-evident problems in advocating sustainable rates for use of exhaustible resources, so that ‘sustainable’ tend to think in terms of a resource set encompassing substitution between renewable and exhaustible. Equally self-evident is the implicit assumption that sustainability is a ‘good thing’- that is, optimising within sustainable use rates is a desirable objective. On these terms, sustainability could imply use of environmental services over very long time and, in theory, indefinitely.” (Asian Development Bank (ADB), 1990: p12).

Thus, it is obvious that, economic growth alone is not enough to constitute development, even if it accompanied by the elimination of poverty. Development progress should constitute improved health and nutritional status, educational achievements, access to resources, equitable distribution of income, well-paid employment opportunities, basic freedoms and ‘intergenerational equity’. In



other words, it is to ensure that enough of the resources earned from products extracted from goods are invested in industry, education, health, the physical infrastructure, the environment, and other man made 'resources' which will have such productivity that they offer future generations a basis for a quality of life that is at least similar to and preferably higher than what is currently provided.

The population increase from the 1960s and 1970s entered into the labour force in the 1980s. This increase in the labour force called for rapid employment creation. In addition to unemployment problems, a persistence of high levels of under nutrition, and poverty, are also deeply-rooted imbalances that Sri Lanka's strategy for sustainable development needs to deal with. These imbalances point to an increasing reliance by Sri Lanka on increasing productivity in agriculture and industrialisation. However, these attempts have already placed severe threats on the environment and to sustainable development. Main threats to the environment come from;

- (1) Deforestation and consequences, such soil erosion, siltation, and land degradation
- (2) Degradation of coastal eco-resources
- (3) Environmental pollution in urban and industrial zones.

Poor agricultural practices in many areas have increased deforestation activities, as the land is used extensively. For example, 25 per cent of tea lands in the mid-country have been subjected to severe soil erosion and are now described as marginal lands for tea (Gunatilake et. al, 1990). Population increases in the 1960s and 1970s, and the slow rate of economic growth which was unable to create productive employment, encouraged shifting cultivation in the dry zone areas. This also resulted in abuse of the environment through uncontrolled exploitation of forests in Sri Lanka. The accelerated increase of construction activities in the free market economy further leads to rapid forest clearance.

The national forest cover in the dry zone areas was 1.48 million hectares in 1982/85 and it declined to 1.30 million hectares in the late 1980s. The rate of deforestation has increased from 30,000 hectares per year in 1987 to 40,000 hectares per year in 1994, while the reforestation rate was only 10,000 hectares per year (Ministry of Agricultural Lands and Forestry, 1995). It is also important to note that the total forest cover had already declined below the safety level of 25 per cent of the total land area in 1990.

Rapid deforestation has already caused many problems such as soil erosion, silting and soil fertility decline, in the central and mid-hill country plantations and in the river catchments. Soil siltation in the irrigation dams threatens the irrigation capacity and the hydro-electric power generation capacity of the dams. Silting on the agricultural lands affects agricultural products as well. Biological diversity and the life of wild animals especially in the dry zone is also affected by deforestation.

As Gunatilake et. al (1990: p209-210) states that,

“Natural forest has been replaced by plantation agriculture (tea, rubber and coconut), by irrigated farming systems (mostly paddy) and by rain fed farming ranging from areas of high rainfall to dry zone farming. In addition, natural forest has often not been replaced by agriculture but has been left to regenerate to form scrub. In addition to these changes of land use, two other areas of environmental stress are documented, notably coastal resources which cover a wide variety of ecosystems and the impact of industrial urban development in Sri Lanka.”

Further, the agricultural sector has been providing substitutes for the fuel wood instead of forest wood. For example, 18 % of the cooking fuel is obtained from rubber and coconut plantation and 28.8 % is obtained from other crop waste. However, threats to the agricultural sector from the policy changes as well as from deforestation and related problems directly affect the above forest replacement and the fuel wood substitution of the agricultural sector.

Unplanned urban and industrial activities are having a negative impact on the sustainable development of the country. The government's failure in redefining urban boundaries created unwanted and unplanned urban expansion outside the urban authorities (Economic Review, 1995). High population migration to the urban areas, inadequate infrastructure development, and the location of environmentally hazardous and harmful industries without any control, have been the main threats to the environment and to human health in the urban and industrial areas.

Overcrowding in the urban areas is causing drainage and other sanitary problems, traffic jams, and other social problems. The development of slums and shanties in the cities and suburbs has also been increasing since 1980s (Economic Review, 1995).

Sri Lanka has planned to achieve economic growth of 7% per annum in the 1990s. According to the Minister of Industry, this target “can be achieved only through a process of export-led industrialisation (with a concurrent growth in services) fulfilled by foreign investments” (ADB, 1990:p.220). Industrial policy, based on this target, and with the aim of creating more employment opportunities, through incentives given to the local and foreign investments, has brought a large amount of industrial investments into the country. The total number of the industrial units in Sri Lanka has increased from 1728 in 1978 to 16,983 in 1991 (Department of Census and Statistics, 1995a).

The rapid industrialisation which seems to be inevitable in terms of employment creation, has brought industrial pollution and related environmental stresses. Extraction of mineral resources from the ground, such as limestone and clay for cement, the discharge of liquid and solid wastes which pollute surface water and the soil, and discharge of gaseous pollution, are all serious pollution problems caused by industries.

Coral reefs, for example, one of the non-renewable resources, have been rapidly mined during the last two decades. According to Gunatilake et. al (1990), the mining rate of coral was 7,000 tons per annum in 1990, when the growth rate of the reef was only 10cm per annum. Further he said, by 1985, the live coral cover at the Hikkaduwa area had been reduced to 18 per cent and was being destroyed at a very rapid pace, as a result of collection of salt corals, coral mining, and tourist and industrial activities (Gunatilake et. al, 1990). The declaration of a ‘marine sanctuary’ has not been effective in stopping the unplanned illegal and fast extraction of these resources.

Uncontrolled urban and industrial expansion, tourism, aqua culture, and marine culture have all had a significant effect on coastal resources. Illicit sand mining on the beaches and in the delta of the streams for increasing building construction also contributes to the coastal resource depletion. The total population on the south and west coast of Sri Lanka is to be expected to increase by 3 million between the period of 1981 to 2001 (Department of Census and Statistics, 1981). This will create further stress on coastal resources in the near future. According to the Coastal Zone Management Project (1984), 700,000m<sup>3</sup> of sand had been removed from the reservoirs and beaches during the 1984 period and this has increased to 1,000,000m<sup>3</sup> in 1989.

As most of the urban and industrial sewerage water and waste has been directed to the rivers and sea, the fishing industry and the marine resources have also been affected (as revealed in the field survey in this study). Multi-purpose development activities, increasing domestic and industrial

water supply, hydro-electric power generation, inland fishing projects, and the wildlife sanctuaries consume more water resources and have caused soil salinity in many parts of the country. The north, east, west and the central (hill country) parts of the country already have salt and low levels of ground water problems (Department of Survey General's, 1987), which directly affects the irrigation systems for agriculture and the fertility of the land.

Even though many of these development activities are inevitable, Sri Lanka needs to regulate the activities to a sustainable level. Incentives and disincentives need to be provided to the market to guide in a socially desirable and sustainable direction. In a situation where the market fails to do so, supportive regulatory policies and the law are necessary to provide the basic framework to direct the system in an environmentally friendly way.

Agriculture has remained a major contributor to the economy's income since the reforms of 1977. The importance of this sector to the economy is as follows;

- Food security: The agricultural sector in Sri Lanka contributes 70% of the daily calorie intake, 73% of the daily protein intake and 89% daily fat intake (Food Balance Sheet, 1993). As rice is the staple crop, it is expected to reach self-sufficiency and substitute for imported wheat.
- Export earnings and import substitution: The traditional export crops (tea, rubber, and coconut and minor export crops) and other non-traditional agricultural exports (vegetables, fruits, flowers and foliage and fish), still bringing significant foreign exchange to the country.
- Raw material for the local industries: The local agro-based import substitute industries (oil, tin milk, butter, rice flour etc.), as well as the export led value-added agro-based industries (e.g.: rubber products, instant tea, tea bags etc.) use the local agricultural products for their raw material.
- Employment opportunities: The agricultural sector accommodated 41.4% of the total employees in 1991. According to the ADB (1990), this sector was further expected to create 60,000 jobs annually during the 1990s while 28,000 were expected from the industrial sector.

It could be argued that Sri Lanka does not necessarily have to depend on locally produced agricultural products (i.e. food security) and that it can buy more of its food on the world market. However, to be able to do so requires an ability to afford doing so. Even with the industrial development that has taken place, Sri Lanka is not able to afford importation of food. Thus, for this research, it is accepted that for the foreseeable future, Sri Lanka needs the agricultural sector for food security and employment provision. Therefore, Sri Lanka needs to be careful about the conversion of agricultural land for urban and industrial uses.

In recent years, several pressures have been impacting on the role the agricultural sector is playing in the economy. Some of these pressures are for the good of the sector but others have detrimental effects. Of particular interest for this study is the availability and quality of land for agriculture. Increasing demand for land for non-agricultural purposes, such as for housing, industry, infrastructure and recreation are putting great pressure on agricultural land and on the environment. The Land Use Policy Planning Division (LUPPD) in Sri Lanka has estimated that by the year 2000, there will be a shortfall of land (for agricultural and urban uses) of 93,081 hectares (Somasekaram, 1996).

According to the expected GDP growth rate of 7% per annum in the 1990s, the agricultural sector need to grow at about 4-5 per cent per annum (ADB, 1990). As it is mentioned by Gunatilake et. al (1990:p.215), "...most of the land available for agriculture has come under cultivation." Thus, protection of agriculture land from further decline and disappearance for uncontrolled urban and industrialisation is therefore, becoming very important.

"The very rapid economic expansion of many countries, the increasing levels of population and the greater awareness of environmental problems brought the realisation that land may not be as inexhaustible as we thought. The increasing loss of good agricultural land to urban sprawl, the rebirth of Malthusian thoughts in the shape of the Neo-Malthusian 'Dooms day' models, the famines in South East Asia and the Shelian Desert, the greater demand for natural environments and the more recent energy crisis, all have contributed to renewed emphasis on preserving agricultural land" (Meister, 1982:p1).

Accordingly, even in Sri Lanka, there is a need to control and regulate the unplanned urban sprawl and the agricultural land conversion. Uncontrolled urban sprawl, industrial locations and

their environmental effects such as effluent discharge into the irrigation rivers, wells, fertile soil and into the agricultural lands have to be considered in land use, environmental and industrial location planning. Pollution into the marine and fishing resources needs immediate attention in order to protect valuable marine resources and to improve the fishing industry.

As stated by the ADB (1990:p212),

“the policies for achieving the development objectives and increase in output, need to be analysed for their efficiency in the use of resource available to the sector; this is the primary pre-condition for sustainable development. Second, the pricing and tax policy specific to the sector (or the lack of such policies) has to be examined for the way policy takes account of environmental costs, the depletion of natural capital, and the need to provide resources for the protection of the environmental quality”

Even though the total population of the country is not going to double, it will reach 21 million by the year 2015, and 26 million in year 2025 (Allohoon, 1994). This implies an increase in the number of people in the working age group, which will require a greater amount of employment, and a change in the structure of the adult dependent population, which will imply more consumption. It is important to note the quote by Berugodas (1996) from the recent World Bank studies which stated that “Sri Lanka has been listed as being one of the low income- food deficit countries, ...A further study by the World bank stated that doubling of food production will be required [by Sri Lanka] by 2025 to satisfy the demand increase from population growth and rising incomes.”

However, some would argue, why should Sri Lanka need to depend only on the local agriculture production while some parts of the world produce excess food? But the question is, does/and will Sri Lanka be able to afford to import its food requirement now and in future? Otherwise, will all the excess food production be equally distributed among the countries (as has been known for a long time, this is unlikely to ever happen)? Thus, it is time to realise that Sri Lanka needs to preserve the agricultural sector to feed the increasing population, not only in the agricultural sector, but also in the non-agricultural sectors as well. Providing employment to the increasing working age group will also require a contribution from the agricultural sector.

It is, therefore, the issue of peri-urban land use conversion, seen within the wider concept of sustainable development and maintaining the stock of natural resources, that form the topic for this research.

## **1.2 OBJECTIVES OF THE STUDY**

The overall objective of this thesis is to obtain a greater understanding of what is happening to land in Sri Lanka and in particular what is happening at the peri-urban boundaries of the larger cities. The overriding question this thesis is dealing with is:

‘are the changes taking place, with regard to land conversion, simply a reflection of the changing profitability of agriculture and industry and therefore the outworking of the market system in terms of land allocation and in the best interest of the nation, or is what is taking place not in the best interest of the nation and that government intervention is needed in the market place to manage the allocation of land?’

To answer the question posed, the research first of all looks at role of land in agriculture and in the achievement of other social objectives. The issue of land degradation and conversion will be discussed in general. To concentrate on the urban land conversion issue, a case study area has been chosen and surveys have been conducted to obtain a clear picture of the issues and to understand better the factors underlying land conversion. On the basis of the findings, a conclusion will be drawn as to how land should be allocated (market or a system with government intervention). Recommendations will be made as to how any possible intervention could proceed.

In particular therefore, the detailed objectives of this research are to:

1. Describe the land use issues in Sri Lanka and describe the role of the Agricultural sector.
2. Describe in detail issue of peri-urban land conversion and focus on a case study area.
3. Analyse the factors underlying the conversion of land.
4. To draw a conclusion about the way land is currently allocated.
5. To make recommendations about future mechanisms to allocate land.



### **1.3 CHAPTER OUTLINES**

The thesis will in chapter one provide the context of sustainable development within which the issue of land conversion in the Sri Lankan economy needs to be seen, and state the objectives of this study.

In chapter two, the role of agriculture and the land resource base will be discussed. The discussion will focus on what is happening to the resource base in terms of a decrease in quantity as well as quality and how this affects agriculture. The agricultural sector will be discussed in terms of export earnings and import substitution, employment opportunities, raw material for many industries and food security. The impacts of changing economic policies on agriculture will also be discussed.

Chapter three will highlight the problems associated with the agricultural sector in Sri Lanka and in particular in the case study area of Gampaha District. The problems of land conversion, industrialisation and land degradation will be discussed. It will present the results of the various surveys conducted in the Gampaha District, which deal with environmental and degradation problems, conversion and landowners' attitudes.

Chapter four discusses various possible solutions to the problems identified in previous chapters.

In the final chapter various policy recommendations will be presented regarding the management of land within a sustainable development framework. Suggestions for further research will also be made.



## **CHAPTER TWO**

### **LAND RESOURCE AND AGRICULTURAL IMPACT IN SRI LANKA**

#### **2.1 INTRODUCTION**

The purpose of this chapter is to describe and analyse the land resources of Sri Lanka, and to discuss the role of agriculture and its impacts on the economy. Of special interest will be the role of land, and the changes in its availability. Hence, after the discussion of the role of agriculture, the focus of this thesis will turn to land use, and a survey used to study land use changes in a case study area will be discussed.

Sri Lanka is a small island nation with an increasing population. Land has been, and still is, of great importance to society for living space and for development. The continued degradation of land and the disappearance of agricultural land through conversion for urban and industrial uses, has raised the issue of protection of land for agricultural purposes. The past 19 years of free market policies have brought about many changes in the Sri Lankan economy but those changes have not overcome poverty. Today, it is realised that although the Sri Lankan government is now placing more emphasis on the industrial sector, and most resources are directed to this sector, the agricultural sector still has an important role to play in terms of food security, export earnings and import substitution, employment opportunities, and the provision of raw materials for many industries. For this reason, it is important to consider the supply and allocation of agricultural land and to critically consider its management and protection.

#### **2.2 LAND RESOURCES: DEGRADATION AND DISAPPEARANCE IN SRI LANKA**

Of the 186 countries listed in the World Almanac, Sri Lanka ranks 118<sup>th</sup> in land area, 47<sup>th</sup> in total population, and 19<sup>th</sup> in population density (World Almanac, 1994). Thus, it can be said that Sri Lanka is a moderately sized country by area, large in terms of population, and very high in population density. According to the Statistical Abstract 1995 (Department of Census and Statistics, 1995a), the total area of Sri Lanka is 65,609.8 sq. km (6,560,980 hectares), of which the total land area is 64,453.6 sq. km, with large inland water bodies making up 1,156.2 sq. km. When allowances are made for these inland water bodies, housing, towns and cities, barren and steep lands (i.e. lands over 30 degree slope) and forest cover, the land area available for agricultural production is only about 40 % of the total land area (Ministry of Agriculture Land

and Forestry, 1995). The Third Land Commission Report estimates this to be only about 2.5 million hectares. Therefore, there is no doubt that with a density of 268 persons per sq. km, land is a very scarce factor of production in Sri Lanka.

During the 1970s and early 1980s, increasing levels of population and unemployment, and the associate demands for housing, have resulted in an encroachment onto State lands at an unprecedented rate (Department of Survey General's, 1987). At the same time, the continuing incidence of shifting cultivation, which uses the forest and marginal lands, has significantly contributed to the process of land degradation. The rapid process of urbanisation and industrial expansion during the last two decades has also led to substantial conversion of agricultural land to non-agricultural uses, particularly along the urban fringes of the populous Southwest part of the country (Department of Survey General's, 1987). Under Sri Lanka's free market policies, land use is in a state of flux, responding to a variety of market forces and related socio-economic developments.

The decline of the agricultural land at the urban fringe, and deforestation, are a threat not only for sustainable agriculture, but for hydro-electric generation, irrigation reservoirs, and bio-diversity. Deforestation has also led to natural disasters (in particular flooding), soil erosion, soil fertility losses, soil siltation in dams and fields (which affects the irrigation capacity and the hydro-electric productivity of the dams), and changes in rainfall (drought and unpredictable weather conditions). Meteorological records prove that drought and irregular rainfall seem to have become a regular feature in the recent past. For example, rain-free periods often extend beyond 120 days in Sri Lanka (Dias, 1993).

An increasing population leads to a higher demand for land and urban development. In Sri Lanka this demand has been greater than the rate at which land has been made available for this purpose and *ad hoc* land use conversion has been taking place, often causing negative externalities (Ariyathilaka, 1993). According to Perera (1996), land converted for urban development purposes in the Greater Colombo Area was 7,199 hectares in 1956, 21,392 hectares in 1982, and 35,928 hectares in 1984. The percentage change of land was 9% over the 1981-1994 period.

Haphazard conversion of agricultural land for urban and industrial usage, without proper and systematic land use planning, has caused enormous damage to the land base of the country, and consequently to agriculture and the environment (see appendix II, plate 1).

## **2.3 IMPORTANCE OF THE AGRICULTURAL SECTOR IN SRI LANKA**

Sri Lanka has been identified as an agricultural country, and agriculture plays a vital role in the Sri Lankan economy, especially in terms of food security, export earnings and import substitution, employment opportunities, income generation, and raw material for many industries. The contribution of the agricultural sector to GDP was 23.3% in 1991. The percentage contribution of the agricultural sector to total exports was 31.51% for the same year (Institute of Policy Studies (IPS), 1991/92).

In spite of the fact that Sri Lanka has limited raw materials, technology, know-how and capital for manufacturing, the government, through free market economic policies, has encouraged local and foreign investments in manufacturing industries. This has resulted in the State and private investors having to import the inputs for their industries. Because of this import dependency, and despite the significant role of the textile and garment industries in total exports, Sri Lanka still depends heavily on the export of traditional plantation crops for its revenue. This dependency on the traditional agricultural sector is one of the main constraints for the development of the manufacturing sector.

The important aspects of the agricultural sector that will be discussed below are as follows:

- Food security,
- Export earnings & import substitution,
- Employment,
- Raw materials
- The inefficiency of the manufacturing sector (thus the need for the agricultural sector)

### **2.3.1 FOOD SECURITY**

Agriculture provides the livelihood and survival of the people, not only for those who live in the rural areas, but also for those who live outside the rural area. Cheap and easy availability of local food throughout the country is one of the important factors in food security (Ratnayake, 1995). Table 2.1 shows the contribution of agricultural sector to various food types.

**TABLE 2.1 CONTRIBUTION OF AGRICULTURAL SECTOR FOR FOOD SECURITY IN SRI LANKA, 1993**

<b>Commodity</b>	<b>contribution to calorie intake per day (%)</b>	<b>contribution to protein intake per day (Gms)</b>	<b>contribution to fat intake per day (%)</b>
Rice	37.63	27.87	0.97
Other field crops	9.67	17.37	0.05
Live Stock & Coconut (meet, eggs, fish, milk, oil & fats)	22.58	27.77	88.13
Total contribution to food security %	69.88 <b>(70%)</b>	73.01 <b>(73%)</b>	89.17% <b>(89%)</b>

Source: Calculated from Department of Census and Statistics, 1993.

As shown in Table 2.1, 70 % of the calorie intake, 73 % of the daily protein intake and 89 % of the daily fat intake are received from local agricultural products. Furthermore, domestic agricultural production reduces the expenses that would be incurred from having to import food items. Overall, the total contribution to food security is high, indicating its importance to Sri Lanka. It should be noted that a large proportion of the population are peasants and rely heavily on domestic resources for security. Most people are rural based and they, along with many urban based people, cannot afford the price of imports. This suggests that a large proportion of the population of Sri Lanka relies on staple products which are produced locally. This decreases the cost of food imports, and also maintains employment in agriculture and related industries, and contributes to the income of people in the agriculture sector.

### **2.3.2 SOURCE OF EXPORT EARNINGS AND IMPORT SUBSTITUTION**

The agricultural sector's contribution to total exports was 31.5% in 1991 (Institute of Policy Studies, 1991/92). Before the open economic system was introduced to the country, Sri Lanka had been practising an import substitution policy. Since the implementation of the economic reforms in 1977, export promotion policies (i.e. export-led policies) have also played a major role toward the growth of export sectors. Thus the International Monetary Fund (IMF)'s and the World Bank's structural adjustment program played a key role in the various policy changes in the post economic reform period.

Agricultural products were the main export items in the pre-reform period, including tea, rubber and coconut, and minor export crops such as cinnamon, nutmeg, mace, pepper, cardamoms,

cocoa, coffee, cloves, papain, cashew nuts, aeronaut, oil seeds, sesame seeds, and others like tobacco and betel leaves. After 1977, with new economic policies, some new, non-traditional, agro-export crops have become export products. These include items such as vegetables, fruits (dried and fresh), cut flowers and foliage, and aquatic fish.

The percentage contribution of traditional export crops (tea, rubber and coconut) to total exports was 57% during 1978-82, and it declined to 29.3% in the period of 1988-1992 (Institute of Policy Studies, 1994). Although the contribution of the agricultural sector to total exports dropped due to domination of the garment manufacturing sector, traditional export crops are still a significant component of export earnings. For example, foreign earnings in 1991, from the garment sector were SDR 225 million, while tea exports earned SDR 316 million in 1991 (even with the depressed international prices of tea). Rubber and coconut products earned an additional SDR 93 million for the same year. The production and export values of these crops have been increasing throughout the period 1980-94, as shown in Table 2.2.

Besides the traditional export crops, other minor agricultural export crops contributed SDR 56 million to export earnings in 1991. Export earnings from fish increased from SDR 15.9 million in 1991 to SDR 21.8 million in 1992, i.e. a 37.3% increase (Calculated from IPS, 1994).

The demand for new value-added agricultural products, such as tea bags, instant tea, fruit juice etc., has increased in recent years. Production of these value-added products has also led to higher demand in the level of skills employed in this industries.

**TABLE 2.2 PRODUCTION AND EXPORT VALUES OF PLANTATION CROPS (TEA, RUBBER & COCONUT) IN SRI LANKA, 1980-1994 (Rs)**

Year	Tea		Rubber		Coconut	
	Production kg (m)	Export Value Rs. (m)	Production Kg (m)	Export Value Rs. (m)	Production. Kg (m)	Export Value Rs (m)
1980	191.4	6,170.1	133.2	2,590.4	2,026	-
1984	208.0	15,764.3	141.9	3,301.3	1,942	28,470
1988	26.9	12,298.7	122.4	3,706.6	1,936	70,470
1992	178.9	14,893.4	106.1	2,959.3	2,296	216,140
1994	242.2	20,963.7	105.0	3,582.2	2,610	220,942

Source: Department of Census and Statistics (1980-95).

In addition to export earnings, the local agricultural sector assists in the reduction of costs on imports. For the last two decades, customs records show an increase of import expenses on food items, even for foods which could have been cultivated in Sri Lanka. For example, in 1983 only 6.84 % of the total fish consumption was imported, but this increased to 24.64% in 1993. In 1977, 196.7 million Rupees were spent on imported sugar. This increased by 86.93% to Rs. 4952.4 million in 1992. Flour imports which cost only Rs. 104.7 million in 1977 increased to Rs. 1387.0 million in 1990 (Rupesana and Chandrasri, 1996).

Furthermore, these imported goods have become costly as prices fluctuate, and some of the commodities are only available in the big cities where rural people have little access. Table 2.3 shows the price difference for some locally produced and imported food items.

**TABLE 2.3 DIFFERENCE IN PRICES BETWEEN SOME IMPORTED AND LOCAL FOOD ITEMS**

Items	Prices for imported items (Rs)	Prices for local items (Rs)
Sugar (kg)	32.00	29.00
Rice (kg)	32.00	26.00
Butter (500gm)	74.00	48.00
Fish (kg)	236.02	169.16
Cooking Oil (500ml)	169.00	28.00

Source: Department of Census and Statistics (1995a) and Field Survey Data (1996).

It can be said, as seen from the data in Table 2.3, that importing food items has a low comparative advantage in Sri Lanka. Decreasing local production of agricultural commodities over the last two decades, has required an increase in imports. Table 2.4 shows the decline of local food production and the increase of food imports in Sri Lanka.

**TABLE 2.4 LOCAL PRODUCTION AND IMPORTS OF SOME SELECTED FOOD ITEMS IN SRI LANKA**

Items	1983 production (%)	1983 imports (%)	1993 production (%)	1993 imports (%)
Rice	92.7	7.3	88.73	11.27
Sugar	91.86	8.14	84.61	15.39
Dry salted fish	60.65	39.35	19.32	80.68
Onion	92.5	7.5	68.89	31.11
Cope and Dhal	64.68	35.32	29.88	70.12

Source: Calculated from Department of Census and Statistics (1983) and (1993).

### 2.3.3 AGRICULTURE FOR EMPLOYMENT OPPORTUNITIES

According to the Consumer Finance and Socio-Economic survey conducted by the Central Bank of Sri Lanka, 42.6 % and 41.4 % of the total number of people employed were in the agricultural sector in 1988 & 1991 respectively (Central Bank of Sri Lanka, 1988-1991). The sub-sector of paddy (i.e. rice cultivation) absorbed much of the owner operators, paid employees and unpaid family workers. There were about 1,075,000 employees in this sector in 1990 (calculated from Census of Agriculture Report 1990).

The Census Report 1981 points out that the highest rate of employment of about 91 % to 96 % was recorded in the predominantly agricultural districts such as Mullaitivu, Vavuniya, Anuradhapura, Monegralla, Nuwera Eliya, and Mannar. The medium employment rate of 81 % to 90 % was recorded in the remaining agricultural districts such as Ampara, Polonnoruwa, Puttalam, Jaffna, Trincomallee, Batticolla, Matale, Badulla, Ratnapura, Kandy and Kurunagalla. High unemployment rates of 20% to 24 % (higher than the national average of 22%) are observed in the capital city of Colombo and the adjoining districts Gampaha and Kalutara. These districts have also been experiencing high rates of urbanisation and industrialisation and fall within the Colombo Metropolitan Region (CMR).

As Adelman points out in his paper, "Development Strategy and Industrial Policy-Issues for Sri Lanka", the employment elasticity of the industrial sector in Sri Lanka is typically lower than that of the agriculture and service sectors (quoted in Edwards, 1987). For the last two decades, employment creation in the manufacturing sector has been only 2% (Edwards, 1987). Under



these circumstances the agriculture and service sectors have had to absorb much of the increase in the labour force.

On the other hand, since the rapid changes in the economy, most of the young labourers who migrated from the agricultural sector to urban areas were unable to find jobs in these areas. This brought about illegal and informal employment development, development of slums and shanties, unauthorised building construction in cities (especially in the city of Colombo and Gampaha), and other related problems (Economic Review, 1996). Agricultural labour migration also caused high labour wages and seasonal labour shortages in the agricultural sector. Interviews with farmers revealed that nearly 70% of the cost of production is for labour. Therefore, when the urban sector is unable to absorb all the migrants it is a loss for the both rural and urban areas; that is, high labour wages and seasonal labour shortages in agricultural sector, and socio-economic problems (related to unemployment, crime, poverty) in the urban areas.

#### **2.3.4 AGRICULTURE AS A SUPPLIER OF RAW MATERIALS**

There is a high export and local demand for value-added agricultural products. Rubber products such as rubber thread, and un-hardened rubber, which consists of a wide range of household, general and industrial materials including automotive parts, rubber mats, sealing rings, rubber bands etc., accounted for 22 % of total industrial exports. These products earned SDR 54 million in 1992. This is 81.3 % higher than in 1982 (Export Development Board, 1982-1992 data base). Locally, Kelaniya Tyre Co-operation, Ceylon Leather Products Co-operation, State Leather Products and hundreds of private leather and rubber industries all use Sri Lankan rubber.

Export earnings from tea products such as tea bags, instant tea and green tea made up 33.62 % of the total tea exports in the 1989-90 period and this increased to 39.54 % in 1991 (IPS, 1994). Value-added coconut products are another important agricultural export commodity. In particular, export earnings from desiccated coconut increased by 40.8 % from 1991 to 1992, and earned Rs. 20 billion during that period (Department of Census and Statistics, 1991-1992). Coconut oil export increased from SDR 0.7 million to SDR 1.7 million for the same period. A substantial increase of 9.1 fold has been recorded for copra exports from SDR 3.3 million to SDR 38.3 million during the same period (IPS, 1994).



Coconut is an important small scale industry in Sri Lanka. It is a major contributor of employment, creating employment opportunities especially in the rural areas, and producing many products for local and export markets. High quality robe, coir mattresses, carpets, cricket mats, toys, spoons, trays, carved items, acetic acid and coconut toddy are some of the coconut products. According to the Export Development Board Reports, Japan, Germany, Pakistan, Bangladesh, South Korea, South Africa, and Commonwealth of Independent States (CISs) are the main importers of Sri Lankan coconut products.

Besides the above agro-based industries, food & beverages, tobacco and sugar industries, as well as the milk and oils & fat industries receive almost all their raw material from the local agricultural sector. The forest estate is also important as a supplier of most raw material for many of the existing forest based industries, classified into saw-milling (more than 4000 mills throughout the nation), furniture (more than 700 in number), preservations (105 firms), plywood (12 firms), parquetry (1), particle board (1), paper (2 factories), and matches (2 factories). Over 50 % of the timber and 80% of the fuel wood demand is currently met by supplies from the cash crop plantation sector and homestead gardens (National Policy Framework, Forestry Sub-Sector, 1995, p.59). The National Policy Framework (1995) further points out that the major industries such as tea, brick & tile manufacture, coconut, rubber and tobacco industries consume over 800,000 metric tons of fuel wood annually. Furthermore, 90% of the Sri Lankan households use bio-mass as their cooking fuel.

The palmyrah tree is one of the important palm trees for nutritional food and income generation. Palmyrah-based industries have declined since the reforms of 1977 and today Palmyrah products are imported rather than produced locally. An example in case is pectin, the import cost of which in 1992 was Rs. 5,753,855 (Rupasena and Chandrasri 1996). This product could have been produced locally. By decreasing palmyrah plantation, the country also misses out on by-products from these plantations, such as medical products, food & beverages, and fruit.

### **2.3.5 FREE MARKET POLICIES AND MANUFACTURING SECTOR**

“When the economy was closed and the imports were restricted, Sri Lanka achieved a high level of production in agriculture; specially in the field crops like chillies, red onions, dhal, cope and potatoes; which were well grown and import expenses were little” (Abeyagunawardena & Kudaligama, 1989, p.100).

The changes in economic policies to facilitate the free market economy, such as removal of trade restrictions, removal of price controls, freeing of travel and exchange restrictions, replacement of the fixed dual rate of exchange with a single managed floating rate of exchange, massive infrastructure development, incentive package for export oriented foreign investments, Export Development Board (EDB), Board of Investment (BOI), Free Trade Zones (FTZs), and parliamentary guarantee of security for foreign investments, imposed many negative impacts on the Sri Lankan economy (Indiraratna, 1996, p.6).

Inflation increased more than the Asian and Newly Industrialised Countries (NICs) average standards. It was 12.2 % in 1992, whereas NICs' average was 4.5 % in the same year (Central Bank of Sri Lanka 1992 and IMF, various). The percentage of budget deficit to GDP, increased from -7.4% in 1992 to -8.1% in 1993. Trade deficit in the Balance of Payments increased from SDR -685 million in 1992 to SDR -972 million in 1993. External Debts to GDP rose five times from 17.9% in 1976 to 86.4% in 1993 (Central Bank of Sri Lanka, 1992).

The Colombo Consumer Price Index (CCPI) for food increased from 203.3 in 1977 to 1654.4 in 1994. The annual rate of increase of CCPI increased from 1.2 in 1977 to 12.2 in 1991 (Statistical Abstract, 1995). The cost of living also increased rapidly. The annual rate of percentage change of cost of living was 1.2 % in 1977, increasing to 12.1 % in 1978, 14 % in 1987 and 21.5 % in 1990. Table 2.5 shows the average annual increase of CCPI for major groups of commodities and the annual rate of change.

**TABLE 2.5 ANNUAL AVERAGES OF COLOMBO CONSUMER PRICE INDEX BY MAJOR GROUPS AND ANNUAL RATE OF CHANGES, 1977-1994 (Base 1952=100)**

Year	All items	Food	Clothing	Fuel and Light	Annual rate of change %
	100%	62%	9%	4%	
1977	203.2	203.3	223.8	257.5	1.2
1978	227.8	237.5	226.2	262.1	12.1
1980	318.2	339.7	239.9	563.9	26.1
1983	474.2	506.3	291.1	1087.6	14.0
1988	744.1	802.0	419.8	1535.1	14.0
1990	1008.6	1090.9	610.2	1934.2	21.5
1994	1527.4	1654.1	795.7	3131.6	8.4

Source: Department of Census and Statistics (1995a).

There has been a decline in the rate of unemployment from 23% in 1977 to 11.7% in 1982, but this rose again to 14% in 1993 (Census and Statistics Reports, 1977-1994). Even though the manufacturing sector absorbed part of the unemployed, some of the manufacturing factories that were established under the new policies were already closed in early 1990, mainly due to inefficiency in this sector. This caused an increase in unemployment again (Indraratna, 1996).

Import expenditure on intermediate and investment goods rose significantly. According to Central Bank Annual Reports (1991-1993), during the period 1991 to 1993 nearly 70 % of import expenses were on intermediate and investment goods, especially textile, machinery and equipment imports for the garment industry. Table 2.6 shows the share of import expenses on intermediate and investment goods as a proportion of total imports.

**TABLE 2.6 IMPORT EXPENSES IN SRI LANKA, 1991-1993 (SDR million)**

<b>Commodities</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
1.Consumer goods	572	615	897
2.Intermediate goods	1135	1242	1304
3.Investment goods	526	609	696
4.Total imports	2233	2 466	2897
percentage of 2 & 3 to total imports	74.38%	75.06%	69.03

Source: Data obtained from Central Bank Annual Reports (1991, 1992 & 1993).

The Institute of Policy Studies (1994:p48), noted that “even though the export earnings of the manufacturing sector show an increase, there has been an over-emphasis on these sectors and the import dependency of this export industry is often overlooked, while the importance of the agricultural sector has been underestimated.”

Even though the manufacturing sector has received aid in terms of government assistance, its contribution to the Sri Lankan economy has not increased dramatically. Some of the reasons for this effect are as follows:

- Sri Lanka has not been successful in obtaining high value quotas from the world market, especially from the Western European and North American countries for its

industrial goods (especially for garments). This is possibly due to lack of professionalism and expertise in quota negotiations (IPS, 1995).

- Lack of skills and know-how in the manufacturing sector, has resulted in poor quality control. For example, in the gem industry the stone mined in Sri Lanka needs to be cut overseas, because of the low skill level of workers. For the same reason, some of the foreign investors in the electronic sector prefer to invest either fully, or in joint ventures, in India, which is far more advanced in this area (IPS, 1995).
- Lack of backward linkages with small industries. Ancillary items for the garment industry such as buttons, hangers, zips etc., have to be imported, due to lack of backward linkages.
- Lack of modern technology in the heavy industries. For example, despite Sri Lanka being an island in the Indian Ocean with massive fish resources, Sri Lanka still spends large sums on fish imports. According to the Department of Census and Statistics (1993), 24.64 % of the total consumption of fish has been imported. Even though there is a possibility of achieving self-sufficiency and increasing export markets in the fishing industry, the absence of modern technology is a major constraint for the development of this industry. This applies to many other industries as well.
- Weak institutional infrastructure and poor local savings. The percentage of local savings to GDP was only 16% in 1994, while the desired percentage was 32-35% (IPS, 1995).
- Development of illegal transactions in the export sector and black markets, for example, gem and jewellery exports (IPS, 1995).
- Even the Public Enterprise Reform Commission (PERC), which is the agency responsible for implementing Sri Lanka's privatisation programmes, faces budget constraints, lack of qualified staff and know-how problems and requires professional advisors to assist in carrying out the programme (*The Island*, 1995).

Due to all the above constraints, the Sri Lankan manufacturing sector has not been able to compete successfully in the competitive international markets. This problem is stated by the Department of Survey General's (1987:p102) as follows:

“Recent development strategies have attempted to mobilise private enterprises to further economic development. A challenge which the private manufacture has to meet is that of operating in a liberalised economy, where the producer needs to compete with imported items in the local market. As this restricts the local market, the most appropriate approach would be for the private sector manufacturer to gear himself to an export market. However, problems such as lack of sufficient research back-up, inadequate quality of products, absence of technology transfer, lack of packing know-how, raw materials, and in general the inadequacy of institutional support have hindered the development of private sector industries. In order to compete with high technology productivity advantages, it may be inevitable to adopt modern technologies even at the expenses of labour incentives. Provision of more efficient facilities and services will be required to minimise or eliminate difficulties encountered by private entrepreneurs. The inadequate subcontracting facilities available from large scale industries hinders the development of small and medium industries in Sri Lanka.”

The Report concludes by stating that “the public sector has a role to play in Sri Lanka as the private sector is not yet strong enough to make the large basic industries” (Department of Survey General's, 1987:p104). However, incompetence in the public sector adds more problems to industrial sector. This was clearly revealed in the World Bank Mission study, which studied the Sri Lankan economy in 1978 and advocated the closure or privatisation of the corporations running at a loss (Department of Survey General's, 1987).

Apart from the above constraints and problems, the income distribution among the population under the new policies is highly skewed. The neglect of the agricultural sector and equity policies are the main reasons for this problem (IPS, 1995). The Central Bank of Sri Lanka suggests in its annual report that “instead of licensing, variable tariff systems would be more appropriate to provide the required protection to farmers” (Central Bank of Sri Lanka, 1996). Giving protection to the farmers could be an ideal policy to overcome the unequal income distribution, as nearly 70 % of the population of the country still live in the agricultural sector and 41 % of the employees depend on this sector. Overall, it can be said that although there has

been some export growth performance in industrial sector, this has been accompanied by a high rate of inflation, a large fiscal deficit, together with high unemployment rates. Furthermore, high import content of the industries places a constraint on the industrial sector. These difficulties impose important policy challenges to Sri Lanka.

## 2.4 CONCLUSION

Due to various reasons, agricultural land in Sri Lanka has been rapidly degrading and disappearing. Soil erosion, silting, flooding and soil fertility decline due to deforestation are some of the main reasons for land degradation. Plantation agriculture in the hill country and paddy cultivation in other areas are especially affected by these activities. The situation of irrigation dams also reduces the capacity of dams for both irrigation and generation of hydro-power. Reduction in the irrigation capacity further reduces the amount of land available for agriculture.

Rapid urban and industrial expansion under free market policies has also contributed to agricultural land degradation. As there are many incentives given by the free market policies for private investments, a significant number of local and foreign investments have been undertaken in commercial and industrial activities, especially in the major cities. When the urban centres reach full capacity, the expansion of the city inevitably stretches into the peripheral zones. Besides the commercial and industrial establishments, there are associated developments in urban and rural housing schemes, infrastructure developments to facilitate local and foreign investments, large scale regional developments, and establishment of BOI and FTZs, all of which require more land.

As the demand for land increases rapidly, many *ad hoc* land use changes take place. This often causes negative externalities. Agricultural land conversion for non-agricultural usage, deforestation and related problems, environmental pollution, and unplanned urban expansion and related problems are some of the negative externalities. The shift to free market economic policies has emphasised the development of an export manufacturing sector. Up until now this has done little for poverty alleviation, the balance of payments deficits, and rural unemployment problems. The agricultural sector still maintains a crucial role in terms of employment (especially in the rural area), food security, export earnings and import substitution, and income generation. It is for this reason that land management is of utmost importance, so that Sri Lanka does not lose, permanently and irreversibly, its agricultural land resource. It is on this issue of land management (planning and allocation) that this thesis will focus.



# **CHAPTER THREE**

## **FACTORS BEHIND AGRICULTURAL LAND CONVERSION A CASE STUDY IN GAMPAHA DISTRICT**

### **3.1 INTRODUCTION**

This chapter presents a case study on land conversion in the district of Gampaha, suburban centre to the capital city of Colombo. It sets out the facts behind land use conversion and its effects on agriculture.

The increase in government investment projects has brought development activity into Gampaha district, including the establishment of Board of Investment (BOI), Free Trade Zones (FTZs) and many other infrastructure developments. These infrastructure developments, coupled with the freeing up of export taxes and other incentives, have brought both domestic and foreign investment into Gampaha district. This has created significant employment opportunities, and consequently, Gampaha has been receiving a high level of immigration for the last two decades from other regions of Sri Lanka.

A larger population, together with urban and industrial development, has increased demand for more land for non-agricultural purposes. Under the free market policies encouraged by the government, farmers face many difficulties in cultivation, as well as in marketing. Under these conditions, private property developers, who have been encouraged by the new economic environment, exercise significant influence on the process of land conversion. They choose the land, manipulate the price (entice the farmers through attractive prices), and ultimately influx the broad land use of an area with little concern for amenities or other necessary infrastructure developments. These unplanned changes have a serious impact on social, physical, economic and environmental factors in the district.

In this chapter, section 3.2 briefly presents an overview of the district of Gampaha. Section 3.3 explains the reasons for the selection of this district as a case study. Section 3.4 provides the methodology for the field study. Section 3.5 introduces the topic of suburban growth in Sri Lanka and the case study area. The problems faced by the farmers under the new policy changes and the factors behind agricultural land conversion are discussed in section 3.6 This section

further reveals the consequences of urbanisation and industrialisation on agricultural land use and the environment. The final section provides a conclusion.

### **3.2 GAMPAHA DISTRICT: AN OVERVIEW**

Gampaha district is situated adjacent to the north of the Sri Lankan capital of Colombo. The district is essentially square in configuration, measuring 40 km from north to south and 35 km from east to west. The total land area is 1,398.7 sq. km. The Kelani river constitutes the southern boundary of the district, while the Maha river forms the boundary with the adjacent Kegalle district. To the west, Gampaha borders on the Indian Ocean. Map 3.1 shows the location of Gampaha district. The district is flat except for a hilly area situated in the eastern part of the district that borders with Kegalle district. Moving westward, land elevation steadily decreases, with lagoons and marsh land in the vicinity of the coast.

Gampaha falls within the wet zone, with annual rainfall between 2,000 and 2,600 mm. Rainfall occurs primarily during the two yearly monsoons from May to September (the South-west monsoon, which brings most rain, thus the season and the cultivation are called 'Maha season' i.e. Big season) and November to February (the North-east monsoon, called 'Yala season' i.e. Small season). The mean temperature in the district is 23-33 degrees Celsius (Department of Survey General's, 1987).

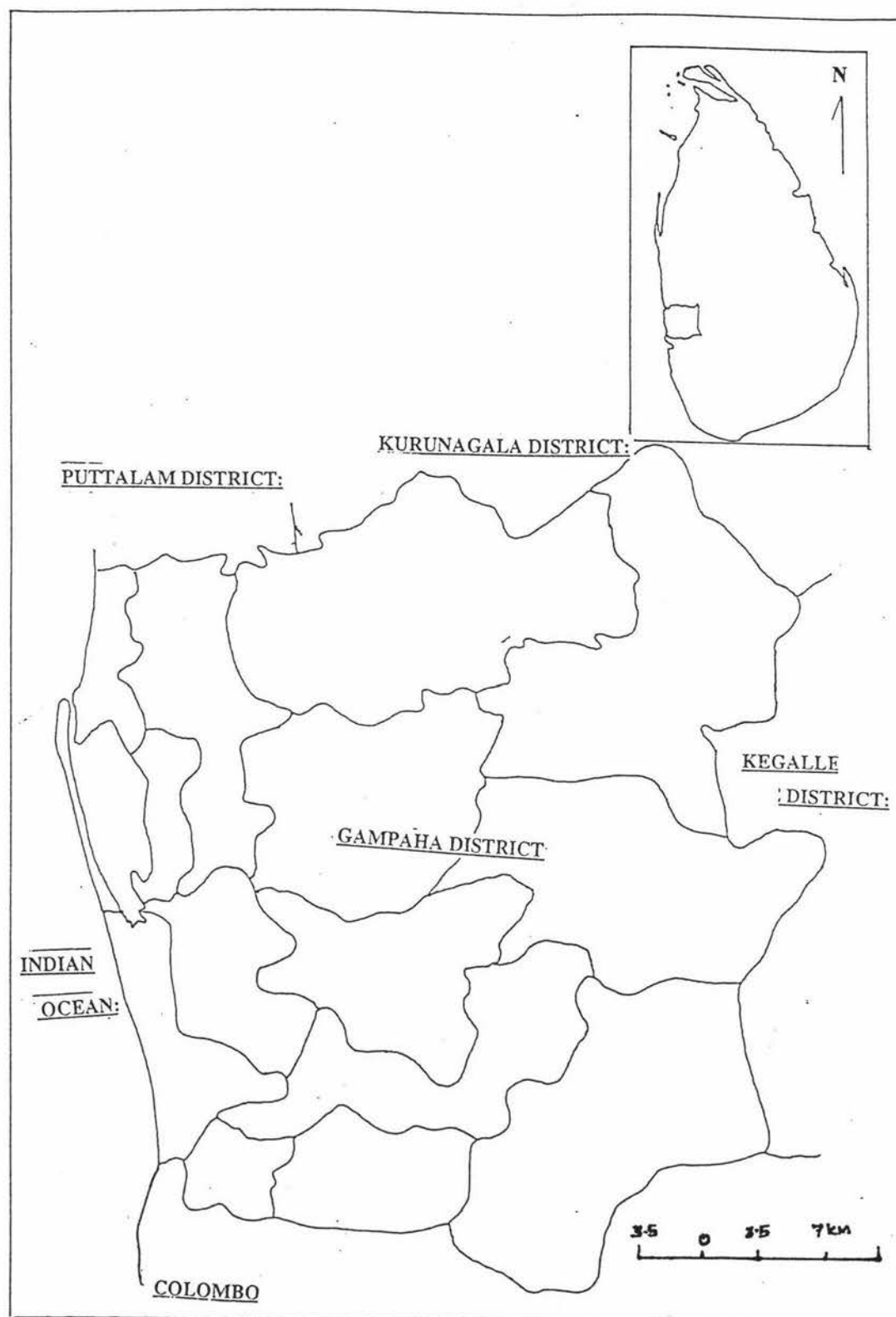
Sri Lanka is divided into three agro-ecological zones: Wet, Intermediate and Dry zones. These are further sub-divided into six zones: Ultra-Wet, Wet, Semi-Wet, Semi-Dry, Dry and Very Dry. Gampaha district lies entirely within the Wet zone, and most of the district belongs to the Wet Lowland Laterite region (WL<sub>2</sub> classification), while the lagoon and the western portion of the district fall into the Wet Lowland region (WL<sub>4</sub> classification) (Department of Surveyor General's, 1987). The soil in Gampaha district has been classified as follows:

- Regosols: distributed in the coastal area (sand dune, etc.)
- Alluvial soil: distributed in lowlands along the rivers and streams
- Red-yellow podzolic soil: widely distributed throughout the district with the exception of the central area and coastal area in the west (JICA, 1987).

Besides the Kelani and Maha rivers, the Attanagalla river flows through the centre of the district. The catchment area of these three rivers in Gampaha district are; Kelani river, 402 sq. km., Maha river, 302 sq. km. and Attanagalla river, 688 sq. km. The land along the rivers and their



MAP 3.1 LOCATION OF GAMPAHA DISTRICT



tributaries consists mainly of paddy fields. In addition to irrigation uses, the rivers supply water to Gampaha and Colombo districts. The Attanagalla river supplies 600,000 gallon/day to Gampaha district, while supply from the Kelani river to Gampaha district is 113,700 gallon/day (JICA, 1987).

Underground water is also an important source of water in Gampaha district, for both domestic use and cultivation purposes. The rural areas which have not been provided with pipe-borne water use underground water for drinking and other domestic purposes. Negambo lagoon, with 1600 hectares of mangrove swamps, is another important natural resource of the district. Nearly 3000 families are employed in the fishing industry in this lagoon. Around 15,000 people depend on fishing in this area (Central Environmental Authority, 1992). This lagoon is also a natural reservoir for much indigenous and migrant birdlife. The fertile soil, and undulating terrain and flat land, are conducive for both residential and agricultural activities. The administration of Gampaha district is carried out by thirteen Assistant Government Agent (AGA) Divisions, eleven Regional Councils (RCs 'Peradesiya Sabha'), six Urban Councils (UCs), and one Municipal Council (MC) (Department of Census and Statistics, 1985).

### **3.3 SELECTION OF GAMPAHA DISTRICT FOR CASE STUDY**

Reasons for the selection of this district for the case study are as follows:

Proximity to the Capital City of Colombo and the Colombo Metropolitan Region (CMR)

- The policy changes in 1977 resulted in an incessant increase in the demand for urban land. The rapid expansion of Colombo city led to the spreading of the activities to suburbs. As Gampaha is the immediate neighbour and falls within the CMR, much of the expansion directly affected the agricultural land in Gampaha district.

High Degree of Public Investment and Infrastructure Development

- A significant amount of capital investment has been directed to Gampaha district during the last two decades. The establishment of the Greater Colombo Economic Commission (GCEC, now called Board of Investment (BOI)), the establishment of Export Promoting Zones (EPZs) in the Katunayaka and Biyagama areas, the Integrated Rural Development Programme, two major housing schemes, and other infrastructure developments have contributed greatly to land use changes in the district.

### High Population Migration to Gampaha District

- Gampaha district was separated from Colombo to form a new district in 1981. The high investment in this district has resulted in high inward migration. Gampaha has been the highest immigration district since 1981 and is the second highest in population (Department of Census and Statistics, 1981). This population increase also caused an increase in the demand for land for housing.

### Future Development Proposals

- The on-going Muthurajawella Project, the Rural Development Project at Divilupitiya division, the Colombo-Katunayaka Expressway, along with other future development proposals, have attracted property developers and other investors into the area. These proposals have led to an increase in the land value in Gampaha and encouraged land conversion for non-agricultural activities without a proper plan.

### Importance as an agricultural region

- Gampaha district is an important agricultural area, supplying food and agricultural products to the increasing population in and around the capital. Land conversion is impacting negatively on agriculture, and limiting the ability of the agricultural sector in the district to be productive.

## 3.4 METHODOLOGY

The following two questionnaire surveys, and one survey were made to get the relevant information for this study.

- The first questionnaire survey was with 'former farmers' who had already sold their lands for non-agricultural uses. 9 out of 13 AGA Divisions were chosen, based on the degree of land conversion. 135 former farmers (15 farmers from each division) from Kelaniya, Negambo, Biyagama, Wattala, Katana, Mahara, Ja-Ela and Minuwangoda were interviewed to find the reasons, which made them to sell their lands.

- The second questionnaire survey was made with 195 present farmers from all 13 AGA Divisions, to identify the problems, that farmers have been facing under the free market economy.
- A survey was carried out to identify the present land use patterns in Gampaha district. To choose the samples, the district was divided into 390 equal grids. Each grid was recorded with its present and last use.

Besides the surveys, remote sensing data from the UDA, and Aerial Photographs and Land Use Maps (1981-1992) were also used to identify the land use changes in Gampaha District.

Secondary data, both published and unpublished, were collected from the relevant departments, including:

Department of Census and Statistics.

Central bank of Sri Lanka.

Peoples Bank.

Urban Development Authority.

National Housing and Development Authority.

Central Environmental Authority.

Board of Investment.

Sri Lanka Land Development and Reclamation Authority.

Survey General's Department.

Land Use Planning Division.

Department of Irrigation and Engineering, Gampaha.

Department of Land Registration.

Government Agent's Office of Gampaha (kachcheri).

Department of Agriculture-Gampaha.

Department of Town and Country Planning, University of Moratuwa.

Demographic Training and Research Unit, University of Colombo.

Population Division, Ministry of Health and Women Affairs.

Municipal, Urban and Town Councils in Gampaha.

Regional Secretaries in Gampaha.

Village Headmen's offices (Grama Niladhari).

MOH's office, Negambo.

PHIs, offices, Gampaha.

Further, consultations were made with the relevant officers, including Land Use Planning Officer, Planning Officers, Assistant Director for Agriculture, Environmental Planning Officers, BOI officers, PHIs, Village Headmen, Irrigation Engineer, Regional Secretaries, MOH, and scientists (especially in the universities) who work in the field of land use planning, to find out their views regarding the issue.

Some of the areas affected by urban and industrial pollution were photographed. The agricultural lands which were converted to non-agricultural uses or affected and abandoned due to urban and industrial pollution were also photographed to provide further evidence for the study.

### **3.5 SUB URBAN GROWTH IN SRI LANKA**

The modern towns came into being in Sri Lanka in the 19th century under the British rule. At the time of the first census in 1871 there were 40 towns with a total population of 260,300, amounting to 8.0% of the total population (Bulankulame, 1993). Over the years the share of urban population grew to reach 21.7% in 1981 and the estimated share of urban population was 24% and 35% in 1991 and 1995 respectively (Economic Review, 1996).

The total population living in towns grew phenomenally up to 1953, it increased at a higher rate than the national population growth, running up to 4.2% in 1971. This was caused by an influx of the rural population into towns. However, the trend changed during the 1970s. It has reversed, staying at 1.2% at the time of 1981 census, indicating a lower growth rate in towns than the national population growth of 1.7%. This was achieved in the context of declining general and child mortality rates in the country (Department of Census and Statistics, 1981).

Fast urban population growth was stimulated by the declaration of 89 Rural Councils between 1963-1971 as 'Town Councils', further increased to 135 by 1981. Later, with the decentralisation programmes, all 135 towns were absorbed by the 'Regional Councils' ('Prasadiya Saba') in 1987. The growth of medium towns (i.e., towns with a population of 50,000 to 100,000) into the status of large towns is unlikely within this century. In contrast to the big towns, the medium towns are growing at a higher rate than the national urban average

(Mendis, 1983). Accordingly, the national urban hierarchy in Sri Lanka will continue to be a dispersed network of small and medium towns. This dispersed network does not reflect an intensive development in terms of land use, but an extensive pattern. The net result of this development is the growth of dispersed urban centres creating new suburban areas in Sri Lanka (Ariyathilaka, 1993).

In addition to the medium towns, the government which came into power in 1977 has placed higher stress on regional development and concurrent development of urban areas. The major landmarks under this programme are:

1. The Rural Awakening Programme (Gum Udawa). Under this 41 rural centres were developed in to small towns between 1991-1993.
2. One hundred, One million housing programmes by the UDA and NHDA.
3. Mahawelli Settlement Programme, under which nearly one million people in the dry zone have been settled in the Mahawelli area, with the necessary infrastructure.
4. Development of the Southern province.
5. Regional Urban and Suburban development programme prepared by the UDA for Trincomalee District.
6. Promotion of industrial development by way of establishing Free-Trade Zones and Industrial Estates.

Under this programme the Free Trade Zones at Katunayaka, Biyagama and Kogalla, and the industrial estates at Jaffna, Puttalam, Kurunagalla, Gampaha, Kalutara and Kandy districts were established.

Besides the above programmes, under the provision of the Urban Development Authority Law No: 41 of 1978, several areas outside the Municipalities and Urban Councils have also been declared '*urban development areas*' by the minister in charge of urban development (Ariyathilaka, 1993). This further helps urban expansion in areas even outside the real Municipal and Urban Councils' administrative boundaries. In a similar manner, the 'Tourism Development Act'(1984), has contributed to urban development in the areas designated under the act; Negambo, Kandy, Kathiragama, Jaffna, Polonnurawa, Anuradhapura, Nuwera Eliya, Hatton, and others.

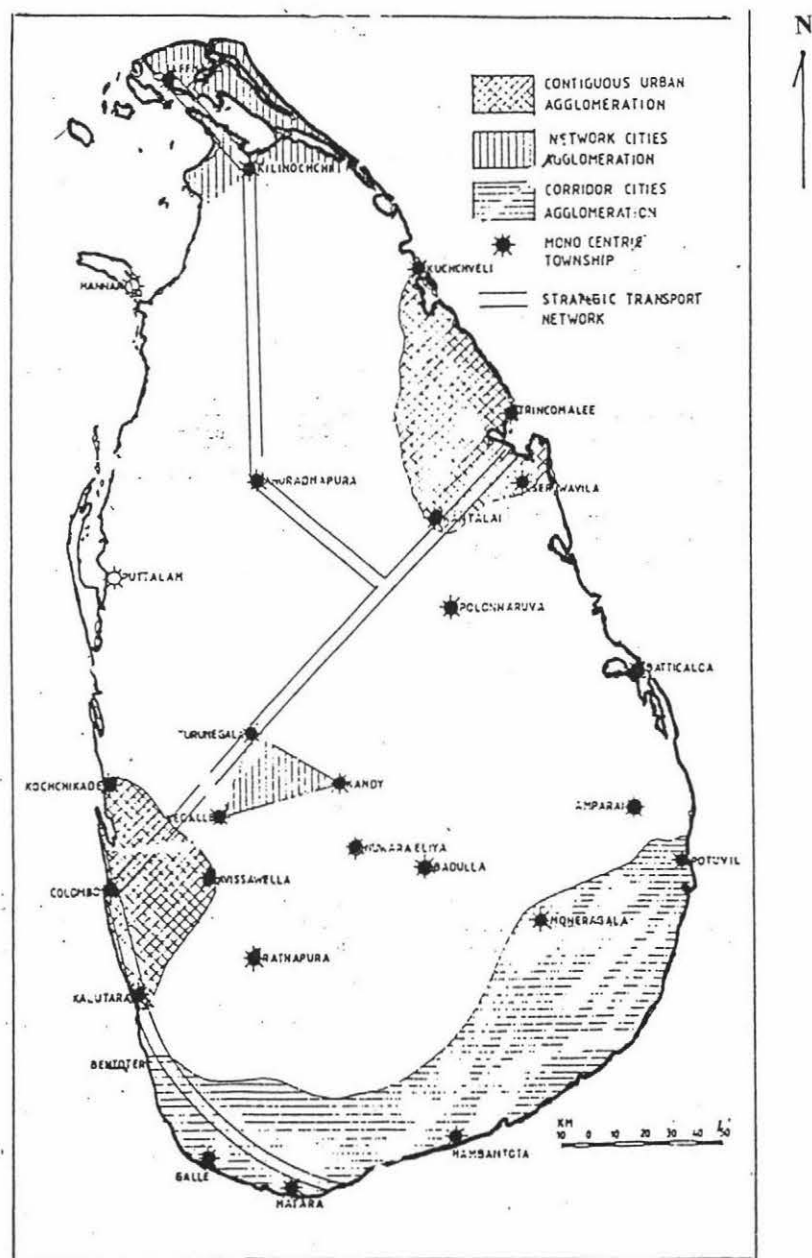
Urban agglomeration in Sri Lanka can be divided into major six areas. Table 3.1 and the Map 3.2 will give a clear picture of urban agglomeration in the country in 1981 and 2010.

**TABLE 3.1 URBAN AGGLOMERATION IN SRI LANKA 1981 AND 2010.**

<b>Centres</b>	<b>population -1981.</b>	<b>Population -2010.</b>
Colombo contiguous Urban agglomeration.	1,825,000.	3.5 million.
Southern Area corridor cities agglomeration.	281,000.	2.0 million.
Triple 'K' Triangle net work cities agglomeration.	83,300	1.0 million.
Jaffna urban region net work cities agglomeration.	244,800.	1.0 million.
Trincomalee contiguous Urban agglomeration	.270,600.	2.0 million.
mono centric towns development	.-	1.5 million.
Total urban population percentage share of total population in year 2010.	21.7%	50%

Source: Economic Review, 1996

MAP 3.2 URBAN CONFIGURATION IN YEAR 2010



Economic Review, March 1996: Map 3.



**3.5.1 SUBURBAN GROWTH IN THE COLOMBO AREA**

The urban picture in Sri Lanka represents a concentration in favour of the Western province, especially the Colombo Metropolitan Region(CMR), which stretches from Negambo in the north to Kalutura in the south, in the shape of an arc encompassing Avissawella in the east and having a total urban population of 3,000,000 or 75% of the total urban population of the country (Bulankulame, 1993).

Agglomeration of commercial, industrial and centrally controlled administration with the headquarters of all ministries and departments located within the CMR, attracts many people for their specialised service requirements. Thus, expansion of urban land area within the CMR is inevitable. Table 3.2 gives the increase of urban extent in the CMR from 1956 to 1994.

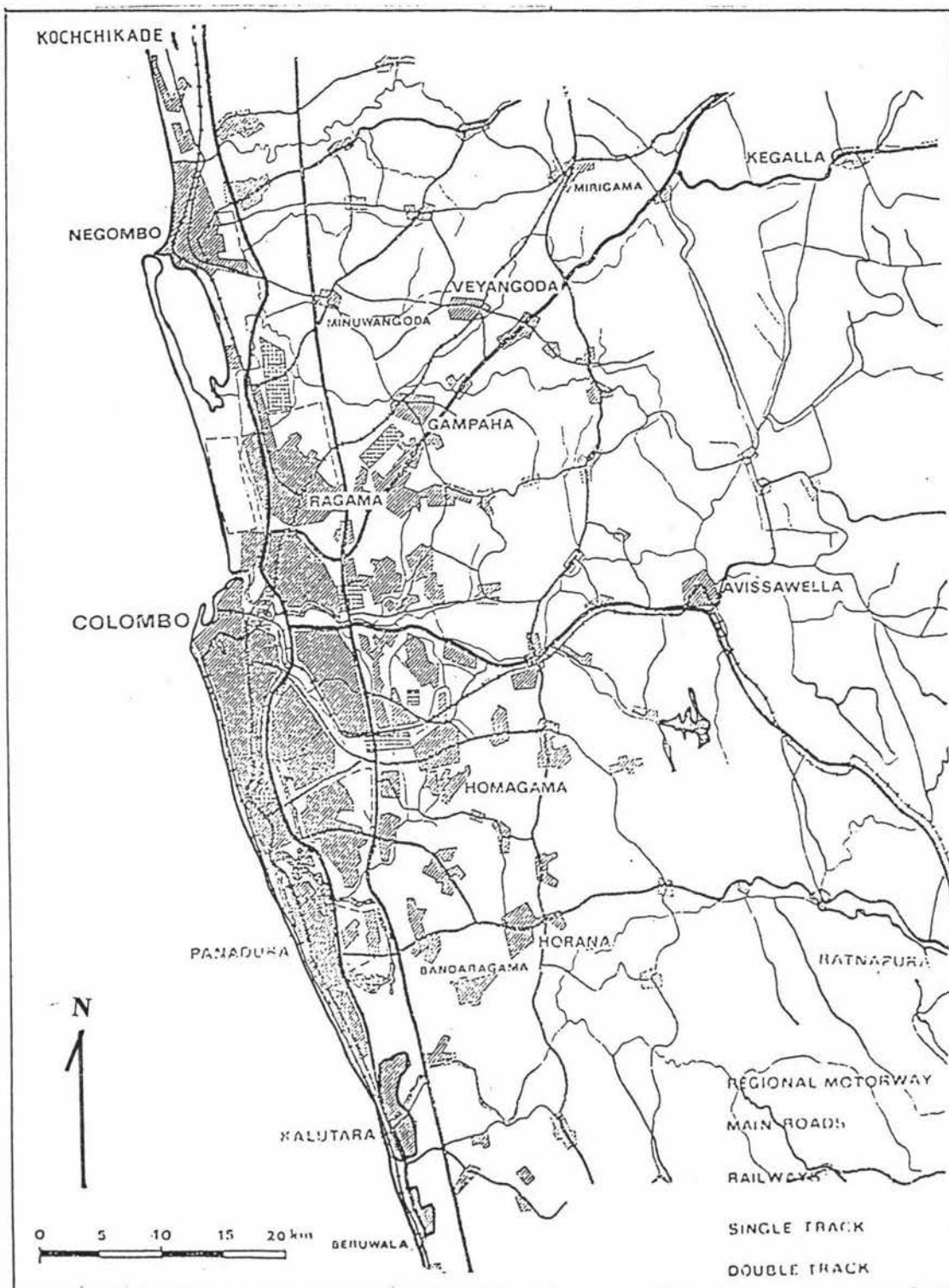
**TABLE 3.2 EXTENT OF URBAN AREA IN CMR 1956-1994 ( in Hectares)**

<b>Urban area (ha).</b>	<b>1956</b>	<b>%</b>	<b>1981</b>	<b>%</b>	<b>1994</b>	<b>%</b>
Core area.	5,288	73.45	13,744	64.25	20,293	56.48
Peripheral area	1,911	26.55	7,648	35.75	15,635	43.52
Total	7,199	100.00	21,392	100.00	35,928	100.00

Source: Economic Review, 1996: p.27.

During the period of 1956-1981, although the core area grew 160%, its relation to the total urban area had declined to 64%; reflecting a greater increase in the peripheral areas. This peripheral growth was the result of ribbon development along the Colombo-Katunayaka road from Welisara to Ja-Ela (in Gampaha district) and again from Kudawaskaduwa to Katakutunda. Growth was also observed around Kalutura town and along secondary roads. During the period of 1981-1994, the core area expanded up to Hokandara in the east, beyond Kesbewa in the south-east, Panandura in the south and continued northward expansion into Gampaha district ( Economic Review, 1996). Map 3.3 shows the urban expansion of Colombo into its suburban areas during the last two decades.

**MAP 3.3 URBANISATION IN COLOMBO METROPOLITAN REGION**



Economic Review, March 1996: Map 1.

According to Majeed (1996), 47% of the expansion of the CMR was observed during the 1981-1994 period i.e. after the free market policies were introduced to the country. Further, Majeed states that the area within a 10km radius of Colombo is almost completely urban (Majeed, 1996).

Colombo's suburban growth was most pronounced along the Ja-Ela-Minuwangoda road, Negombo-Horana road, and around Gampaha town, around the Katunayaka airport and around Kalutara Town (Economic Review, 1996).

During the 1981-1994 period, the urban area had increased to 35,900 hectares, comprising 25 % of the CMR . This represented an increase of 68% over the 1981 figures and an annual increase of 5% between 1981 and 1994 (Economic Review, 1996). The AGA Divisions, Katana, Kaduwela, Homagama and Ja-Ela together accounted for 38% of the urban area. Kesbawa, Budaragara and Gampaha together recorded 19% of the total urban area. Nearly 57% of the urban growth occurred in these seven AGA divisions. Table 3.3 gives the total urban land increase in this area during the 1956 to 1994 period.

**TABLE 3.3 URBAN LAND INCREASE IN THE CMR BY AGA DIVISIONS, 1956-1994 (HECTARES).**

Division	area (ha)			% increase.		% of total increase	
	1956	1981	1984	'56-'81	'81-'94	'56-81	'81-'94
Negambo	236	1,438	1,975	509	37	8.5	3.7
Katana	398	913	2,520	129	176	3.6	11.1
Minu.goda	0	169	402	NA	138	1.2	1.6
Gampaha.	200	252	1,117	26	344	0.4	6.0
Ja-Ela.	269	566	1,782	110	215	2.1	8.4
Wattala.	97	652	1,026	573	58	3.9	2.6
Kelaniya.	69	598	1,222	770	104	3.7	4.3
Mahara.	0	159	905	NA	469	1.1	5.1
Biyagama.	0	205	1,009	NA	393	1.4	5.5
Colombo.	3028	3,742	3,770	23	1	5.0	0.2
Total urban.	7,199	21,392	35,928	197	68	100.0	100.0

Only AGA Divisions which fall in Gampaha District are included.

Source: Economic Review, 1996.

The field survey reveals that most of the urban expansion has taken place into the agricultural lands in the Gampaha and Kalutara districts. Most of the coconut and paddy lands along the Colombo-Negambo road, Colombo-Kandy road and Colombo-Galle road have been converted to urban uses. Even the remaining lands do not seem to be cultivated, due to many problems caused by a number of factors related to the newly developed environment. This is stated by Majeed (1996:p.28) as “the pattern of urbanisation since 1956 was influenced mainly by small-scale infilling of rural areas and the intensification and extension of ribbon development along the main and secondary roads.”

Further, the Director General of UDA said that the “Metropolitan region of Colombo is growing, which is reflected in the conversion of agricultural lands for commercial and industrial activities” (Dixon, 1996:p.25)

Besides agricultural land conversion, the trend of fast urban expansion with an absence of both major urban development projects and greater planning intervention has led to greater problems of infrastructure provision and consequently, to a poorer urban environment. According to Majeed (1996:p.28), “The towns to the north-east (in Gampaha district), such as Ragama, Gampaha and Veyangoda need to be developed on a priority basis, considering the present scattered development and the attendant problems. In the absence of such strategy, the tendency for urban sprawl would be greater to the north-east, where most of the lands are high lands (high-land crops like rubber, vegetables, and paddy).

Presently there is an acute shortage of essential infrastructure in all urban areas in Sri Lanka. Poor maintenance of existing infrastructure has worsened environmental and development problems in Sri Lankan towns. The infrastructure deficiencies in the urban areas are evident from the lack of drainage, narrow and poorly planned roads that create traffic congestion, towns not served with water or with poor and intermittent water supply, and low income settlements without basic facilities. The bus stands and public markets are either poorly located or congested due to the lack of planned development.

The estimated population in the city of Colombo in 1973 was 611,000, and therefore the slums and shanty population figure of 350,953 formed 57% of the total population. In 1994, the total population of the CMR was 635,459 and total shanty dwellers were 273,945 or 43%, even after the implementation of several housing and settlement programmes for the slum and shanty dwellers (Senanayaka, 1996). Further, the slum and shanty structures lack essential housing

amenities such as water supply, lighting, and toilet facilities. As a result, neighbourhoods have become insanitary and the occupants are prone to frequent illness and disease. The situation in the shanties is made much more serious because of their location on canal tanks, road reservations, low-lying areas and flood-prone stretches, as well as the structural conditions of the houses themselves (Senanayaka, 1996).

Colombo, Dehiwella, Mount Levaniya, Kolonnawa, Kotte, Moratuwa Urban Council areas and Kochchikadai, Avisavalla, Panandura in the CMR, and other district capitals, especially Jaffna, Kandy, Galle, Matara, Budulla, Nurewelliya, Ratnapira and Annuradhapura all together had 0.80 million urban poor in 1981 and this increased to 0.97 million in 1987, 1.14 million in 1991 and 1.32 million in 1996. The projected urban poor in 2001 is 1.50 million (Senanayaka, 1996).

All these complex problems were the consequence of lack of comprehensive planning under the Free-market policies. Karuratna (1996:p.8), says that

“When urban development increases, the tendency is for vertical expansion in construction which provide a substitute for additional quantities of land. Therefore, in urban areas planning becomes a sine qua non... if urban planning is not undertaken for the optimum utilisation of land, the consequences can be serious.”

As the present plan for urban development was prepared in 1974 (even before the UDA was established) it must now be updated (Dixon, 1996). During the past two decades, there have been rapid changes and sprawl in urban areas and this has caused many socio-economic and environmental problems. Unplanned urban sprawl converts fertile agricultural lands rapidly. Also, existing land legislation does not keep pace with the fast changing urban scene (Karuratne, 1996).

Finally, it is obvious that land is becoming increasingly limited. The total supply of land is finite. Unplanned urban and industrial development has given rise to several complex land related problems, and special concern needs to be paid to land use urgently.

### **3.6 THE FACTORS BEHIND AGRICULTURAL LAND USE CHANGES IN GAMPAHA DISTRICT: THE CASE STUDY AND THE RESULTS**

In Gampaha district, the fast growth in terms of domestic and foreign investment and infrastructure development for industrialisation, resulted in agricultural land conversion at a rapid pace, to cater for the demands of the industrial sector. The following are the major factors which caused agricultural land conversion in Gampaha district.

#### **3.6.1 GOVERNMENT INVESTMENT AND INFRASTRUCTURE DEVELOPMENT**

The Sri Lankan government has promoted the development of this region through the development of infrastructure and investment (See Lakshman (1987) for a discussion on the government policy implemented in this district). These policy changes led to significant public industries being established in Gampaha district. These include:

- Greater Colombo Economic Commission (BOI),
- Export Promotion Zones (EPZs) in Katunayaka and Biyagama (Map 3.4),
- Expansion and upgrading of Katunayaka Airport to International level,
- Ek-Ela Industrial Estate,
- Construction of housing schemes at Raddolugama and Ranpolurugama with 3622 units,
- Integrated Rural Development Programmes, and
- Other infrastructure developments including major and minor road construction.

The BOI region, established in 1978, stretches to 32 km in length, is about 18 km at its widest part in the south, and covers an area of nearly 450 sq. km (JICA, 1987). The BOI has established two EPZs for industrial plants that enjoy tax-free status with regard to import and export of capital, raw materials, and products. The total number of industries in Katunayaka and Biyagama in 1995 were 80 and 37, and the total number of employees were 55,644 and 22,699 respectively. Industrial activities and employment opportunities brought high immigration, which led to more demand for land for housing and other services. The BOI initially allocated 250 acres [100ha] of land for housing purposes, and planned to develop a low density area with an average plot size of 20-40 perches [1 perch is equivalent to approx. 25m<sup>2</sup>](BOI, 1987).

[illegible]



To facilitate the industrial estates and FTZs, a motorway was constructed, which joins the Colombo-Kandy main road, and this further eases the transport activities of the industries within the capital city and Colombo harbour areas. Moreover, there were three new towns established under the BOI: Seeduwa township with 500 acres [200ha] of land, Kaddkelle with nearly 350 acres [140ha], and Katana township of 230 acres [93ha]. Thus, further development of business complexes, supermarkets, schools, health centres, playgrounds and parks, took place. Besides these facilities, the BOI provided commercial centres, tourist complexes on the lagoon, light industries and accompanying services in the district. Establishment of the BOI and FTZs caused direct agricultural land conversion (Appendix 3.1). Table 3.4 shows the land use pattern for 1985 and 1996.

**TABLE 3.4 LAND USE PATTERN OF BOI AREA, 1985 AND 1996**

Land use	1985 (%)	1996 (%)
Residential	64	66.8
Commercial	4	6.0
Industrial	7	9.41
Public and semi-public	12	13.4
open spaces	4	3.8
Agriculture	9	0.6
<b>Total</b>	100.00	100.00

Source: JICA (1986) and field survey.

The urban concentration of population and the increase of industrial and commercial activities in the BOI area have resulted in the conversion of agricultural land for non-agricultural uses. The Master plan prepared for the Integrated Rural Development Programme (JICA, 1987), forecasted that “the urbanisation taking place in the western and southern parts of the [Gampaha] district will expand to other areas, particularly upland farm lands where fragmentation and coinciding integration of agricultural land holdings will also be affected.” The results of the field survey carried out for this study also support this forecast. The survey results indicate that the upland coconut, rubber, and paddy lands along the main roads, around the new and old towns, and at main junctions have been converted to non-agricultural uses. (See appendix II, Plate 2)

Besides the BOI investments, Gampaha received investments through the Decentralised Capital Budget and the District Development Council Budget. According to the Planning Unit of Western Province, Katana, Mahara, Kelaniya, and Mirigama AGA Divisions each received more than 5.1 million Rupees for public investment during the period of 1989-1993. Weke and Biyagama AGA



Divisions received 3.6 to 4.5 million (Ariyathilaka, 1993). Ariyathilaka further states that high investment took place in Katana, Wattala, Mahara, Kelaniya and Mirigama AGA Divisions. Drabkin (1977) pointed out that land value is based on the amount of investment on the land. i.e., as the economic cost of land increases, the value of the land also increases. This high land value has not only attracted property developers into this area, but also enticed farmers into obtaining quick money, thus leading to the conversion of agricultural land to non-agricultural uses (Ariyathilaka, 1993).

### 3.6.2 INCREASE OF COMMERCIAL AND INDUSTRIAL ACTIVITIES

Many import control laws and regulations were abandoned or relaxed under the free market economy. This created a flourishing atmosphere for trade and commercial activities. The city of Colombo, the main centre for commercial and industrial activities, had to absorb most of this increase. Table 3.5 gives the number of commercial and high rise building applications received by the Colombo Municipal Council between the period of 1982 to 1992.

**TABLE 3.5 COMMERCIAL & HIGH-RISE BUILDING APPLICATIONS, 1982-1992**

Year	Number of commercial buildings	Number of high rise buildings
1982	107	25
1983	6*	8*
1984	2*	5*
1985	53	13
1986	160	32
1987	162	41
1988	165	28
1989	192	37
1990	175	48
1991	172	47
1992	283	89
<b>Total</b>	<b>1477</b>	<b>373</b>

\* Indicates the drop in 1983 and 1984 due to the socio-ethnic unrest during this period.

Source: Unpublished data from Building Application Register, 1982-1992.

The pressure from the new commercial activities in the city of Colombo pushed many space consuming activities away from the central city. Thus, the new administrative capital moved to Sri Jeyavardena Pura Kotte (Dixon, 1996). The commercial, industrial and warehousing activities have been built at locations in the suburban areas of Peliyagoda, Wattala, Kelaniya, Ja-Ela, Seeduwa, Katana, and Minuvangoda areas in Gampaha district. This shift further increased

the demand for rapid land conversion from residential and agricultural land in the Gampaha area to commercial and industrial uses (Ariyathilaka,1993).

According to a survey done by the Central Bank of Sri Lanka in 1973, nearly 80 % of the industries of the sample were located in Colombo and Gampaha district (Central Bank of Sri Lanka, 1973). However, in 1995, out of the total number of 16,983 industries in the country, 10,453 or 61.54 % were located in Gampaha District (Central Bank of Sri Lanka, 1995). This trend was explained by the Director of UDA as follows: “We discourage major industries being set in Colombo. They are being encouraged to go to Biyagama’s Free Trade Zone [Gampaha district] or to Homagama or Ratnamalana and Panandura. We have constructed big industrial projects for this purpose.” (Dixon,1996, p. 13). Table 3.6 gives the number of industries established in Gampaha District up to 1995.

**TABLE 3.6 TYPE OF INDUSTRIES IN GAMPAHA DISTRICT, 1995**

AGA Division.	Large Industries	Medium Industries	Small Industries	Total.
Attanagalla.	30	108	627	765
Biyagama.	29	154	332	515
Divilupitiya.	29	291	1798	2118
Gampaha.	27	119	583	729
Ja-Ela.	67	103	196	366
Katana.	52	264	552	868
Kelaniya.	62	135	169	366
Mahara.	33	98	466	597
Minuwangoda.	24	106	670	800
Mirigama.	22	190	1517	1729
Negambo.	19	73	175	267
Wattala.	66	114	178	358
Weke.	13	137	713	863
Katunayake BOI.	-	-	80	80
Biyagama BOI.	-	-	37	37
<b>Total.</b>	<b>473</b>	<b>1892</b>	<b>8093</b>	<b>10,458</b>

Source: Department of Census and Statistics, 1995b.

These industrial projects have caused a high level of land sub-division and conversion of land in the rural agricultural areas. The 473 large and 1892 medium scale industries directly converted a large amount of agricultural land. Ja-Ela, Katana, Kelaniya and Wattala AGA Divisions recorded significant decline of paddy, coconut and mixed crop land for commercial and industrial uses (Table 3.15 and Figure 3.2). The percentage of paddy land to the total land area in Kelaniya declined from 14.41 in 1981 to 6.90 in 1996. In Wattala, it declined from 3.46 % in 1981 to 1.8

% in 1996. In Katana, land use under coconut cultivation declined from 42.03 % in 1981 to 31.59 in 1996 (Table 3.15).

It has also been noted by the UDA that “the metropolitan region of Colombo (includes Colombo, Gampaha and part of Kalutara district) were fast growing, which is reflected in the conversion of agricultural lands for commercial and industrial activities. The move towards industrialisation invariably leads to more urban development” (Dixon,1996, p.25). For example, during the 1985-1990 period, out of a total 323.2 hectares of converted land, only 33 % has been in urban (in MCs and in UCs) areas, whereas 67 % was in the rural areas in this district (see table 3.11).

### 3.6.3 POPULATION IMMIGRATION AND LAND CONVERSION

The establishment of new industrial and commercial activities, and the ongoing Rural Development Projects and the Muthurajawella Land Reclamation Projects attracted many immigrants to Gampaha District. According to the Census of Population Report, total immigrants to Gampaha district during the period of 1971 to 1981 was 120,271 and the estimated net migration during 1981 to 1994 was 86,006 (Department of Census and Statistics, 1981, 1996). Gampaha has been the highest immigration district in Sri Lanka since 1981 and has become the second highest populated district (Department Of Census and Statistics, 1981).

Besides the employees and their families working in the new establishments, middle and low income workers, who were pushed from the Colombo district due to high land prices, also moved into Gampaha District. The construction of the Colombo-Katunayaka expressway and Colombo-Katunayaka railway line in particular attracted more commuters to live in Gampaha and commute to work in Colombo. Table 3.7 gives the place of employment of residents in Gampaha in 1996.

**TABLE 3.7 PLACE OF EMPLOYMENT OF RESIDENTS IN GAMPAHA**

<b>Place of employment.</b>	<b>Percentage</b>
Gampaha District.	48
BOI and FTZs.	4
Colombo District	33
Outside to Colombo and Gampaha District.	3
Abroad (employees' families).	12

Source: Field survey.

The field survey showed that nearly 36 % of the residents in Gampaha commute to work outside the district, whereas only 52% of the residents work within the district. Due to immigration, the total population of the district increased rapidly Table 3.8 gives the population growth in some of the areas of Gampaha, between 1981-2002.

**TABLE 3.8 POPULATION GROWTH IN SOME SELECTED AREAS IN GAMPAHA, 1981-2002**

Centres.	Increase in 1981 (%)	Increase in 1991 (%)	Increase in 1997 (%)	* Increase in 1991-2002 (%)
Wattala UC	1.2	13.6	12.2	27.3
Peliyagoda UC	1.6	7.4	6.9	14.8
Mahara UC	16.2	11.1	10.0	-
Kelaniya RC	87.0	12.7	10.7	-
Biyagama RC	26.6	20.2	10.2	-
Wattala RC	31.5	19.5	16.3	-
Urban population growth rate in Sri Lanka.	24.3	10.7	16.2	-

\* Estimated

Source: Economic Review, March, 1996:

According to table 3.8, the percentage increase of urban population in Wattala and Mahara UCs, was greater than that of the country. Meanwhile, the RCs also had higher immigration during the 1971-1981 period. For example, Kelaniya, Biyagama and Wattala RCs had 87 % , 26 % and 31.5 % increases respectively during 1971-1981 period. This sudden increase in population seems to have been caused by the immigration of the worker and commuter population into the district.

Urban population growth in Gampaha district in general was 2.24 % in 1995 while it was 0.48% in Colombo District (Economic review, 1996). As the crude birth rate of Gampaha district (CBR Gampaha District was 16.1 in 1985 and 14.8 in 1990) was lower than the national rates (Sri Lankan CBR was 28.4 in 1985 and 20.0 in 1990) during the same period, it is obvious that high immigration was, and is, the reason for high population growth in this district (Ministry of Health and Women Affairs, 1993).

The Land Commission Report (1985:p65), states that the “majority of the people moving into the urban fringe of the city of Colombo are in search of cheap land for residential purposes. In the more recent past, property development agencies converted some of the rubber and coconut

plantations into urban settlements. If this trend continues unchecked, the encroachment of the urban sprawl into rural landscape would result in the neglect of agricultural lands.”

Private Property Developers (PPDs) play a significant role in Gampaha district in supplying land for the above-mentioned increase in non-agricultural uses. As they are more profit-orientated, in most cases they fail to provide necessary infrastructure facilities. Mendis (1987:p3) claims that “population concentration in the suburban areas of Colombo Metropolitan Region is taking place in an unplanned manner. This is due to an uncontrolled real estate business which has arisen to meet the demand for residential land. The lack of comprehensive planning for residential development in these areas has compounded the problem.” Thus, due to this lack of infrastructure development, most of the lands converted by the PPDs are under utilized or used extensively.

Areas such as Kelaniya, Negambo, Biyagama and Wattala, for example, have a higher proportion of population living below the standard level set by the Urban Development Authority (UDA). Table 3.9 gives UDA’s standard for housing and population density per hectare, and Table 3.10 shows the existing population and housing density, which reveals the under or extensive use of converted lands in the area.

**TABLE 3.9 URBAN DEVELOPMENT’S STANDARD FOR HOUSING AND POPULATION DENSITY IN URBAN AREAS (per hectare)**

DENSITY TYPE.	POPULATION PER HECTARE		HOUSING UNITS PER HECTARE	
	Gross.	Net.	Gross	Net.
Low	60-75	75-100	7-10	12-17
Medium	100-150	125-200	12-17	20-25
High	175-225	250-300	20-25	30-35

Source: Urban Development Authority, unpublished data

**TABLE 3.10 PLOTS CREATED BY PRIVATE PROPERTY DEVELOPERS  
BETWEEN 1980-1990**

Local Authority	Number of housing units 1996	Plots created by P.P.Ds **	% of land use changes 1980-90	Total No of subdivision	Average No. of housing units/ha.	Net population density/ha
Negambo MC	13,102	161	20 %	13	22	138
Ja-Ela UC	6,585	305	10 %	36	NA	NA
Wattala UC	4,516	-	15 %	14	17	75
Peliyagada UC	5,396	-	-	NA	30	163
Katunayaka-Seeduwa UC	6,456	459	10 %	46	NA	NA
Biyagama RC	21,718	294	11-15 %	48	08	46
Kelaniya RC	11,439	259	> 21 %	45	07	138
Negambo RC	10,957	-	16- 20 %	07	NA	NA
Katana RC	20,686	2,386	11-15 %	29	06	61
Ja-Ela RC	21,077	425	5- 10 %	54	05	41
Wattala RC	19,087	140	11-15 %	21	06	65

\*\* P.P.Ds: Private Property Developers, MC: Municipal Council, UC: Urban Council, RC: Regional Council.

Source: Unpublished data from Urban Planning Unit and, Urban Development Authority (1980-1996).

According to Table 3.10, Kelaniya RC, for example, has the highest percentage of land use change (>21%), but has a very low level of housing units per hectare and medium population density. Similarly in Katana RC, 2,386 plots were created by the private property developers, and the percentage of land use change was significant (11-15 %), whereas the housing and population density were very low, i.e., 6 and 61 per hectare respectively; these were even lower than the low standard set by the UDA (table 3.9 and 3.10). Except for Negambo MC, Peliyagoda and Wattala UCs, all other areas have reached only the low standard of housing density. Biyagama, Negambo and Ja-Ela RCs also have low population density. Furthermore, the field survey shows that over 40 % of the converted lands were not provided with adequate water, drainage and transport facilities (Appendix 3.3a). This percentage is even higher in

Katana, Negambo, Ja-Ela, Biyagama, Wattala and Kelaniya AGA Divisions where a very high proportion of land conversion was undertaken by the PPDs (Appendix 3.1).

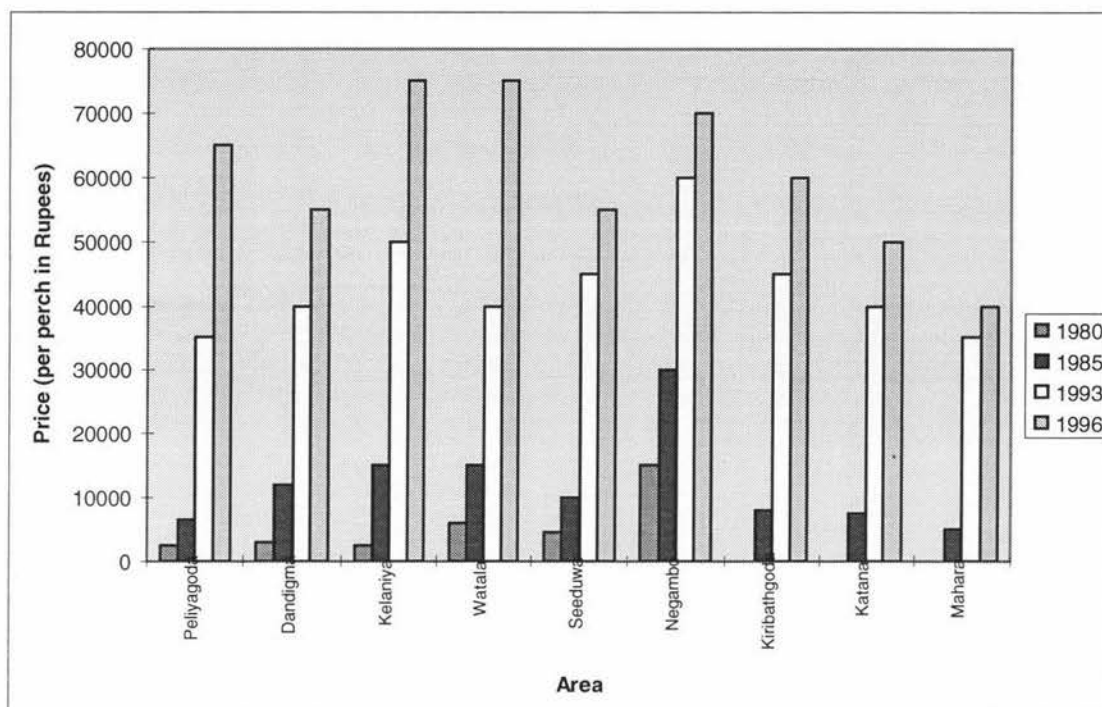
The under utilisation of converted lands shows that consideration has not been given to identify policies to maximise utilisation of land. According to Ariyathilaka, the present plot size and under utilisation will remain until urban infrastructure facilities reach the areas (Ariyathilaka,1993). This inefficient use of land (in a land-scarce country) further adds to land degradation, as land is neither in the use of agriculture nor in the proper use of any other sector.

#### **3.6.4 CONTRIBUTION OF PROPERTY DEVELOPMENT IN THE LAND CONVERSION**

Public and private sector investment has helped to create high land values in Gampaha. Present land values in some places do not reflect the present use, but the value of land in its future use, i.e. residential or industrial infrastructure developments (Ariyathilaka, 1993). Ariyathilaka adds that “the land prices in Colombo and suburban areas increased at an annual average rate of 22.2 per cent during the period of 1978-1993. This is substantially more than the average rate of increase of consumer prices which was 13% for the same period. The current value of an investment in land is much higher than an average equivalent investment in risk free assets such as fixed deposit with the National Savings Bank” (Ariyathilaka,1993, p: 27) (Appendix 3.4). Figure 3.1 shows the prices for residential land in Gampaha in 1980 and 1993 (Appendix 3.5 gives the figures for this figure).



**FIGURE 3.1 RESIDENTIAL LAND PRICE INCREASE IN GAMPAHA 1980-1996**



Source: Unpublished data from Department of Valuation, 1980-1993, and the field survey.

Because of the absence of a national urban spatial policy to manage the development of urban areas, and the profitable land market, private property developers have become the pivots in urban land expansion, and enjoy the freedom of converting and developing any area (Ariyathilaka, 1993). According to the field survey, 79 % of the former farmers said that they sold their lands through property developers, while the balance of 21 % sold on their own or through other family members or friends (from the field survey). Table 3.11 gives the total land extent developed by both public and private property developers in this district.



**TABLE 3.11 LAND DEVELOPMENT - PUBLIC AND PRIVATE PROPERTY DEVELOPERS IN GAMPAHA DISTRICT, 1985-1990**

Local authority.	Total land developed (ha)	private property developers (ha)	private property developers (%)	Total
Negambo MC	5.3	3.5	66	24 %
Wattala UC	7.1	NA	NA	
Ja-Ela UC	29.4	14.4	48	
Katu-Seedw TC	36.8	27.6	75	
Kelaniya RC	13.7	5.0	36	76 %
Wattala RC	10.6	NA	NA	
Ja-Ela RC	36.3	28.7	79	
Mahara RC	34.3	14.6	42	
Katana RC	131.3	115.2	87	
Biyagama RC	18.4	11.1	60	
Total	323.2	220.1	68	

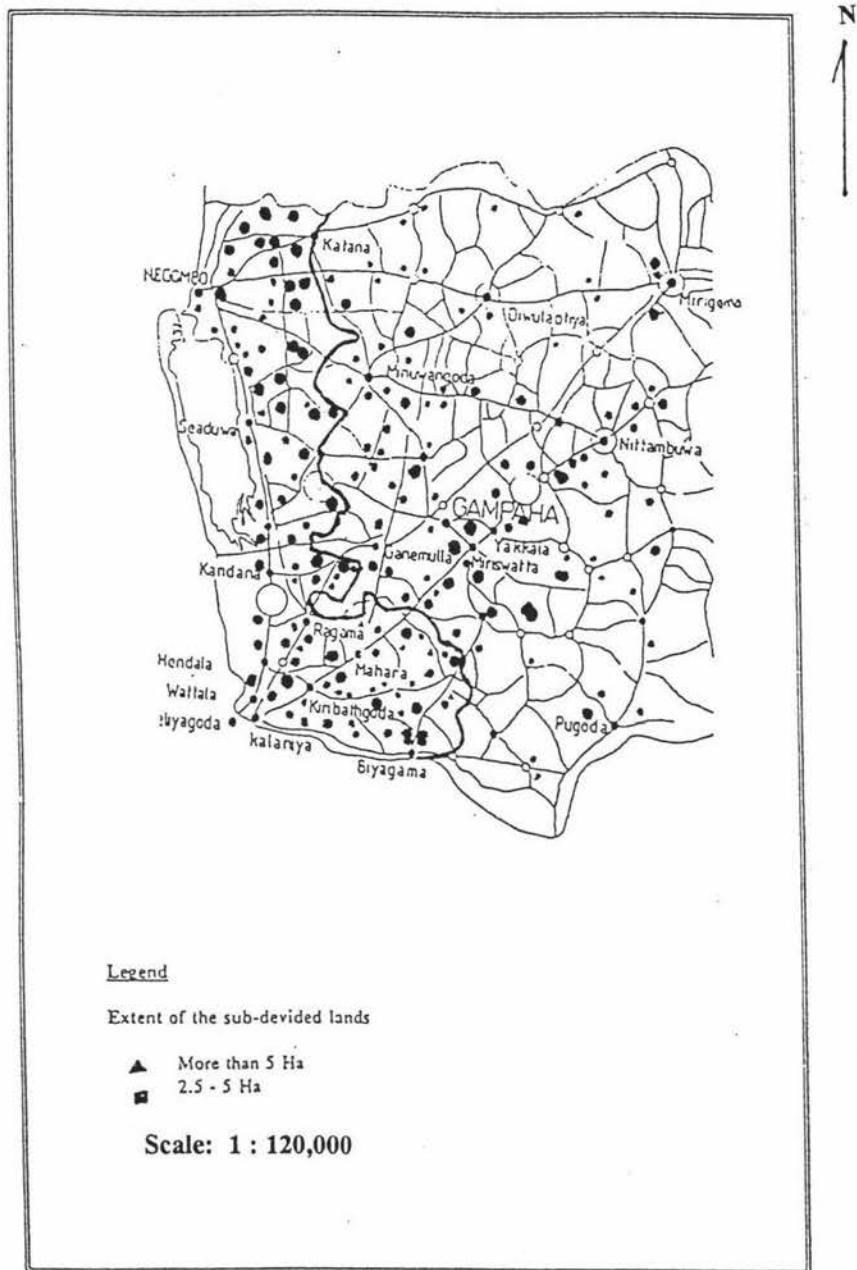
Source: Calculated from Department of Land Reports (various).

According to table 3.11, an average of 68 % of the land was developed by private property developers, of which 24 % was in urban areas and 76 % in the rural areas. As these results are based only on registered property developers and do not include informal property developers, the extent and share of land developed by private property developers could be even higher than is shown in table 3.11. Map 3.5 shows the land sub-divisions by PPDs in the area.

Besides converting agricultural lands, property developers have filled in natural retention areas as well, especially in the marshy lands. This landfilling has caused flooding and waterlogging problems. For example, the west coast and the Negambo lagoon areas get affected by floods annually, even after a small amount of rain (Land Use Planning Division, 1987 and 1996). Map 3.6 shows the flood affected areas in the district. According to the Irrigation Engineer, Gampaha, these problems are mainly due to the unplanned land blocking and building constructions of the property developers (from the field survey). Another problem created by PPDs regarding land conversion, is the bypassing of large areas of land suitable for urban development. Large areas lying between two focal points are often bypassed and this has caused an unwanted expansion of urban land and unwanted agricultural land conversion.

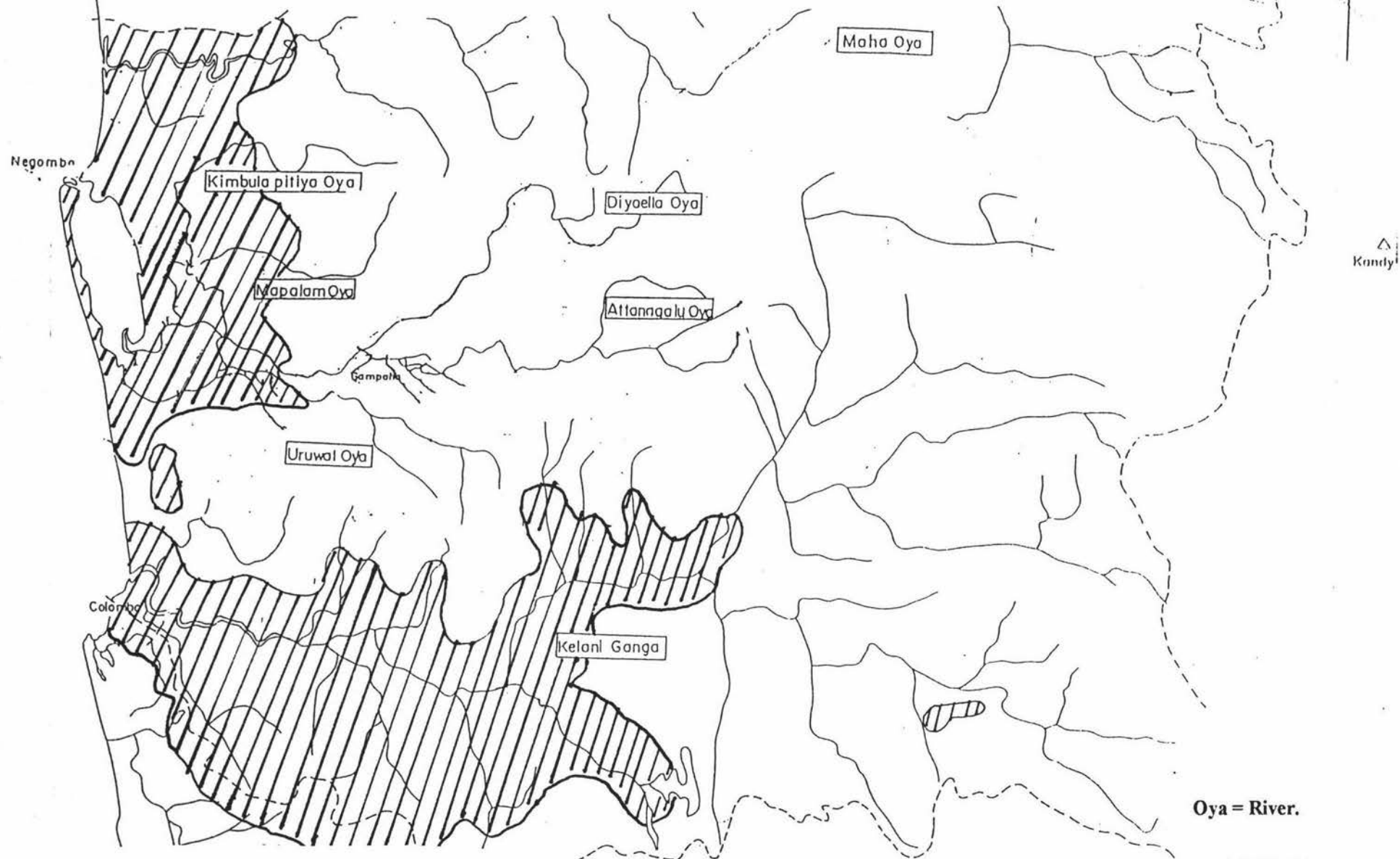
It was observed during the field survey that large extents of land along the Colombo-Kandy road, Colombo-Negambo road and lands between the small clusters were bypassed. Now, even though these by-passed lands are not converted into urban or industrial uses, the farmers are unable to

**MAP 3.5 LOCATIONS OF LARGE LAND SUB DIVISIONS IN  
GAMPAHA DISTRICT**



Land Sub Divisions Registry, Area Administration Division, BOI  
Field Survey.

**MAP 3.6 ANNUAL FLOOD AFFECTED AREAS IN GAMPAHA DISTRICT**



Land Use Planning Division, Gampaha District.

Oya = River.

MS = 1 / 253,440  
(Quarter inch = One Mile)

continue their cultivation, as the neighbouring fields are no longer in agricultural use. According to the farmers, the following reasons were given for stopping cultivation in these areas.

- Existing irrigation systems had collapsed as most of the neighbouring agricultural lands were converted.
- Problems from stray cows, goats and other animals. Earlier, all the farmers had common protecting walls or fences. Now, as the neighbouring areas have been converted, most of the agricultural fields are isolated.
- Theft.
- Transport and marketing difficulties. As the fields are now isolated, the middlemen or the higher purchasers no longer come to these areas to buy the products. As many of the farmers haven't got proper transport facilities to take their products to the market, they face severe problems in marketing their products.
- Complaints from the newly developed neighbouring residents or non-agricultural population regarding smell and other farm pollution.

As a result of the combination of these problems, eventually these farmers are compelled to give up their cultivation and land. The survey revealed that 18.5 % of the former farmers had experienced this problem and 4.4 % (6 out of 135 ) sold their lands mainly for this reason. 15.8 % of the present farmers reported this as a problem, while 3.5 % reported this as their main problem (Table 3.12). The 3.5 % of the present farmers further said that they were planning to sell their land for non-agricultural uses due to this reason. This situation applies in other parts of the country as well.

### **3.6.5 FARMERS' PROBLEMS AND AGRICULTURAL LAND CONVERSION**

Former and present farmers were surveyed to identify the problems relating to cultivation and the reasons behind farmers selling their lands. The key points of the survey are presented below. Table 3.12 reveals the three foremost factors leading the former farmers to sell their lands, and the three biggest problems of present farmers. The responses of farmers, both former and present, regarding the factors behind land conversion are given in Appendix 3.6 and 3.7.

**TABLE 3.12 FIRST THREE FACTORS AFFECT THE FORMER AND PRESENT FARMERS IN CULTIVATION (farmers' response percentage)**

Factors	Former farmers				Present farmers			
	1st factor	2nd factor	3rd factor	% of all three	1st factor	2nd factor	3rd factor	% of all three
High cost of prodn	17.7	11.8	22.2	51.84	17.4	21.5	10.7	49.7
credit problems	13.3	16.2	10.3	40.0	11.7	9.2	13.3	34.3
marketing problems	5.9	10.3	8.8	25.18	4.6	3.0	4.1	11.7
lack of storage	0	4.4	2.9	7.4	2.0	4.1	5.6	12.8
small plot size	4.4	9.6	8.1	22.2	8.7	3.0	4.6	16.4
lack of irrigation	12.5	6.6	5.9	25.1	14.8	17.4	9.7	42.0
pollution problems	9.6	4.4	6.6	20.7	10.7	7.1	9.2	27.0
flood	11.8	8.8	8.1	28.8	9.2	4.1	6.6	20.0
lack of transport	0	4.4	5.9	10.3	4.6	3.0	8.2	15.8
competition in market	8.1	5.1	5.9	19.25	2.5	6.6	8.7	17.8
neighbouring areas sold	4.4	9.6	4.4	18.5	3.5	8.2	4.1	15.8
attractive land prices	11.8	8.1	10.3	30.3	8.7	12.3	14.8	35.8
total	100	100	100	299.5	100	100	100	299.1

### 3.6.5.1 HIGH COST OF PRODUCTION

The withdrawal of subsidies and other supports, high inflation, and an increase in fertilizer and other input prices all resulted in an increase in the cost of production in the agricultural sector. Appendix 3.8 and 3.9 show the fertilizer price increase and the increase of cost of production in Sri Lanka. According to these Appendices, sudden increase in the price of fertilizer and in the cost of production occurred soon after the free market policy changes in 1977. Table 3.13 gives the rapid increase of cost of production for paddy in Gampaha district.

**TABLE 3.13 COST OF PRODUCTION FOR PADDY IN GAMPAHA DISTRICT (per hectare, including and excluding family labour)**

Year	Cost of production		Difference between (1) - (2) Rs.
	Excluding family labour Rs. (1)	Including family labour Rs. (2)	
1980/81	2020	1375	645
1981/82	2789	2034	755
1982/83	2554	1658	896
1983/84	2937	1775	1162
1984/85	3202	1662	1540
1985/86	3110	1818	1292
1986/87	3833	2394	1439
1989/90	5187	3114	2073
1990/91	6998	3718	3280
1991/92	7421	5025	2396
1992/93	9537	4503	5034

Source: Data Bank: Agrarian Research and Training Institute, 1980-1993.

Nearly 51 % of former farmers reported that the high cost of production was one of the foremost three problems that affected their cultivation. Out of 135 former farmers, 24 (17.7%) said this was the primary reason for them leaving the agricultural sector (Table 3.12). The survey further identified that the increases in fertilizer prices and labour wages were the main factors affecting the cost of production. During the 1988-1993 period, labour and fertilizer costs were on average of 43% and 18% of total cost respectively. Currently (1996), the survey found that these costs are 51% and 16 % respectively.

As many of the young labourers migrate to non-agricultural employment (BOI, FTZ, or to Colombo and overseas), most of the farmers have lost their family labour as well as hired labourers. This has caused a seasonal labour shortage and higher labour wages in the agricultural sector. The 4th column in table 3.13 shows the difference in cost of production with and without the family labourers in paddy cultivation; the increase in the difference over the years shows the increase of labour wages due to the loss of family labour (Section 3.6.7 in this chapter gives more detail about family labour migration to non-agricultural sectors).

### 3.6.5.2 CREDIT AND FINANCIAL PROBLEMS

As institutional credits were restricted to ‘credit worthy farmers’, many farmers have been unable to gain access to institutional credits. The field survey revealed that only 18.5 % of the former

farmers qualified for institutional credits. Only 13 % of the farmers used their own savings and the remaining 68.5 % of the farmers had to approach private money lenders for credit at higher interest rates. Among the present farmers, only 21 % are able to access institutional credits, while only 16 % use their own savings. The remaining 63 % of the farmers have to approach private money lenders for financial support (Appendix 3.10). This again is added to the cost of production. 40 % of the former farmers in the survey said that inaccessibility to institutional credits with lower interest rates was one of the foremost three reasons for abandoning their cultivation (Table 3.12).

### **3.6.5.3 MARKETING PROBLEMS**

As already noted, most of the agricultural lands were converted and developed without necessary infrastructure facilities. 25 % of the former farmers and 11.7 % of the present farmers reported inadequate market centres as one of the three foremost important problems that they encountered in cultivation. Even at the market, middlemen and private money lenders had influence in determining the price for the products. As in most cases the private money lenders happen to be the middlemen, the farmers had to sell their products to these middlemen at lower prices to settle their debts. In addition, former farmers said that in most cases farmers had to sell even the share which they normally keep for their family consumption. As most of the food products are also imported, farmers again face competition in the market. 19.2 % of the former and 17.94 % of the present farmers reported competition with imported goods as one of the main three problems. Lack of transport facilities within the district was a major problem for them in getting their products to the market. 10.3 % of the former and 15.89 % of the present farmers reported that this problem affects their cultivation (Table 3.12).

### **3.6.5.4 LACK OF STORAGE FACILITIES**

As lack of transportation and the market situation were already a problem, farmers would have preferred to store their products until there was a good demand for them. However, lack of storage and preserving facilities forced farmers to sell their products immediately after harvest, even though the market prices were low. In terms of fruits, vegetables, and fish, the problem was particularly acute. None of the farmers in the survey had storage facilities for fruits and vegetables. Only 14 % of the fishermen in the survey had access to ice storage facilities, and only 2 % of the fishermen have their own transport facilities to immediately take their catch to the big markets. All the others have to sell their catch at the shore to middlemen and/or to the boat



owner, or to consumers who come to the fish markets on the shore. Also, a few fishermen carried their catch by bicycle along the streets to sell from house to house. 7.4 % of the former and 12.82 % of the present farmers stated it as one of the foremost three problems. 4 out of 195 present farmers said this was the main problem that they have been facing (Table 3.12).

### 3.6.5.5 SMALL PLOT SIZE

Increasing population and the existing traditional system of land distribution has resulted in land sub-division. Most of the lands have been traditionally been divided and distributed among the male children of the family. Population increase over time leads to rapid sub-division of land. Small plot size facilitates land conversion. Table 3.14 shows the land size in Gampaha for 1983 and 1996.

**TABLE 3.14 CLASSIFICATION OF AGRICULTURAL HOLDINGS BY SIZE IN GAMPAHA DISTRICT, 1983 AND 1996 (percentage)**

Size (Acres).	1983		1996	
	percentage.	cumulative percentage.	percentage.	cumulative percentage.
Less than 0.5.	7.8	7.8	26.3	26.3
0.5-1	9.8	17.6	20.9	47.2
1-2	17.7	35.3	12.8	60.0
2-3	12.5	47.8	6.1	66.1
3-5	15.0	62.8	14.1	80.2
5-10	16.7	79.5	9.8	90.0
Above 10	20.5	100.0	10.0	100.0
Total.	100.0		100.0	

Source: Census of Agriculture (1983) and Field Survey (1996).

Increasing demand for land and attractive land prices makes conversion of these land plots easy. According to the survey, 57 % of converted agricultural holdings were less than 2 acres [0.8ha]. 60 % of the present agricultural holdings are less than 2 acres (Table 3.14). 22.2 % of the former farmers said this was one of the foremost three reasons that pushed them from the agricultural sector. 4.44 % of them reported this was the primary reason that they sold the land. Among the present farmers, 16.41 % reported this as one of the foremost three problems, while 8.71 % saw this as the primary problem. Owners of small plots reported that it was easier for them to make the decision to sell the land and move to non-agricultural sectors. This was rationalized by farmers that they face additional problems with small plots, such as in the application of new technologies, in getting loans and other support etc. Under the new economic



changes, increasing land prices have become more attractive to the small holders, compared to the profit that they make from agriculture. 30.3 % of the former farmers said, attractive prices for quick and risk free money was one of the main three reasons they sold their land. Out of 135 former farmers, 16 of them (11.85 %) reported attractive prices was the foremost reason for selling their land. Likewise, 35.89 % of the present farmers said that attractive prices for land encourages them to move from the agricultural sector (Table 3.12). Even though this quick and easy money is attractive to the farmers, the converted land resource is still under-utilized, due to the unplanned conversion and lack of necessary facilities provided by the property developers.

#### **3.6.5.6 IRRIGATION PROBLEMS AND CLIMATE FAILURE**

Inadequate irrigation along with climate failure are also major problems in Gampaha. According to the Irrigation Engineer (pers. com), the irrigation system collapsed due to the following reasons:

- Existing irrigation systems are very old and need to be renovated.
- During the last two decades most of these systems were handed over to the farmer organisations to maintain and operate. However, most of these were not properly maintained.
- Because of improper maintenance and new settlements along irrigation channels, the channels and systems were blocked and the system could not be properly maintained. Low land paddy fields in this area are always affected.
- Industrial and urban pollution affecting the quality of water.
- Land-filling along the Negambo lagoon causing annual flooding in the district.
- After the council system was changed into the administrative system, minor irrigation systems were abandoned.

These are the reasons for farmers getting insufficient water, in time, as well. 25 % of the former farmers reported lack of irrigation as one of the three main reasons that they sold their lands. 12.59 % of the former farmers reported this was the foremost reason for them selling their lands. 42 % of the present farmers have irrigation problems and 14.87 % of the present farmers reported this as the foremost problem that they face in cultivation (Table 3.12). Almost all the farmers along the western border of the district experienced flooding problems. 28.8 % of the former farmers reported flooding as one of the major problems they faced. 11.85 % of the former farmers said flood was the main reason they sold their lands. For 9.2 % of the present farmers, flooding is the main problem (Table 3.12).

### **3.6.6 SOCIAL FACTORS**

4.4 % of the former farmers said that one of the reasons they sold their land was that their children who worked in the non-agricultural sectors wanted their parents to retire from farming. 9 % of the present farmers (44 % of them were fishermen) said their children or other family members who work in the non-agricultural sector (including abroad), want them to leave the agricultural sector. Increasing risk in the agricultural sector in the recent past, and risk in fishing due to the civil unrest, are the main reasons given by the farmers for this social factor.

Besides the above problems, inadequate marketing information, and lack of knowledge about new pesticides and fertilizers have also caused inefficiency in agriculture. 12 % of the former farmers reported that they did not get enough information about market situations, new machinery, and the use of different fertilizers and pesticides. They further reported that they did not participate in any relevant training programmes at all. According to the Assistant Director for Agriculture (Gampaha District), lack of staff, accommodation (including quarters for field workers and other visiting officers) and financial support are the main reasons for not having enough visits and training in this area (pers. com.).

### **3.6.7 ATTRACTION FROM NON-AGRICULTURAL EMPLOYMENT AND AGRICULTURAL LABOUR MIGRATION**

According to the Socio-Economic and Labour Force Survey, 1985/86 and 1992, the percentage of the labour force employed in the agricultural sector in Gampaha was 19.8 in 1985 and 13.0 in 1992 (Department of Census and Statistics, 1985/86, 1992).

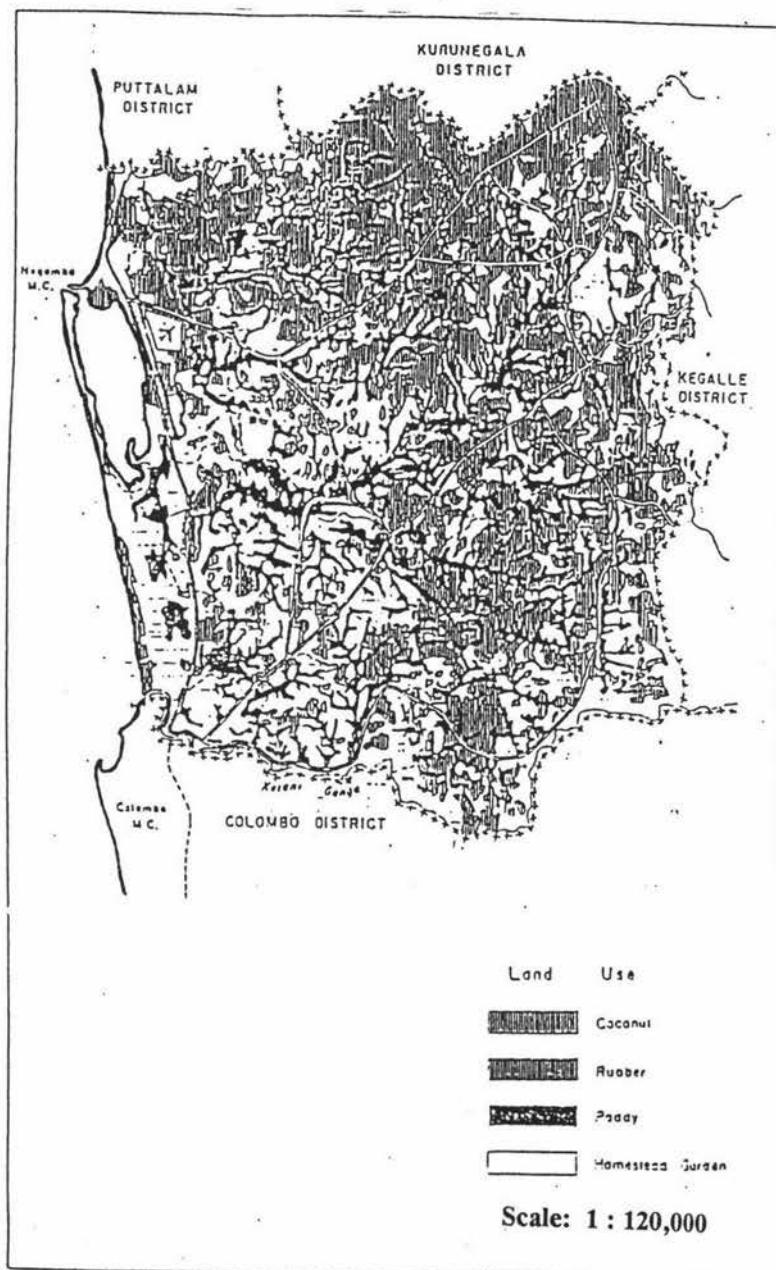
Increasingly, non-agricultural employment opportunities in the industrial and service sectors and from abroad have pulled agricultural labourers away from the sector and this has indirectly led to land conversion. According to the field survey 13.3 % of the former farmers said at least one of their family members had permanently migrated to non-agricultural employment, 8.14 % of them lost two family labourers to non-agricultural employment, and 1.48 % of the farmers lost 3 family labourers for this (Appendix 3.11). Further, nearly 23 % of the present farmers have extra, non-agricultural, part-time employment, and 26% do agriculture as a part-time job (Appendix 3.12). The following reasons were found from the field survey for this trend:

- Attraction from non-agricultural employment
- Young people like to have employment in secondary or in tertiary sectors
- The emerging problems in the agricultural sector during the past two decades, pushing them away from agricultural sector.

Once the farmers get into non-agricultural employment, they eventually sell part or all of their land for non-agricultural uses and/or become part-time farmers. For example, out of the 135 former farmers, 55 of them (41 %) had non-agricultural jobs, while 29 % did agriculture as a part time job (Appendix 3.12).

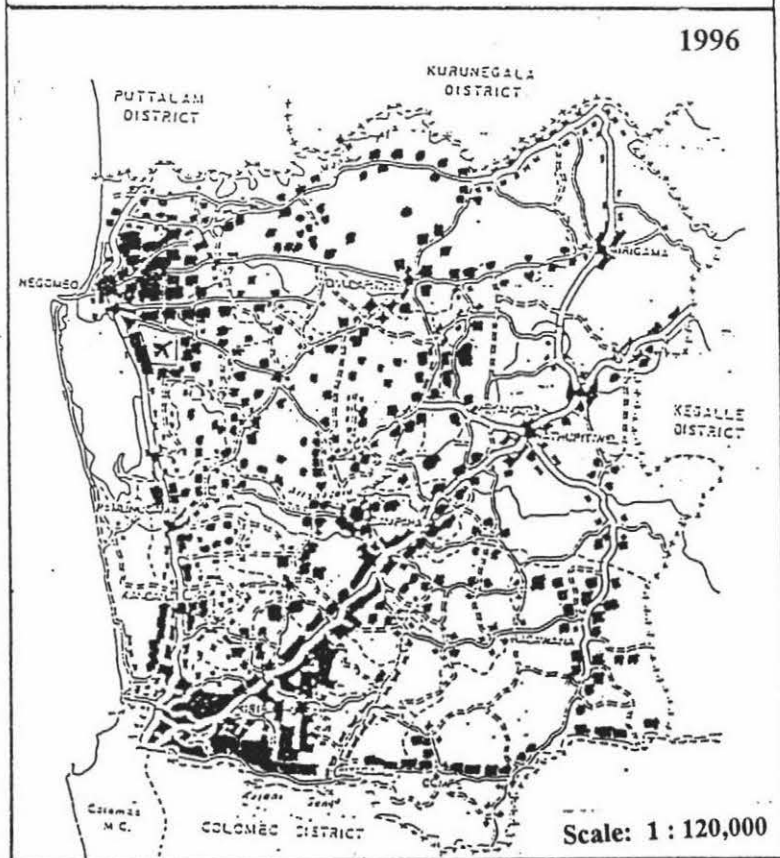
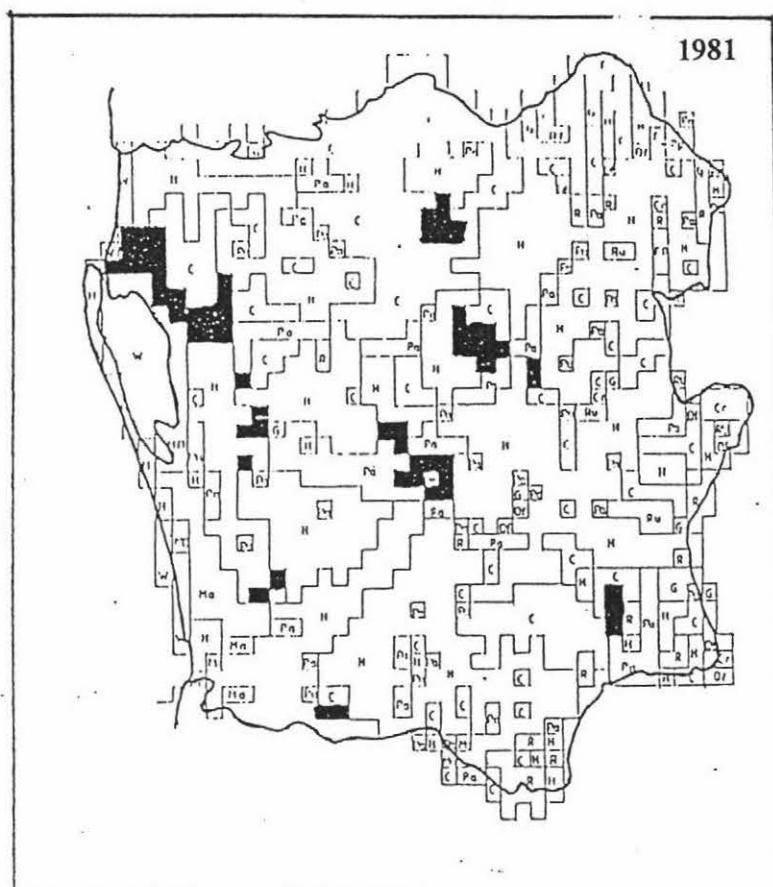
Maps 3.7, 3.8 and 3.9 shows the agricultural land taken by urban and industrial activities. Map 3.7 shows the agricultural land use in the district in 1981, and map 3.8 shows the built up area in the same period (urban, industrial and housing areas). Map 3.9 shows the built up area in 1996, and reveals the agricultural land conversion to non-agricultural uses over the period of 1981-1996. Most of the agricultural lands along the Colombo-Kandy main road, Colombo-Puttalam main road, Lands in the BOI area, and around the towns and clusters, have been converted to urban and industrial uses. Table 3.15 and figure 3.2 clearly show the decline in agricultural land and the increase of the built up area in this district.

MAP 3.7 AGRICULTURAL LAND USE IN GAMPAHA DISTRICT, 1981



JICA, 1987.

**MAPS 3.8 AND 3.9 BUILT UP LAND IN GAMPAHA DISTRICT  
IN 1983 AND 1996**



Based on Agriculture Based Maps, Aerial Photographs and Field survey.

**TABLE: 3.15 PERCENTAGE OF LAND UTILIZATION IN GAMPAHA DISTRICT, 1981 AND 1996**

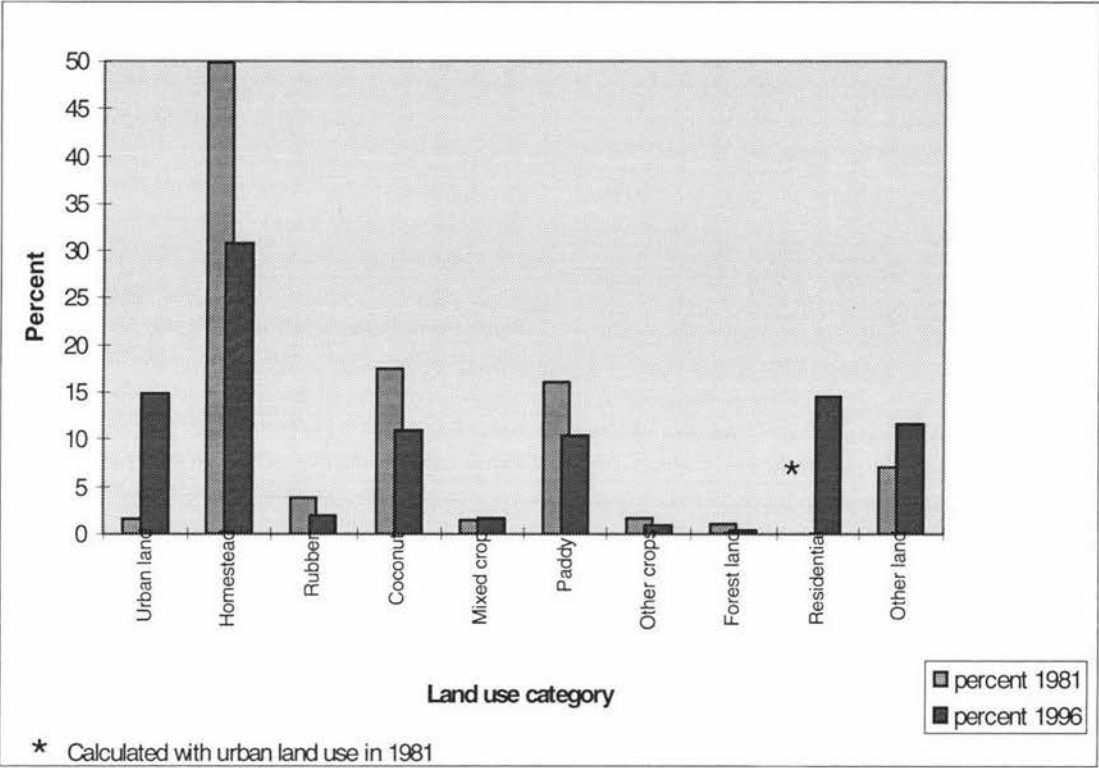
AGA Divisions	Year	Urban land	Home-stead	Rubber	Cocont	Mixed crop	Paddy	Other crops	Forest land	Residential	Other land
Attanagalla	1981	1.03	49.28	5.51	17.01	1.23	17.27	5.00	2.40	-	1.23
	1996	8.26	32.03	3.46	12.26	4.43	13.72	4.1	1.98	11.56	8.2
Biyagama	1981	3.55	60.58	2.58	7.91	0.80	20.19	0.8	0	-	3.55
	1996	17.6	38.53	1.06	4.92	1.34	11.85	0.3	0	14.3	10.1
Divilupitiya	1981	0.30	41.48	1.10	38.55	0.65	13.91	1.0	0.95	-	2.01
	1996	6.97	29.32	1.0	26.3	2.53	9.61	2.34	0	9.8	12.22
Gampaha	1981	0.74	61.16	0.95	6.64	0.74	29.14	0.21	0	-	0.42
	1996	11.61	44.10	0.72	3.32	0.60	18.73	0.73	0	13.19	7.0
Ja-Ela	1981	4.70	55.80	1.01	6.06	2.52	16.79	0.75	0	-	12.24
	1996	12.6	36.77	0.83	4.87	1.93	11.0	0.20	0	13.63	18.17
Katana	1981	1.76	39.38	2.21	42.03	0	11.50	1.76	0	-	1.32
	1996	14.54	17.95	1.57	31.59	0	6.63	0.53	0	14.99	12.2
Kelaniya	1981	7.20	63.51	0	0	0	14.41	0.45	0	-	14.41
	1996	40.3	31.40	0	0	0	6.90	0.32	0	13.08	8.0
Mahara	1981	0.31	57.41	1.56	17.64	0.83	17.43	0.52	1.25	-	3.02
	1996	7.51	44.0	1.2	13.0	0.5	11.0	0.70	0.90	9.27	11.92
Minuwangola	1981	0.07	64.53	2.56	12.27	0.15	19.20	0.22	0	-	0.97
	1996	7.83	49.61	1.30	5.91	0	7.10	0	0	15.02	13.23
Mirigama	1981	0.37	49.41	4.73	21.93	1.65	15.47	2.77	2.12	-	1.49
	1996	5.0	35.18	3.80	18.30	1.34	13.0	1.09	1.90	13.19	7.2
Negambo	1981	6.17	37.68	0	19.31	0	5.08	0	0	-	31.74
	1996	26.5	24.30	0	9.5	0	2.0	0	0	21.50	16.20
Wattala	1981	3.89	39.17	0.21	6.06	0	3.46	0.21	0	-	46.96
	1996	31.0	26.0	0	3.0	0	1.8	0.2	0	26.24	11.76
Weke	1981	0.28	43.43	13.75	11.37	5.05	18.70	2.84	1.36	-	3.18
	1996	4.0	27.80	9.50	9.80	3.91	16.92	2.07	1.20	14.56	10.24
*	1981	1.60	49.90	3.80	17.51	1.38	16.12	1.70	0.92	-	7.0
*	1996	14.90	30.84	1.94	10.94	1.69	10.48	0.96	0.40	14.94	11.68

\*Average percentage of land use in Gampaha district

Source: Department of Census and Statistics, 1995b (data for 1981 only).

Field survey.

**FIGURE 3.2 AVERAGE PERCENTAGE OF LAND USE BY TYPE IN GAMPAHA DISTRICT 1981,1996**



Source: Table 3.15

According to table 3.15, the percentage of total built up land in Gampaha District increased from 1.6 % in 1981 to 14.9 % in 1996; further, the residential uses acquired 14.44 % of the total land. Agricultural lands such as homestead, rubber, coconut, mixed crops, paddy and other crops which were 49.9 %, 3.8 %, 17.51 %, 1.38 % 16.12 % and 1.7 % respectively declined to 30.84 %, 1.94 %, 10.94 %, 1.69 %, 10.48 % and 0.96 % respectively.

Even though the amount of agricultural land declined rapidly, the production per hectare increased in the past years in the district. For example, the sown area of paddy for ‘maha season’ declined from 41,258 acres [16,710ha] in 1978/1979 to 33,470 acres [13,550ha] in 1993/1994. However the production per acre increased over the same period from 39.91 bushels per acre to 55.48 bushels pre acre (see Appendix 3.2). Likewise, while the extent of the highland crop sweet potato has declined from 738 hectares in 1978/79 to 359 hectares in 1993/94, the production per hectare increased from 4.72 metric tons in 1978/79 to 5.07 metric tons in 1993/94. Total agricultural land losses for the highland crops were 1423, 379, 173, 464 and 213



acres [503, 153, 70, 187 and 86ha] for Manioc, Sweet potato, Green chilies and Ginger respectively. The paddy land loss was, 7,788 acres [3154ha] between 1978/79 and 1993/94 period (Table 3.16).

**TABLE 3.16 EXTENT AND PRODUCTION PER HECTARE OF HIGHLAND CROPS IN GAMPAHA DISTRICT (Maha season)**

Year	Manioc		Sweet Potato		Green Chilies		Turmeric		Ginger	
	Area ha	pn/ha	Area ha	pn/ha	Area ha	pn/ha	Area ha	pn/ha	Area ha	pn/ha
1978/79	2661	NA	NA	NA	NA	NA	NA	NA	NA	NA
1981/82	2248	10.12	738	4.72	293	0.89	620	1.85	519	2.62
1984/85	1839	8.13	621	3.78	323	0.69	140	2.41	681	4.22
1986/87	1572	8.18	498	4.17	275	0.85	555	0.65	737	4.33
1988/89	1596	8.10	463	3.40	238	0.82	529	4.78	711	4.80
1990/91	1571	7.29	439	4.82	155	0.98	308	4.62	470	3.97
1992/93	1238	8.21	NA	NA	NA	NA	NA	NA	NA	NA
1993/94	NA	NA	359	5.07	NA	NA	156	2.69	306	5.46
Total land loss	1423		379				464		213	

Source: Department of Census and Statistics, 1980-1995.

### 3.6.8 URBAN AND INDUSTRIAL POLLUTION AND AGRICULTURAL LAND CONVERSION

#### 3.6.8.1 URBAN POLLUTION

Concern with environmental problems is a relatively recent phenomenon in Gampaha district, but has increased with the acceleration of recent development activities since 1977. According to the Director General of the UDA, “urbanization in Sri Lanka has been completely unplanned ... Gampaha District is growing faster than the Colombo District... and more employment opportunities generated by the Free Trade Zone area” (Dixon, 1996:p.13). Because of this fast development, Gampaha district has received a high immigration rate. This unplanned population influx has resulted in unplanned settlements as well. This has created serious environmental problems in the district. As Sriwardena (1996:p7) explains,

“presently there is an acute shortage of essential infrastructure in all urban areas in the country. Poor maintenance of existing infrastructure has worsened



environmental and development problems in our towns. The infrastructure deficiencies in the urban areas evident from the lack of drainage, narrow and poorly maintained roads that create traffic congestion, towns not served with water or with poor intermittent water supply and low income settlements without basic services. The bus stands and public markets are either poorly located or congested due to lack of planned development”

According to the Secretary of the Gampaha Urban Council, there is no permanent place to dump the urban solid waste in Gampaha District (Pers. com.). It was also observed in the field survey that all the urban waste is being dumped along the Negambo lagoon and in the uncultivated agricultural lands (see Appendix II, Plate 3 and 4). According to the Environmental Authority Regional Office of Gampaha, the urban waste consists of various chemicals and uncompressed polythene and plastic materials. The effects of this waste is serious in terms of soil and water quality in the area. Also, the sedimentation caused by solid wastes has led to flooding of agricultural lands and of the lagoon areas. The Negambo Municipal area has been badly affected by environmental pollution. During the field visit, the Village Officer of Negambo pointed out that the Dutch canal, which runs through the municipal area and has been mainly used by fishermen to reach the lagoon for fishing, has not been cleaned or renovated during the last 20 years.

Furthermore, the residents and traders of this area dump their solid waste into the canal. Due to improper maintenance and increasing waste dumping, the water in the canal is stagnant and highly polluted. The bad smell and increasing number of mosquitoes are the main threats to the environment, as well as to health. According to the Medical Health Officer (MOH) Negambo, lack of infrastructure facilities to fulfill the demand from the increasing population, and improper maintenance of the existing facilities, are the main cause for many of the diseases in this area (pers. com.). Table 3.17 gives the levels of water pollution in some of the urban, town, and market centres in Gampaha district.

**TABLE 3.17 WATER QUALITY IN SOME URBAN, MARKET AND RESIDENTIAL AREAS IN GAMPAHA DISTRICT, 1987**

Sample	PH (6.5 -8.5)	Turbidity (5.0) mg/l	Fe (0.3) mg/l	NHa (0.5) mg/l	Remarks (WHO drinking water standard.)
Mirigama Hospital. Filtered water (shallow well)	<u>6.0</u>	5.0	0.1	<u>0.6</u>	Should be chlorinated
Mirigama shallow well AGA Office	5.9	6.0	0.1	0.3	
Minuwangoda shallow well Town Centre, Market	<u>6.0</u>	<u>15.0</u>	0.2	0.3	
Mirigama shallow well Existing Water Supply	<u>6.2</u>	<u>20.0</u>	0.1	0.3	
Mirigama shallow well Town Centre public well	5.8	<u>20.0</u>	0.1	0.3	
Katunayake shallow well drinking water	<u>6.2</u>	<u>15.0</u>	0.1	<u>0.6</u>	* Should be chlorinated
Katunayake shallow well domestic water	<u>6.2</u>	<u>10.0</u>	0.1	<u>1.0</u>	* Should be chlorinated
Divilupitiya shallow well AGA Office	6.4	<u>8.0</u>	0.1	0.1	
Divilupitiya shallow well Town Centre	<u>5.7</u>	<u>10.0</u>	0.1	0.2	
Pallawala shallow well Town Centre	5.8	<u>5.0</u>	0.1	<u>1.0</u>	Should be chlorinated
Udgampola shallow well Town Council	<u>6.2</u>	<u>10</u>	0.1	<u>0.5</u>	Should be chlorinated
Ja-Ela shallow well Gasoline Station	5.8	<u>10</u>	0.1	0.2	*
Pamung shallow well AGA Office near the market	<u>5.8</u>	8	0.1	<u>0.8</u>	* Should be chlorinated
Yakkara shallow well Town Centre	<u>6.2</u>	<u>20</u>	0.1	0.1	

Under lined figures: in excess of WHO drinking water standard.

\* BOI area.

Source: JICA, 1987:p. 141.

Rapid land conversion along the Negambo coast, for commercial and residential purposes, and constructions which have no concern for irrigation and natural run-off, have caused severe flood problems in the area (Irrigation Engineer, Gampaha - pers. com). According to residents and farmers, the annual flood affects their houses, cattle die, and paddy, coconut, and mixed crop lands in the area are badly affected. 28.8 % of the former farmers reported flood as one of the main three problems which pushed them from the agricultural sector, while 11.8 % reported flood was the main reason why they made the decision to sell their lands. 9.2% of the present farmers reported agriculture floods as the main problem in proceeding with cultivation, and 20 % of them reported this as one of the main three problems that they face. Most of the farmers at Negambo, Wattala, Kelaniya, Katunayaka, and along the Dandungama river reported flood and related problems in cultivation. Most of the farmers in these areas said that even though they still continue with cultivation, they do not maintain it very well, as they have been experiencing severe damage due to flooding during the time of harvest. (Refer to Map 3.6).

Besides the above problems, lack of health and sanitary facilities, lack of infrastructure facilities, increasing crime, accidents, and poor security are additional problems that are faced by the people in these areas. Health and the medical facilities have not been improved to meet the demand arising from the increasing population. For example, the total number of doctors, nurses and public health workers per 100,000 population in 1993 was 17, 59 and 13 respectively and it remains the same in 1996 (in other words one doctor serves 5882 patients, one nurse serves 1695 patients and one public health worker serves 7692 people) (pers com. Assistant Government Agent Officer, Gampaha). According to the records from the police department, the number of crimes, especially robbery at knifepoint, theft of property, attempted homicide, arson and mischief also increased. The number of casualties reported by police has increased from 2644 in 1991 to 3494 in 1993 (Assistant Government Agent Office, Gampaha district, 1996). Table 3.18 gives the increasing number of accidents and type in Gampaha District.

**TABLE 3.18 ACCIDENTS REPORTED BY POLICE GAMPAHA DISTRICT**

<b>Nature of Accidents</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
fatal	265	257	255
Grievous	264	317	407
Non-Grievous	1732	1783	2222
damages only	2972	3061	4155
Total	5233	6120	7039

Source: Assistant Government Agent Office, Gampaha District, 1996: table. 9.8, p. 73).

The Village Officer, Negambo, said in his interview that increasing population and unemployment, and a lack of social, economical, infrastructural and security facilities were the main reasons for the increasing social problems. Higher demand for these services from the increasing population has not been met by the responsible departments. Immediate attention needs to be paid to this unplanned urban expansion and to population redistribution.

**3.6.8.2 INDUSTRIAL POLLUTION**

Agricultural land degradation due to environmental stress in Gampaha district is mainly through soil and water pollution. The recent changes in urbanization and industrialisation, coupled with the inadequate waste disposal facilities in the industrial areas, have aggravated the problems (Public Investment 1993). The Central Environmental Authority has identified that 90% of the polluting industries such as chemical, textile, leather, base metal, timber and wood, mineral products, pulp and paper, service stations and mechanical industries are located in the Western province, especially in Colombo and Gampaha districts (Appendix 3.13).

Nearly 80.2 % of the industries in Gampaha district are considered polluting industries. Of these, 498 and 1446 are large and medium scale industries (see table 3.6), which contribute more to pollution. Table 3.19 gives the distribution of these industries by Divisional Secretaries in Gampaha District.

**TABLE 3.19 DISTRIBUTION AND TYPES OF INDUSTRIES BY DIVISIONAL SECRETARIES IN GAMPAHA DISTRICT 1995**

Divisional Secretaries.	Mining & quarrying	Food & Beverage	Textile & Wearing	Wood & Wood products	Paper & Pulp	Chemical Plastic & Rubber	Non-Metal	Fabricated Metal	Other industries.	Total
Attanagalla.	26	183	72	114	5	24	198	44	99	765
Biyagama.	90	78	48	40	6	25	87	76	65	515
Divilupitiya.	135	563	227	170	6	25	919	33	40	2118
Gampaha.	19	161	119	109	15	27	53	89	137	729
Ja-Ela.	-	91	89	46	11	32	21	62	14	366
Katana .	02	100	140	48	08	66	434	50	20	868
Kelaniya.	-	61	92	47	20	30	19	86	11	366
Mahara .	36	124	91	46	08	18	54	77	143	597
Minuwangoda.	01	252	144	101	05	37	134	53	73	800
Mirigama.	40	723	142	368	07	34	298	42	75	1729
Negambo.	01	59	28	36	16	05	30	63	29	267
Wattala.	01	72	81	27	17	42	11	98	09	358
Weke	94	210	73	74	09	178	124	56	45	863
Katunayake BOI	-	01	48	01	02	07	-	06	15	80
Biyagama BOI	-	01	09	-	01	11	08	02	05	37
Total	445	2679	1403	1227	136	561	2390	837	780	10,458

Source: Statistical Hand Book of Gampaha district, 1995.

According to the field survey, Attanagalla, Divilupitiya, Gampaha, Katana, Kelaniya, Minuwangoda, Mirigama and Weke Divisional Secretariats were badly affected by industrial pollution. Effluent from textile and wearing apparel, food and beverages, fabricated metal products and non-metallic products, such as bricks, tiles and rice mill industries, have greatly affected agricultural lands in this area. For example, 53% of the wells (drinking and irrigation water) and 26% of the land were affected in Katana AGA Division where 140 textile and wearing industries and 434 non-metallic products, and a large number of chemical, plastic and rubber products industries are located. Coconut was the main source of income and economy in Katana before the new policy changes took place (Ariyathilaka, 1993). However, much of the coconut producing land has been abandoned due to industrial pollution (Ariyathilaka, 1993) (see also appendix II, plate 5). Mirigama is also one of the areas badly affected by pollution. 723 food and beverages industries, and 142 textile and wearing apparels are the main contributors to pollution in Mirigama (Assistant Government Agent Office, 1995). Table 3.20 gives the percentage of present farmers affected by the soil and water pollution in this district.

**TABLE: 3.20 PERCENTAGE OF FARMERS AFFECTED BY THE SOIL AND WATER POLLUTION IN GAMPAHA DISTRICT (percentage)**

Pollution source	Present farmers	
	Well	Soil
Attanagalla	40%	7%
Biyagama	73%	27%
Diviliputtiya	60%	13%
Gampaha	47%	7%
Ja-Ela	60%	33%
Katana	53%	26%
Kelaniya	27%	53%
Mahara	7%	13%
Minuwangona	47%	47%
Mirigama	40%	20%
Negambo	60%	27%
Wattala	73%	60%
Weke	60%	33%
Total	53.8%	28.2%

Source: Field Survey.

The production of chemical, plastic, and rubber products in Kelaniya, Ja-Ela, Katana and Weke Divisions directly affects the agricultural lands in these areas. According to the Assistant Director for Agriculture, in Kelaniya, 693 acres [280ha] of paddy land cultivated in 1984, had declined to 5 acres [2ha] in 1995 in Kelaniya AGA Division (see Appendix II, Plate 6). Nearly 688 acres [278ha] of paddy land was totally abandoned due to pollution (effluent water discharge 3,000 litres per day) from the Kelaniya Tyre Co-operation (Field survey). As there is no treatment of effluent water, almost all the effluent flows into the nearby lands. Solid waste is dumped into the surrounding lands, which also compounds the problem. Farmers in Kelaniya Division have been directly affected by this industrial pollution. 93 % of the present farmers in Kelaniya AGA Division complained about groundwater pollution caused by industry. 9.6 % of the former farmers said that the pollution problem was the main reason for them selling their lands. 10.76 % of the present farmers reported pollution as the primary problem that they face in cultivation.

Most of the lands in the Minuwangoda and Katunayaka areas have been affected by pollution from the airport and industry in the FTZs. The effluent from these factories flows directly into the Dandungama River. Most of the farmers around Dandungama, Katana, and Minuwangoda areas depend on this river for irrigation. Due to the recent pollution problem, nearly 500 hectares of paddy and mixed crop land along the Dandungama River has been affected. Inland

fishing of the river had to be totally abandoned due to industrial pollution in the river (Field Survey). 200 acres [81ha] of paddy land around the airport at Katunayaka were acquired by the airport expansion programme (see Appendix II, Plate 7) (Land Use Planning Division, 1996).

After the brick and clay-based industrial development expanded into this area, many farmers leased their lands for clay cutting. It was observed during the field survey that fertile agricultural lands along Attanagalla and Maha rivers, and Dandungama and Negambo AGA Divisions are leased for clay cutting. 6% of the present farmers in the survey allowed part of their land for clay cutting, and 4% of the former farmers leased part of their land for clay cutting. According to the Physical Health Inspector of Gampaha, the trenches in the fields get inundated with river water and become breeding grounds for mosquitoes. This causes further disease and environmental problems in the area.

Agricultural lands in Kelaniya, Ja-Ela and Wattala areas which are located on the border of the city of Colombo have been rapidly converted by property developers for commercial purposes. 61 % of the converted land in this area is used for commercial uses (Department of Survey General's, 1995). Even though the total number of industries in these areas is low; 40 % of the large scale industries are located here (see table 3.6). According to the land use maps (Department of Survey General's, 1980 and 1990), 60 % of the agricultural land which was located on the border of the city of Colombo had been converted to non-agricultural uses.

Almost all the industries in the district dump their solid waste into the rivers or into the lagoon on the west coast. Solid waste from textile, leather, plastic, and chemical industries has badly affected the fishlife in the lagoon. The 15,000 population who depend on lagoon fishing have been seriously affected as the lagoon water is polluted (Ariyathilaka, 1993).

Further, the Master Plan Study for Gampaha District stated that,

“in recent years the households and agricultural lands located closer to the urban and industrial areas have increasingly become contaminated with waste water...Several shallow wells located in these areas had pressure of organic matter...Such contamination serves as a vehicle for waterborne diseases and is of high concern from a health and sanitation view point” (JICA, 1987).



The phenomenon of waterborne disease is aggravated during the dry seasons, when little water is available (JICA,1987).

According to the Central Environmental Authority (CEA), the BOI area, Kelaniya, Katana, Ja-Ela, Wattala, Divilupitiya, Minuwangoda and Negambo are the areas highly affected by industrial pollution. Table 3.21 shows the water pollution levels (even after treatment) in some of the industrial areas in this district.

**TABLE 3.21 WATER POLLUTION LEVELS IN SOME SELECTED AREAS IN GAMPAHA DISTRICT (BOD, COD AND TSS levels)**

Year	location		sample.			standard.		
			BOD	COD	TSS	BOD	COD	TSS
		***	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
1991	Dankotuwa	inland surface water.	1400	-	5715	30	-	50
1994	Katana	inland surface water	60	500	-	30	250	-
		inland surface water	180	850	413	30	250	50
		soil	250	580	-	30	250	-
		inland surface water	60	200	724	30	250	50
	Katana.	soil	1040	4280	-	30	250	-
		well water	45	215	-	5	10	-
1995	Seeduwa	inland surface water	920	1320	-	60	250	-
	Kurumbulipitiya river	up stream 150m away from the discharge point	05	12	-	05	10	-
		Down stream 50m away from effluent discharge point.	110	94	-	05	10	-

TSS: Total Suspended Solid.

BOD: Biological Oxygen Demand.

COD: Chemical Oxygen Demand.

\*\*\* : The effluent tested samples after treatment.

Source: Central Environmental Authority, unpublished data.



According to Table 3.21, the level of BOD in Dankotwa surface water was 1400 mg/l after treatment, whereas the accepted standard level was only 30 mg/l. The case of TSS was 5715 mg/l, against the standard level of 50 mg/l. BOD level in Down stream (50 meter away from the affluent discharge point) of Kirunbulipitya River was 110 mg/l, while the accepted standard was only 5 mg/l. The COD level in the same spot was 94 mg/l, where as the standard was only 10 mg/l. Inland surface water in Seeduwa area had 920 mg of BOD per litre, while the accepted standard was only 60 mg/l. COD level at the same area was 1320 mg/l, against the accepted standard of 250 mg/l.

As the groundwater and the river water of the country are the main source of irrigation for agriculture, animal husbandry, wildlife sanctuary and for other domestic purposes, it is important to pay immediate attention to this water pollution problem. The main rivers of Gampaha District supply water to the city of Colombo and to some parts of Gampaha District. Thus, maintaining the water quality of these rivers is a necessity. Further, industrial pollution indirectly affects the fertility of the soil and the land and in this way ultimately affects the agriculture of the nation.

All these pollution problems require immediate attention. As is mentioned in the Public Investment Programmes, “these unplanned [urban and industrial] activities require urgent attention, considering their negative impact on agriculture and environment” (Public Investment Programme, 1993, p. 103). Map 3.10 shows the areas affected by urban and industrial pollution in Gampaha district.

MAP 3.10 POLLUTION AFFECTED AREAS IN GAMPAHA DISTRICT



Field Survey, 1996.

### 3.7 CONCLUSION

The opening up of BOI, FTZs, industrial estates, and new towns, together with the public sector investment on infrastructure development, have attracted a significant number of local and foreign investments into Gampaha District. Furthermore, after the relaxation of controls on commercial activities, Colombo had to expand in order to absorb increasing commercial activities. Space consuming activities like administrative, industrial and warehousing have been (and still are being) shifted from the city of Colombo. Meanwhile, Gampaha District has encouraged commercial and industrial establishments. Consequently most of the new establishments under the free market economy have settled there.

New employment opportunities have pulled a higher number of labourers and their families into Gampaha District. The newly developed transport links with the capital city of Colombo have allowed city workers to reside in Gampaha and commute to work in Colombo. Thus, the high rate of immigration resulted in population increase. This population increase resulted in an urgent demand for more land for housing and other services.

Attractive returns from land investments and policy changes with regard to land, have encouraged private property developers to invest in land in Gampaha district. Property developers have manipulated land prices and values and have virtual control of the land market in Gampaha district. It can be said that to some extent the free market policies leading to the industrialisation process have created difficulties for farmers in cultivation. The high cost of production, inflation, increase of input prices, inaccessibility to institutions, lack of irrigation, storage and transport facilities, and marketing problems have all discouraged farmers from continuing in the agricultural sector.

Unplanned urban expansion, with inadequate infrastructure development, and the profit-oriented property development activities have caused extensive use of converted land, and added to land degradation. Inadequate treatment facilities have resulted in severe pollution of the environment. In particular, the soil and water pollution has directly affected agricultural lands in this area. Inadequacy of infrastructure facilities in the urban areas has led to many health and social problems as well.

## **CHAPTER FOUR**

### **SOLVING THE LAND PROBLEMS IN SRI LANKA**

#### **4.1 INTRODUCTION**

The fast increase in the demand for land for non-agricultural purposes, and lack of proper planning and implementation, together with increasing urban and industrial activities under the free market policies, have led to rapid conversion of agricultural land. The increasing demand for food and the importance of the agricultural sector in the economy, means that more land needs to be made available for agricultural uses, and food production needs to be further increased. As the land resources are already depleted, it is necessary to put in place proper land use planning procedures to stop the situation from worsening. Some of the alternatives for overcoming the land problems which are discussed in this chapter are; reducing the land degradation in the rural areas, intensifying the agricultural sector to maximize the agricultural production, controlling the premature land conversion in the peri-urban areas, and controlling of land degradation from pollution.

#### **4.2 SOLUTIONS TO MITIGATE LAND PROBLEMS IN SRI LANKA**

The population in Sri Lanka continues to increase and is forecast to level off at about 25 million after year 2025 (Department of Census and Statistics, 1995a). The demand for food is expected to double due to this increasing population and rising income levels. Thus, competition for land among various uses, and appropriate management of land according to its capacity, will inevitably become a more pressing problem in Sri Lanka. These pressures have already caused continued misuse, over exploitation, and land degradation. Improper planning due to the rapidly increasing demand for land is the biggest challenge facing Sri Lanka's land resources. For example, urbanization has steadily expanded into areas still not officially declared "urban". Urban expansion has reduced rubber and coconut plantations around major cities (the land commission estimated a 10 percent decline in coconut plantation between 1962 and 1982). Tea plantations also declined in size by about 10 percent (Asian Productivity Organization, 1995a).

Land under shifting cultivation increased from about 1 to 1.2 million hectares. In the past, about 90 percent of the shifting cultivation was restricted to Dry and Intermediate Zones, but it is now

found in every region. Deforestation and soil erosion are identified as very widespread and are serious problems in Sri Lanka. Any erosion of the soil can reduce crop yields drastically. Sedimentation of tanks, irrigation works and up country reservoirs, directly results from soil loss in catchment areas. Recent observations of high rates of siltation in the Mahawelli reservoirs emphasize the problem of soil loss (Asian Productivity Organization, 1995b).

Management of natural resources has increasingly depended on national administrative and legal structures. The hierarchy of regional administrative divisions that supports the central government now consists of provinces, districts, division and village offices (Grama Niladharis units) in decreasing administrative order and area. Provinces are now the fundamental administrative units of regional governance, and they have concurrent jurisdiction with the central government over the protection of the environment, soils, coastal fisheries and wildlife.

Management and implementation of environment and farm land conservation has depended on national administrative and legal structures as stated in the constitution of the Democratic Socialist Republic of Sri Lanka in 1978. The important national level legislative institutional developments in the field of natural resources and environment include the establishment of Central Environment Authority in 1981 under the National Environment Act of 1980, the Environmental Council in 1982, the District Environmental Agencies in 1984, the Ministry of Environment and Parliamentary Affairs in 1990, Control of Pesticide Act of 1981, the National Aquatic Resources Act of 1981, which was amended in 1988 to require environmental impact assessments and licenses for industries potentially producing air, water and land pollution. However, even though there are a large number of government entities responsible for implementing environmental laws, planning and implementation gaps and overlaps, and lack of cooperation and coordination, make their task difficult. Medium and long-term planning for land management and land use is essential to mitigate adverse environmental impacts.

Market orientation makes for more economically efficient use of natural resources, but a major outstanding issue is whether this exploitation will be both environmentally friendly and sustainable. Increasing conflicts over land, water, and forest resources on the one hand, and increasing unemployment, food imports, and the low income of rural people on the other hand, necessitates sustainable management of land resources, especially in light of maintaining the agricultural sector of Sri Lanka. The problem for the government, therefore, is to devise policies that will effectively manage resources in such a way as to facilitate the transition which will minimize any adverse effects on the natural resource base that supports agriculture. As land is

already short and the demand for land is continuously increasing, Sri Lanka has to maximize the use of existing land resources (intensifying the production), control premature land conversion in the suburban areas, and adopt possible alternative ways for agriculture to fulfill the demand with minimum resources. Further, action plans to control land degradation in the rural, urban and industrial areas, and planning and implementation of sustainable land use planning and management, need to be considered immediately.

#### **4.2.1 INTENSIFICATION OF AGRICULTURE**

Feeding an expanding population and improving nutritional standards, without further increasing pressure on the natural resource base, and without causing over reliance on imports, or both, are the main problems which require effective land use strategies. One of the clear approaches in meeting the present and future demands for food, is increasing farm productivity. Emphasis should, therefore, be placed on intensifying production of land already under cultivation, i.e., a transition from extensive to intensive agriculture is required. Improving yields can be achieved by the introduction of high yielding varieties and fertilizer application, and through improved management practices. It will then become possible to reduce the amount of land required for farming. Intensive agriculture will also help to withdraw the agricultural frontier from marginal and environmentally fragile areas, which can then be left to revert to forest or other forms of protective cover.

In the case study area, land along the Kelaniya, Maha and Attanagalla rivers, and in the Attanagalla, Dandungama, Kelaniya and Wattala AGA divisions (with alluvial soil) is heavily used for paddy cultivation. As Gampaha falls in the wet zone and receives annual rainfall of 2000-2600mm, and most of the region fall in the Wet Lowland Laterite region (WL<sub>2</sub>), it is an ideal region for paddy cultivation, and requires little other irrigation. Intensifying the paddy cultivation with fertilizer inputs, and adopting high yielding varieties, could easily lead to higher productivity in these areas, which are suitable for paddy from all other perspectives.

Gampaha falls in the high yielding coconut area in Sri Lanka, the “coconut triangle” (4000 nuts per hectare yield). Coconut cultivation in Gampaha has been declining, as much of the coconut land, especially along the main roads and around urban areas, has been converted to urban and industrial uses. Much of the land which remains unconverted is up for sale (see appendix II, Plate 8). Due to the fact that they are planning to sell their lands, these farmers have neglected their lands and consequently production has dropped to an average of around 1500 nuts per

hectare. Because of the suitable soil and climatic conditions for coconut cultivation, the introduction of intensive cultivation should make it highly possible to increase production at least to the level of 4000 nuts/hectare.

The increase of chemical inputs in surface water and the consequent leaking into ground water can lead to serious problems of downstream pollution, however. Increased application of fertilizer has already caused both short and long-term problems, not only in Gampaha district, but also elsewhere in Sri Lanka. Thus, research and development has to be carried out with a view to increasing the use of organic manure, which is non-polluting, and also serves to condition and conserve the soil. Intensive agriculture further requires research into seed plant technology, for the adoption of high yielding varieties.

The fishing industry in Gampaha district has great potential, due to its proximity to the Indian Ocean and the presence of the Negambo lagoon. However, the fishing industry has not been developed to its potential. The adoption of intensive technologies by the industry would help to increase off-shore and deep-sea fishing. Even though at present there is no quota system in place for fish catch, the resources are not being used to capacity, due to the lack of technology and capital. There is already an existing demand for marine products in Gampaha due to the tourist resorts in the area. The demand for special varieties such as prawn, crabs, cuttlefish and tuna is especially high. An increase in catch due to improved technology would thus help to raise the income and quality of life of the fishermen and their families in this area. However, if improved technology is introduced, there will be a corresponding need to monitor the levels of catch, and a quota system may need to be introduced in order to ensure the sustainable use of the resource.

Besides intensifying the agricultural sector, Gampaha can develop an intercropping system. Even though this system has already been introduced to the district under the Integrated Rural Development Programme, the field survey revealed a lack of knowledge among farmers regarding suitable crops for the system, and this has been a major constraint on the effectiveness of intercropping (see appendix II, Plate 9). For example, as seen in Plate 9, the intercropping of pineapple in coconut plantations has not been maintained very well. Therefore, agricultural extension services need to be improved to educate the farmers in proper knowledge of the system. Also, further research must be undertaken to identify crops suitable to the district for intercropping.



#### 4.2.2 CONTROL LAND DEGRADATION

One of the other important land use issues to be considered in Gampaha is forest land. Forest land has been declining in Gampaha due to unplanned urban and industrial expansion, infrastructure development, forest encroachment, and shifting cultivation. Because of the importance of forests in the country in maintaining the local climate, in ensuring the rivers that flow are perennial, in preventing soil erosion, as a source of supply of industrial and fuel wood, and in securing a balance between the people and the natural ecology, more suitable management of forest land needs to be adopted, not only to preserve forests from degradation, but also to preserve agricultural land from losses due to soil erosion which is caused by deforestation and flooding.

Negambo lagoon, with 1600 ha of mangrove swamp, has been degraded both by flooding and mud siltation, and by urban and industrial pollution. This lagoon is a natural resource that provides facilities for fishing, and about 3000 people are engaged in this area. The total population dependent on fishing is about 15000 (Central Environmental Authority, District Profile Gampaha 1991).

During the recent past, the lagoon has suffered due to silting. This silt accumulates in the lagoon and affects the natural eco-system. Another aspect of lagoon siltation is a reduction in its capacity to contain rainwater and storm water which comes in through the waterways that are connected to it from many parts of the district. As a result, areas through which the waterways travel are affected by flooding (see map 3.6).

According to Ariyathilaka (1993: p.103),

“If the present trend of silt falling into the lagoon continues (one ton annually), the fishing industry connected to the lagoon will get seriously affected. This lagoon is also a natural reserve for many indigenous and migrant birdlife. Furthermore it is the breeding ground for varieties of fish, particularly prawns and lobsters, which gives life to a major export industry as well. It is estimated that the total value earning from this industry is 10 million rupees.”

One solution to the silt build-up is dredging, but according to the Central Environmental Authority, this option is not feasible - "Dredging in the lagoon should not be permitted. The water depth, particularly in the shore region, should not be increased and dredging may cause turbidity, detrimental to the sea grass beds." (Central Environmental Authority, District Profile of Gampaha 1991: p76)

Therefore, a possible solution is to control soil erosion through control of deforestation, at least in strategic areas along streams and waterways which are connected to the lagoon. Land degradation for flooding would also be reduced by this.

Poverty is another important issue which needs to be given attention, as it is also one of the main reasons causing environmental degradation. Poor people are forced to adopt short-term solutions to their problems of food and fuel shortage at the cost of longer-term environmental damage. The forests in the Mirigama AGA division in the case study area have been encroached on by poor migrants entering the district. According to the encroachees, they have no idea about the environmental damage that they cause by encroaching and depleting the forest. The first task of any government which wishes to protect the environment, is to provide the basic needs of the poor in the country. Besides poverty alleviation, increasing individual and community participation in environmental preservation and management, giving local residents the responsibility to preserve their own natural resources (such as rivers, lakes, and forest), would successfully receive high community participation (participatory management approach in utilization and management) in natural resource preservation and management. Public awareness can be achieved through adopting environmental studies in schools and university curricula, and through increasing extension services through workshop and training to the public.

Agricultural land degradation in Gampaha is also occurring due to flooding caused by unplanned building construction, which is blocking the natural run-off. Most of the areas along rivers and in the western coastal area suffer from annual flooding problems (see map 3.6). 28.8% of the former farmers and 20.0% of present farmers in this study were affected by this problem. Paddy cultivation along the riversides and on the western border of the district annually incurs losses due to this. This can be controlled only through control of unplanned construction and deforestation. Agricultural zoning (see below) may help to demarcate the agricultural land from construction activity.

One of the other reasons found in the case study area for land degradation is land ownership. Farmers have little interest in land conservation if the land does not belong to them. If we take Sri Lanka as a whole, nearly 82% of the land area comes under some form of state control, and this has led to widespread land degradation. This was clearly stated by the Asian Productivity Organization as follows;

“Lack of legal tenure also discourages the shifting cultivation farmers from investing in any soil conservation or land improvement measures. Even when the land is given under the Land Development Ordinance(LDO), there is only conditional ownership, which is often unacceptable to commercial banks and lending agencies. Thus, although short-term cultivation loans are given, banks hesitate to support investments on long-term land improvement, and farmers, even where they are interested, find it difficult to improve their lands” (Asian Productivity Organization, 1994: p.445).

Farmers' attitudes to land conversion mostly depend on the extent to which ownership and control is vested in the hands of local inhabitants, who have a built-in incentive to maintain the resource. Therefore, natural resource management and ownership have a close relationship. Outright grants of the land would be an appropriate solution to this problem. Even if the land is small and the farmers are poor, they still take conservation measures when it is their own. Through giving the ownership of land to the farmers, direct responsibility for continued management and conservation of land resources would be secured. Besides this, giving new land to landless farmers would reduce environmental deterioration due to poverty. This was stated by the ADB (1990:p213) as follows: “A strategy for sustainable development needs to pay close attention to the structures of ownership and distribution of resources and how development policies affect them.” However, in the case of Gampaha, tree felling may be the only option available. In the long run, such a decision must take account of the need to maintain sufficient forest reserves to protect watersheds and wildlife, and to prevent erosion. At this stage, then, land use planning is important in deciding the finite level of exploitation of such reserves below the serious damage level.

Most of these methods to preserve the rural land from degradation mentioned in this section are equally applicable to other parts of the country as well.

#### 4.2.3 SOLUTIONS TO MITIGATE PREMATURE LAND CONVERSION

The conversion of agricultural land at the urban fringe for residential and commercial purposes is an inevitable process of urbanization. Urban sprawl is accelerated by business and industrial investors who accrue agricultural land from the urban periphery for commercial, industrial, and housing complexes, especially in Gampaha, Kegalle and Kalutara Districts on the border of Colombo city, and Jaffna, Kandy, Trincomalee, and Galle districts have also been undergoing this phenomenon. (see section 3.5)

In the case study area, most of the establishments moved from the capital city of Colombo and relocated in these suburban border areas. As mentioned in chapter three, Colombo discouraged new and space consuming establishments from locating there, whereas the BOI areas of Gampaha encouraged such establishments. This has increased the demand for land tremendously and *ad hoc* land changes have taken place in the suburban areas.

“The development activities associated with the Greater Colombo Economic Commission [now BOI] have also resulted in the conversion of agricultural lands for urban and industrial uses. Although at present (1993) land under urban use constitutes less than 2 percent of the total land area of the country, at current rates of expansion it is likely that this would be tripled before the end of the century” (Asian Productivity Organization, 1993: p. 357).

In Gampaha district, the land alienated by urban sprawl is not just any land. Urban centres are often located in areas of historically high population density, around which an urban civilization could coalesce (For example, city of Colombo, Kandy and Jaffna). Thus the high population density of Gampaha district in turn reflects fertile agricultural conditions. For example, much of the most suitable land in Gampaha district for coconut, paddy and vegetables has already been converted by urban sprawl.

Rapid land conversion and industrial pollution (see tables 3.15 and 3.21) reveal unplanned urbanization and industrialization in this district. Free-market policies have encouraged local and foreign investments, but the necessary planning and implementation regarding the social, environmental, and sustainable use of resources has not improved at a corresponding rate. Most of the industries located in this district not only exploit the natural resources of the district, but

also degrade and pollute the environment and fertile agricultural land resource (see tables 3.17 and 3.21). The degradation and premature conversion of agricultural lands represent often irreplaceable losses. The conversion is often made without proper knowledge or concern for the long-term consequences on the environment and the social welfare of the people.

Thus, the critical question is, do the market forces take into consideration the social welfare of the people and the environment and/or sustainable use of the natural resources? In other words, does the present trend of development lead to a sustainable development, or is government intervention required? As demonstrated in previous chapters, it is obvious that government intervention and changes in land use policies should be made for the sake of the society and the environment. Agricultural land, not only in Gampaha district but also in the country as a whole, needs to be preserved for the importance of this sector in the economy.

The reasons for the need to preserve agricultural lands are clearly stated by Meister (1982: p.2) as follows:

“Of course one may disagree with the need to preserve good agricultural land- why should we? This is a legitimate question because land is not preserved for preservation’s sake. Land use policies to preserve land are means towards ends. Such ends or objectives of the society may be:

- to preserve open spaces;
- to maintain productive soils in agricultural uses;
- to control urban sprawl;
- to enhance the state of local or national economy;
- to improve visual quality of the landscape;
- to promote or encourage local or national supply of food”.

Further, Meister quoted Gardner (1977), in his study as,

“The legislative field declares that the preservation of agricultural land is of paramount interest to the welfare of the State of California in that the preservation of such land, especially prime agricultural land, is critically important in order to assure and maximize food, open space, and employment

opportunities which are necessary for present and future generations of the state and the national” (quoted in Meister, 1982: p3).

The same issue is applicable to Gampaha district and to Sri Lanka as well. Preservation of agricultural lands from degradation and premature conversion is essential, as the agricultural sector is still vitally important to both Sri Lanka’s economy and to its society. Planning institutions should consider the importance of the agricultural sector in terms of food security, employment opportunities, export earnings and raw material. In addition, the environmental pollution and irreversible destruction of natural resources have serious impacts on sustainable use of natural resources.

Besides the unplanned land conversion, lack of infrastructure development, proper planning and policies also cause urban related problems in Sri Lankan cities, especially in Colombo and its suburban areas. As is stated by the ADB (1990: p211);

“Past industrial and urban policies were not designed to address the issues which were related to the environment and sustainability. It was observed that the growth of urban settlements has not been matched by a corresponding enhancement of the capacity of the urban infrastructure to service this expansion. A failure to redefine urban boundaries, create new urban local authorities as necessary and strengthen the revenue base of the local authorities have all contributed to the inadequacies of the urban infrastructure.”

The unplanned expansion and population concentration of these cities has caused tremendous damage to the environment, especially to the land and water supply, through the discharge of solid and effluent waste (see chapter 3). For example, slums and shanty towns have developed on the Colombo and Gampaha border along the Kelaniya river, and in the Negambo MC and Gampaha UC areas (see appendix II, plate 10). The quality of the life of these shanty dwellers is very low and they often approach the nearest natural resources for their living needs, especially the rivers, the forest, the Negambo lagoon and the sea or coastal areas, or they enter into the urban areas for illegal and informal income generation activities. The consequence of all these factors is always damage to the environment. Thus, it is important that the policy makers consider basic infrastructure development, such as facilities for water, sewerage, flood control, public transport, and low cost housing, adopt an urban waste water disposal system, and encourage the big urban establishments to install water pollution control devices.

Likewise, the policy changes of 1977 encouraged the development of tourism, but the necessary planning and infrastructure developments and the control measures were not provided. According to the hoteliers in Gampaha district, even though the Gampaha and Negambo areas have got beautiful beaches and scenic areas for tourists, and receive a large number of tourists every year, this district has not been included in the tourist guide of the Tourist Board because the necessary planning and infrastructure development has not been provided to deal with the increased tourism activity. Consequently, the tourist resorts and neighbouring environment, especially the coastal beaches, have been further degraded. As the ADB states (1990:p211-212);

“Although the adverse impact of tourism on the coastal environment was recognized, tourism policies were not specifically coordinated to protect the natural resources that can sustain the capacity for the development of tourism. This applies both to the activities within the tourism sector, such as the development of coastal holiday resorts, as well as the activities of other sectors, such as construction, fisheries, industries and urban development which affect the quality of the coastal and marine environment.”

All these show the importance of proper land use planning to the district and to the country as a whole. However, past experiences show that planning alone is not enough; proper implementation of policies is equally important. Planning requires strong administrative and legislative support. Public awareness and community support are also essential ingredients for better land use planning and implementation. Absence of the necessary database is one of the constraints on better planning. It is thus the government's responsibility to collect the necessary information regarding the available resources, and the cost of damage to the society and to the environment.

Some of the methods to control and manage agricultural land conversion in the peri-urban areas are analysed below.

#### **4.2.3.1 AGRICULTURAL ZONING**

Zoning is the allocation of different land uses to particular land areas. At the planning stage, Sri Lanka needs to specify the conditions needed for each particular use, and identify the areas suitable land for those uses. At the implementing stage, restrictions need to be imposed to carry



out the planning. For example, forest land, and land for reforestation, fertile and suitable land for agriculture, land for urban and industrial uses, other land uses such as recreation, open spaces, etc., need to be identified with consideration given to the suitability of land for the particular use (e.g. paddy cultivation in the monsoon areas). Zoning would protect the reserves from unplanned conversion and lead to sustainable use of land and other resources.

In the case of Gampaha district, fertile coconut land along the coastal areas, paddy lands along the rivers and river catchment areas, and forest land in the Mirigama AGA division, fishing areas, especially in Negambo and along the western coast need to be defined for agricultural activities. Negambo beaches and lagoon areas need to be preserved for recreational purposes. The BOI area, Negambo MC, Gampaha UC and other UCs and TCs should be defined for urban, industrial and residential purposes. The rest of the agricultural lands must also be preserved and well maintained for agricultural purposes. Even though a zoning system was introduced to Sri Lanka in 1974, in practice this is not functioning. The rapid changes following the 1977 free market policies have created a desperate need for effective zoning systems in this district which is undergoing rapid land conversion. Local government units need to be given authority for planning and zoning for their own areas. The zoning should also consider the transportation facilities, utilities, drainage and flood protection, and the provision of schools and similar public sector services.

However, as most of the agriculture and residential land in Gampaha has already been converted (within the last 15 years)(see table 3.15), and most of the areas are already suffering from industrial pollution (see tables 3.17 and 3.21), agricultural zoning method may be less effective in this fast-growing district. According to Randall (1987: p350), "There is powerful pressure to rezone agricultural land for residential uses as a metropolitan area grows." This method could, however, be adopted in some other parts of the country where urban sprawl is just beginning.

#### **4.2.3.2 LAND BANKING**

Land banking is used to control the unplanned urban expansion into the suburban and agricultural areas around the cities. However, this requires public ownership of land in the suburban or in the urban fringe areas around the cities. This would control the increasing land prices and unplanned land conversion as is stated by Meister (1982: p22);

“Land banking as a tool to implement land-use plans seems to hold some promise. Conceptually the programme is attractive. If executed properly it can achieve some price stabilization (as the urban price evidence showed), it can control urban development, it can control speculation and if so desired it can appropriate community-created increments in land values in the public interest.”

In the case study area, as the attractive land prices are manipulated by private property developers, this is one of the main factors leading to the conversion of agricultural lands (see table 3.8 and appendix 3.5) without planning, especially in the suburban areas. Land banking would be a better way to stop premature land conversion in Sri Lanka, as it can control land prices. As it restricts land price increases, it would indirectly control the selling of land by farmers, and would therefore control the activities of the private property developers as well. It would, further, reduce the extensive or under-utilization of land resources. The question is, will the public sector be able to purchase the land area in the suburban areas when most of it has already been purchased by the private sector? Other cities which are developing more slowly could implement this strategy to stop premature land conversion. For example, the cities in the Mahawelli settlement where most of the land is still owned by the State, could apply this method.

#### **4.2.3.3 TAXATION METHODS**

Most of the developed countries have already adopted taxation methods to regulate land use. However, in Sri Lanka, land valuation for taxation purposes should be based on current use, rather than its market value, which is manipulated by the private property developers. This is explained by Randall (1987: p351-352) as follows:

Property-taxation strategies are most commonly implemented at the urban/rural fringe, with the intention of restricting urban sprawl and delaying the premature conversion of land from agricultural uses. A common strategy is *use-value taxation*, wherein property is taxed on the basis of its value in its current use, rather than on its market value, which may reflect the value of the land in an alternative and intensive use. It is clear that use-value taxation, while reducing the taxes paid on land in agricultural uses, represents a subsidy for farmers.”

Further, high taxation in the suburban areas discourages the farmers and they will tend to sell their land as cultivation seems to be unfavourable. Therefore, this is accelerating the conversion

of land from agricultural uses (Randall 1987). In the case study area, if the market value of the land, which is manipulated by the private property developers is controlled by government institutions or through land banking or by a combination of both, it is possible to control premature land conversion. Therefore, the tax incentives under the free market policies, which are favourable for private property developers, need to be reviewed in order to ensure the protection of agricultural land.

Lower land prices would also allow the farmers to stay in the agricultural sector and protect agricultural land from future disappearance due to high land prices. As this taxation strategy would restrict premature agricultural land conversion, it would further protect the farmers from other problems which were identified in this study, for example complaints from new (non-agricultural) neighbours about smell and other agricultural pollution.

At this stage, the “land productivity tax” strategy would not be applicable to Sri Lanka, as there are many variables beyond the farmers’ control which affect the productivity of the land. Further studies need to be done to identify the appropriate taxation method for Sri Lanka.

#### **4.2.3.4 DEVELOPMENT RIGHTS (PURCHASE OF DEVELOPMENT RIGHTS AND TRANSFER OF DEVELOPMENT RIGHTS)**

Under the Purchase of Development Rights method, a government institution purchases the development rights from the land owner. Under the Transfer of Development Rights, each zone would be identified for development, and this will be preserved. The selection of areas for particular uses needs to consider the social, environmental and sustainable use of the land resource. Thus, once the land is identified for agricultural uses, the development of the land (conversion for non-agricultural uses), is not permitted. As is explained by Randall (1987:p355), “The proposal for Transferable Development Rights (TDRs) is aimed at accommodating the pressure for more intensive development that arises from population growth and economic progress, while providing for the preservation of natural or built environments, deemed worthy of preservation, and at the same time eliminating the inequitable treatment of owners of different tracts of land.” Thus, as the case study area has high population growth and economic progress, this TDR method would be appropriate for preserving the natural resources and agricultural lands, while progressing with economic development.

#### 4.2.4 CONTROL OF POLLUTION PROBLEMS

The pollution problems from unplanned urban and industrial development, include, air, water, landscape, noise, and smell pollution all of which require policy attention. Market failures and lack of government interference are the main reasons for these externalities. According to Meister (1995: p37), “To correct this failure, they have to be internalized within the decision making process of the firm or person causing externality.” However, before doing this, Sri Lanka needs to establish a system for natural and environmental resource accounts to reflect economy - environment interactions at both national and regional levels, in order to identify the real cost of the environmental damage. Further, revision of the existing environmental regulation standards to conform with the local conditions, particularly with respect to use of appropriate effluent and environmental standards, is also required. In the case of water pollution it is an effluent standard, whereas it is an emission standard in air pollution. This standard would show the level of pollution that the polluter must consider. The amount of pollution exceeded could then be charged, i.e. industries can then be charged according to the level of their effluent discharged (Effluent charges or taxes).

In the case study area, although some of the industries have already installed pollution treatment plants, these plants are not enough to reduce the solid and effluent waste to acceptable levels. The field survey revealed that industrial pollution in most of the area was from the waste discharged after treatment (see table 3.21). There is, therefore, an urgent need that the industries be made to install effective waste treatment plants. This would prevent thousands of hectares of fertile agricultural land from degradation and abandonment due to pollution. The hundreds of paddy plots totally abandoned in Kelaniya AGA Division due to industrial pollution is a very good example of this abandonment.

According to table 3.21, most of the industries are liable to be charged, even though they have been treating their effluent. Their treatment plants are not good enough to meet the environmental standards set for this district. The annual permits for these industries could be canceled. At the moment, however, little of this happens, due to some corruption in the process of issuing permits. Therefore, in addition to planning for land use policies, it is important to adopt strict regulations at administrative and implementation levels, and to improve monitoring standards.

Industrial concentration in the Western province has caused more industrial pollution and environmental degradation in these areas, and is destroying much agricultural land. Through providing necessary infrastructure developments to the dry zone areas, and effective incentives to the investors who are willing to move out of the Western province, the environmental pollution problems in the Western province could be eased.

Besides these specific measures, there are a few issues that policy planners need to consider to solve the land problems, as outlined below.

1. Reduce the increasing rate of population growth.
2. Discourage short-term rent-seeking behaviour and encourage long-term management of resources.
3. Developing agro-based industries. This would help to reduce the regional concentration of pollution problems. That is the agro-based industries can locate all over the island and it would reduce the industrial concentration around the big cities, especially in the Western province. Also, as the land in Western province is more suitable and comparatively advantaged for agriculture, it is necessary to preserve these lands for agriculture, whereas the dry zone can be used for both agriculture and agro-based industries. This would further help to absorb excess rural labour into the industrial sector without bringing them to the cities. Agro-based industry development will further help to have import expenses and increase export earnings.
4. Solving the farmers problems is also very important as the problems caused by their making the decision to sell their land.
5. The shortage of environmental personnel needs to be eliminated. Introduction environmental skills in vocational and professional curricula would help to solve this shortage.
6. Improve agricultural research and development.

#### **4.3 CONCLUSION**

Industrial development, encouraged by free market policies, and an increasing level of population, have led to a rapid increase in demand for land for non-agricultural purposes: for urban expansion, and industrial, recreational and infrastructural development. Private property developers have, under the favourable policy environment since 1977, played a significant role in

making land available. Land price speculation and high land prices have encouraged many, often poor, farmers, to sell their land. Thus, much fertile land has been and still is being converted without any planning. Further, the lack of planning and control often results in land being developed by private property developers without provision of necessary infrastructure. Also, much land suitable for urban expansion is bypassed and the more easily obtainable pieces are bought first. Then, the farmers who are caught in-between land sold and developed for non-agricultural purposes are often forced to give up, sell, or simply abandon cultivation for a variety of reasons.

Lack of planning regarding the location of industries and lack of effluent disposal enforcement and/or environmental legislation, have led to air, water and soil pollution. Agricultural land and groundwater around the industries is already highly affected (see table 3.17 and 3.21). Even after treatment, pollution levels still higher than the acceptable standards (see table 3.21).

Possible solutions to deal with agricultural land supply problem fall into two groups

- 1) those that avoid land degradation of land in the rural area, and increase the productivity of that land in a sustainable way,
- 2) those which, through land use planning, avoid premature land conversion in the peri-urban regions of Sri Lanka and avoid land degradation from industrial and urban pollution.

More specifically sustainable management of the land resource could be achieved through:

- Identification of Suitable crops by types of soil and land.
- Increasing land productivity through intensifying agricultural practices which would help to supply food without requiring more land.
- Using areas which receive monsoon rains for crops which have high water consumption, such as paddy; while dry zone areas could be used for crops that can grow in drier conditions, and for non-agricultural activities.
- Controlling deforestation, especially controlling the cutting of young trees and increasing the rate of reforestation, agro-forestry and grasslands. This would reduce the soil erosion and related hazardous, adverse climatic and bio-diversity problems. Illegal tree cutting, shifting

cultivation and forest encroachment need to be controlled by law. As poverty and landlessness are the main reasons for forest encroachment, these have to be given proper solutions.

- Through removal of factors that negatively affect the profitability of farming. Most of the farmers make decisions to sell their lands based on the problems (see table 3.12) that they have been facing in the sector.

Land use planners have to specify zones for different uses. Appropriate control measures need to be imposed to preserve the specified zones. Agricultural Zoning, Land Banking, Taxation methods and Purchase of Development Rights or Transfer of Development Rights are some of the possible methods that Gampaha district, and Sri Lanka, could adopt to control premature and unplanned land conversion. Polluting industries need to be controlled by law. Adoption of effective treatment techniques must be emphasized, and the issue and the renewal of permits has to be based on the pollution control capacity of each industry. Increasing the public awareness of environment damage would give better results and gain cooperation from the community in meeting the environmental goals.

The land is already in short supply, and demand is continuously increasing. Thus unplanned land conversion and environmental pollution continue to increase. Therefore, there is an immediate need for appropriate planning and effective implementation to internalize the externalities. As the market forces try to maximize their profits, it is the responsibility of the government to undertake the planning and implementation to protect the social and environmental conditions of the country for the sake of the present and future generations.



# CHAPTER FIVE

## CONCLUSION AND RECOMMENDATIONS

### 5.1 CONCLUSION

The new economic policies which have been adopted in Sri Lanka since 1977 have brought about great changes. The policy changes have resulted in significant new development activity in the country, such as the establishment of the Board of Investment, Free-trade zones in the bigger cities, increasing local and foreign investment in the commercial and industrial sectors, construction of tourist resorts and hotels to facilitate the tourism industry, housing schemes to cater for the increasing population, etc.

While much of this development has been desirable and of benefit to Sri Lanka, some of its environmental and socio-economic impacts are less desirable. The latter consequences are very much the result of the lack of planning and of an institutional structure to control environmental impacts. Because of the absence of clear resource planning guidelines and environmental impact control, resource development and use has taken place in an *ad hoc* fashion and the private sector has failed to internalize externalities. The continuing pressures caused by this situation are widespread, and include rapid deforestation, unplanned agricultural land conversion, urban and industrial pollution, coastal pollution, overcrowding and lack of sanitary and social facilities in the cities, and associated problems such as crime, traffic jams, unemployment, and the development of black markets.

To achieve sustainable development in Sri Lanka, it is important that the above problems are dealt with. Economic growth alone is insufficient in reducing the impact and achieving sustainability. While the free market policies, introduced in 1977, have been somewhat successful in developing the industrial sector and in bringing about economic growth, some of this development has been at the expense of the agricultural sector.

The agricultural sector still plays a vital role in the economy of Sri Lanka. For reasons of food security, employment in the rural area, supply of raw material to industry, export earnings and protection of the natural resource base, agriculture will be expected to retain an important role in the sustainable development of Sri Lanka. This role can only be played if the land resource on which agriculture is dependent, is protected. Due to the factors described above, industrial

development, population pressure and poverty, much of the resource base is under threat from land conversion, pollution and degradation. While some of these changes are inevitable, for example land conversion, others are not and much can be done to minimize the total impact on the resource base through planning and control.

The problems in the rural area, although not the topic of this thesis, contribute to a reduced availability of land and other problems. Poverty forces poor people to adopt short term solutions to their problems (such as forest encroachment) with consequent environmental consequences such as soil erosion and siltation. The results are degradation of land, lower productivity, and siltation of irrigation systems.

Under the free market policies introduced by the government, most of the incentives and support given to farmers was withdrawn or reduced. This study found that the consequent increases in the price of fertilizer, the greater instability in output prices, plus inaccessibility to institutional credit and the competition from imported goods clearly affected the profitability of agriculture. In the peri-urban zones, agriculture was also exposed to industrial pollution. All these developments had major impacts on the land resource base and agriculture which showed in terms of land conversion from agricultural to non-agricultural uses in the peri-urban areas around major population centres, land degradation and a lack of maintenance of irrigation systems in the rural sector. The result has been that farmers have felt they have been pushed out of agriculture.

The focus of this thesis is mainly on the issue of land conversion in the peri-urban areas. While land conversion is a natural outcome of population growth and economic (industrial) development, the manner in which this conversion takes place can have very different consequences. It is minimization of the negative consequences that should be aimed for under sustainable development.

In the peri-urban area, land conversion often takes place in an *ad hoc* fashion. The favourable macro-economic conditions (since 1977) for industrial development resulted in high returns to investment in land. Property development activities increased rapidly and private property developers became important players in the land market. The demand for land for urban expansion and industrial and commercial development continues to be high and farmers faced with reduced profitability and urban and industrial encroachment, with associated consequences, are selling their land to private developers.

In the case study area of Gampaha, the resulting rapid conversion of land for non-agricultural uses has resulted in the loss of much prime agricultural land in the wet zone area. The conversion is often carried out at great speed with little concern for the development of infrastructure facilities or planning so that much of the converted land is under-utilized, and the lack of facilities, especially waste disposal facilities, has resulted in the pollution of neighbouring lands and water resources. Environmental control and monitoring currently in place are ineffective in dealing with these problems, and industries freely discharge waste into rivers and onto unused land. Even when treatment facilities are installed, the results of the survey show that the effluents and solid wastes discharged still contain pollutants far above accepted levels.

The overall impact on society is a premature conversion of agricultural land with land not being used efficiently either by industry or agriculture, and environmental problems caused by the spatial nature of the conversion and lack of infrastructure and environmental control. The pollution of land and water has forced many farmers to abandon cultivation, and according to the findings from the survey, farmers have never been compensated for any of these impacts.

As agriculture needs to continue to play an important role, *ad hoc* land conversion (with its associated consequences) and land degradation can be ill-afforded by the Sri Lankan economy. Thus, to manage the stock of land to minimize premature loss of land to urban and industrial development and reduce degradation of other lands, land use change needs to be planned in the peri-urban area and agriculture needs to become more productive and profitable.

## **5.2 RECOMMENDATIONS**

### **5.2.1 SPECIFIC RECOMMENDATIONS FOR THE CASE STUDY AREA**

A. Increase the productivity of the land in rural areas. This could be achieved through:

1. Adoption of intensive agriculture.

As the land in Gampaha is very fertile and suitable for intensive agriculture, this would be effective. In particular, paddy land in the catchment areas (with alluvial soil, and which receive the monsoon rains), especially in Attanagalla, Dandungama, Gampaha and Weke AGA divisions, could be intensified through the introduction of high yielding varieties, and through fertilizer application. Coconut plantations previously reached a high level of productivity, but this has declined in recent years through poor maintenance (due to farmers' intention to sell lands). Production needs to be returned to the high levels, but this also requires control of land conversion through agricultural zoning or other land use

planning options (see below). In order for intensification to succeed, farmers will require some form of subsidy on fertilizer and other necessary inputs, or easier access to institutional credits at the required time relevant to production.

## 2. Introduction of intercropping.

Intercropping could be introduced into coconut, rubber and coffee plantations in the district. Crops suitable for this would need to be identified (e.g. pineapple, pepper, bananas, chilies, leafy vegetables). However, if this system is to work effectively, extension services to educate the farmers regarding the combination of crops, and their maintenance would also be required.

## 3. Introduction of appropriate modern technology to the fishing industry.

The Negambo lagoon and west coast of the district, bordering on the Indian Ocean, contain vast fish and marine life resources which are at present under-utilized due to a lack of technology and storage and freezing facilities. This would also need to be accompanied by some means of protecting the lagoon and shore from pollution and encroachment from other users (see below). Once this technology is in place, there may be a need for a quota system to maintain a sustainable use of the resources.

## B. Prevention of land degradation. This could be achieved through:

### 1. Controlling deforestation and encouraging reforestation.

Deforestation in the western hill country is a major cause of silting and flooding in the Negambo lagoon and low lying areas. Strict laws and penalties need to be adopted and enforced to stop over-cutting or cutting of immature trees. In addition, poor migrants who enter the district and are unable to find formal or legal employment tend to encroach on the forest land to earn a living. These migrants must be provided with land elsewhere in the district, or else relocated to other irrigation settlements. Reforestation along rivers and streams should also be encouraged to stabilise the land and prevent silting which causes flooding and waterlogging further downstream.

### 2. Agricultural zoning/ land banking

Agricultural zoning could be adopted to prevent premature land conversion and degradation in peri-urban areas. In Gampaha district, fertile paddy, coconut and rubber land, forests and fishing areas are in particular need of such zoning. In addition, natural reserves such as the Kelaniya, Maha, Attanagalla and Dandungama rivers, and the

Negambo lagoon need to be defined and protected. Agricultural zoning, and redefinition of urban boundaries would also help to prevent urban sprawl. Land banking in the peri-urban areas is also an option which should be considered, although because much of the land is already in the hands of private property developers, this may be less effective, or more expensive (due to the necessity of purchasing land) in Gampaha district.

### 3. Develop necessary infrastructure in converted areas.

Due to the rapid and *ad hoc* nature of land conversion in the peri-urban areas, and a lack of land use planning, infrastructure development in many of the peri-urban areas of the district is far below the rate required, and this has caused pollution and insanitary conditions. Immediate infrastructure development in areas of sewerage, flood control, urban waste disposal, transport, and housing is needed, particularly in the Negambo, Gampaha, Wattala, Kelaniya and Ja-Ela urban councils.

### 4. Pollution control measures.

Industrial pollution in the district is particularly acute. Further concentration of polluting industries in Gampaha district needs to be discouraged. Either the local administration in Gampaha, or the Central Environmental Authority needs to take responsibility for monitoring the level of pollution each industry produces. Charges or taxes could then be introduced to force industries to pay for the pollution they cause. Industrial permits could be cancelled for industries which fail to reduce their pollution below an accepted level, or pay for the pollution they create.

## 5.2.2 GENERAL RECOMMENDATIONS

In addition to the recommendations made for the case study area, there are a few recommendations arising from the research which relate to the nation as a whole. They are:

1. Promote rain-fed agricultural cropping in those areas, which have comparative advantages in irrigation agriculture, and promote investment away from fertile and suitable agricultural land. Provide infrastructure on such land where it does not yet exist, and give incentives to industries willing to set up there.

2. Encourage and develop small-scale agricultural holdings, which make up three quarters of the total cultivated land in Sri Lanka. This is essential for the agricultural sector and the economy as a whole.
3. Develop an appropriate system that links key natural resource developments to national accounts (that is, integrating resource accounting with national income accounts) so that economic planners are made aware of the environmental costs and benefits of their policies.
4. Review the existing forestry master plan and prepare planning for sustainable use of forest resources. Stop excessive or early tree-cutting and forest encroachment.
5. Review and strengthen existing pollution control policies. It should be made clear to industries that treatment facilities need to be installed and an effluent charge system should be investigated.
6. To encourage profitable and environmentally sound farming, to control land degradation and land conversion, greater emphasis needs to be placed on research and extension.
7. Develop a participatory approach to utilization and management of natural resources by local communities.
8. Strengthen agricultural research and development, in particular in areas such as forestry, erosion control, pollution control, alternative cooking and energy sources, and seed plant technology. Research is also needed on irrigation engineering to mitigate the negative impacts on soil and cultivation, and to optimize the use of water resources through better planning and management.

### **5.3 RECOMMENDATIONS FOR FURTHER RESEARCH**

Due to the limited nature of this study, it was not possible to examine in detail all of the possible solutions or problems described above. Further research is needed to:

- Determine the real cost of environmental pollution at local, regional and national level. Greater knowledge of the costs and awareness of them will help in the design and introduction of environmental policies.
- Determine the impacts of free market policies on the agricultural sector, such as increases in input prices, migration of agricultural labour, changes in transport costs, changes in land values and rent, and the consequences of these changes, especially on the poor.
- Find suitable inter-cropping patterns for different regions according to soil and climatic conditions
- identify appropriate and effective pollution control methods to achieve pollution control
- identify in more detail the total extent of land loss and land degradation
- find ways to help farmers increase profitability
- discover ways and means to encourage agro-industrial development



# APPENDIX I

## QUESTIONNAIRE ONE

This questionnaire was used for the interview with the former farmers who had sold their lands, in order to identify the reasons for their selling their lands and to find other relevant information. The total number of farmers involved was 135. These were chosen from the nine AGA divisions where considerable land conversion had already taken place. 15 Farmers from each of these divisions were chosen.

1. Name of AGA division
2. Address
3. Type of cultivation
4. Year of sale
5. Plot size
6. Price per perch at time of sale [1 perch is about 25m<sup>2</sup>]
7. Sold through whom?
8. What was the land purchased for?
9. Percentage of land sold.
10. If land was retained, what is it used for now?
11. To your knowledge, has the converted land been provided with necessary infrastructure facilities (e.g. roads, drainage, drinking water, electricity etc).
12. Reasons for selling land, in order of priority.
  - a
  - b
  - c
  - d
  - e
  - f
  - g
  - h
  - i
  - j
  - k
  - l
13. How long had you been practising agriculture?

14. Did you invest the money in other economic activities?

If yes, what percentage was invested and on what?

- a house
- b other land
- c business
- d vehicle
- e bank
- f other

If not, how was the money used?

15. Were you a full time farmer?

- a full-time farmer
- b had extra part-time work
- c agriculture as part-time work

If the answer to above was b) or c) , how long had you been doing the non-agricultural work

Place of work

Type of work

What were your reasons for taking non-agricultural work?

16. Present occupation

- a agriculture in some other area
- b industry
- c commercial
- d service sector
- e only in part-time informal employment
- e retired

Are you satisfied with your present occupation and income?

Site of present employment, or of employment of family members

Had any of your family members moved to non-agricultural sectors?

- a yes
- b no

If yes, how many of them?

- A one
- b two
- c three or above

To which sector?

- a Industrial
- b commercial
- c service

17. Did you have access to the institutional credit facility?

a yes

b no

If not, what was your source of finance?

A own savings

b borrowed from private money lenders

18. Was your soil/land affected by pollution?

19. Was your well water affected by pollution?

20. What were the reasons for problems in continuing agriculture when the neighbouring land was sold?

21. Did you have access to storage facilities

a yes

b no

If yes, what type of facility

22. Did you have your own transport facilities?

23. Did you have any training, workshop, or any other extension services?

24. If necessary facilities were provided, would you have continued in agriculture

a yes

b no

c partly

If the answer was b) or c) give your reasons

25. Give details of the cost of production (per hectare) during the following years, including items such as land preparation, labour, fertilizer, maintenance, transportation, weeding.

a 1975-1980

b 1981-1985

c 1986-1990

d 1991-1996

## QUESTIONNAIRE II

This questionnaire was used to interview the present farmers, especially to identify their problems in cultivation and other relevant issues. 15 farmers from each AGA division were chosen to give a total number of 195 farmers interviewed.

1. Name of AGA division
2. Address
3. Type of cultivation
4. Plot size
5. Percentage of land under cultivation

If some land is not under cultivation, what are the reasons for this?

What is that land being used for?

6. Present land value
7. Problems faced in cultivation in order of priority
  - a
  - b
  - c
  - d
  - e
  - f
  - g
  - h
  - i
  - j
  - k
  - l

8. How long have you been doing agriculture?
9. Are you a full time farmer?
  - a full-time farmer
  - b have extra part-time employment
  - c doing agriculture part-time (week-end farmer)

If the answer is b) or c) , how long have you been doing the non-agricultural job?

Place of work?

Type of work

Reason for doing extra employment

10. Have any of your family members migrated to non-agricultural sectors?

If yes, how many of them?

- a one
- b two
- c three and above

To which sector?

- a industrial
- b commercial
- c service

Place of work of migrant labour

11. Place of work of any other non-agricultural family members

- a within Gampaha district
- b in the BOI
- c in Colombo
- d outside of Gampaha and Colombo
- e other areas (especially abroad)

12. Do you have access to institutional credit facilities?

- a yes
- b no

If not, what is your source of finance?

- a own savings
- b private money lenders

13. Is your soil or land affected by pollution?

14. Is your well affected by pollution?

15. What are the reasons for problems in continuing agriculture if the neighbouring areas are sold?

16. Do you have access to any storage facilities?

- a yes
- b no

If yes, what type of facility?

17. Do you have your own transport facilities?

18. Have you been to any training workshop or any other extension services?

If yes, please give details.

19. Give details of the cost of production (per hectare) during the following years, including items such as land preparation, labour, fertilizer, maintenance, transportation, weeding. (If applicable)
  - a 1975-1980
  - b 1981-1985
  - c 1986-1990
  - d 1991-1996
20. Future plans for the next five to ten years
  - a staying in agriculture
  - b part-time agriculture
  - c move to non-agriculture
  - d retire/other
21. Average monthly income (in Rupees) in 1996
22. Recommendations for the government.

### **SURVEY III**

This was a grid survey used to identify the present and previous land use of the area and the infrastructure facilities. The district was divided into 390 equally sized grids.

1. Name of AGA division
2. Address
3. Present land use
4. Previous land use (if applicable)
5. If the land has been converted, is it provided with necessary infrastructure facilities?
  - a road and transport facilities
  - b drinking water
  - c drainage facilities
  - d electricity
  - e others
6. Any other comments



## APPENDIX II

### PLATE 1

Unplanned land conversion by the property developers along the Colombo-Kandy main road. Improper infrastructure facilities and maintenance cause under-utilization of the converted land tremendous soil erosion, damaging large areas of coconut land.



### PLATE 2

Converted paddy land for urban construction at Kelaniya AGA Division.





## PLATES 3 AND 4

Urban and industrial waste disposal onto paddy land at Katunayaka.





### PLATE 5

New industry along the Colombo-Kandy main road dumps solid waste onto the neighbouring coconut land.



### PLATE 6

Effluent discharge from the factory affecting the neighbouring paddy lands, and part of the abandoned paddy lands in Kelaniya AGA Division.





## PLATE 7

Abandoned paddy land in the Katunayaka airport area.



## PLATE 8

Coconut lands along the Colombo-Kandy main road, blocked out and ready for sale.





### PLATE 9

Inter-cropping (Banana and pineapple with coconut plantation), is not successful due to improper maintenance and lack of knowledge of the farmers.



### PLATE 10

Slum and shanty development on the border of Colombo and Gampaha districts, in the Kelaniya river valley.



## APPENDIX III

### APPENDIX 3.1 DIRECT AGRICULTURAL LAND CONVERSION BY BOI

Katunayaka BOI area.

- 205.2 hectares of mixed crop land
- 20.52 sq.km of coconut land.
- 1.72 hectares of paddy land.

Biyagama BOI area.

- 1.96 sq.km of rubber land.
- 1.32 sq.km of cinnamon land.
- 7.08 sq.km of mixed rubber land.
- 0.64 sq.km of cinnamon and coconut land.
- 2.56 hectares of paddy land.
- 148.4 hectares of coconut and mixed crops land.
- 36.68 hectares of coconut land.

Other areas.

- 24.52 hectares of coconut land.
- 14.28 hectares of cinnamon land.
- 2.8 hectares of rubber land.
- 0.76 hectares of paddy land.
- 14.44 sq.km of mixed crop land.

Source: Unpublished data, BOI, 1990

### APPENDIX 3.2. PADDY SOWN AREA AND PRODUCTION 1978/79-1993/94.

Year	Extent sown (acres)	Production (bushels)	production/Acre.
1978/79	41,258	1,647,000	39.91
1981/82	42,237	2,227,000	52.72
1984/85	40,664	2,142,000	52.67
1987/88	36,056	1,647,000	45.67
1990/91	34,691	1,502,000	42.29
1993/94	33,470	1,857,000	55.48

Source: Department of Census and Statistics, 1980-1995.

### APPENDIX 3.3 LACK OF INFRASTRUCTURE FACILITIES IN THE CONVERTED LANDS IN GAMPAHA DISTRICT

Facility	percentage of land without facility
Roads and Transport	31
Drainage /waste water disposal facilities	70
Drinking Water	19
Electricity	9
Other services (shopping, health etc.)	32

Source: Field Survey, 1996.

### INFRASTRUCTURE FACILITIES IN THE CONVERTED LANDS IN GAMPAHA DISTRICT

Response	Number	Percentage
Yes	18	13.4
No	56	41.4
Partly	32	23.7
No idea	29	21.5
	135	99.8

Source: Field Survey, 1996.

### APPENDIX 3.4 BANK INTEREST RATES AND INFLATION RATES IN SRI LANKA 1981 TO 1990

Year	Normal interest rates on saving and 12 months, fixed deposits (1)		Rates of inflation (2)	Real interest rates (1 - 2).	
	NSB*	C.Bank**		NSB	C.Bank
1981	20.0	21.0	20.0	0	-1.0
1984	18.0	18.0	17.0	1.0	1.0
1987	13.0	11.25	10.2	2.8	1.05
1988	13.0	12.25	14.0	-1.0	-1.75
1989	14.5	14.25	15.1	-0.6	-0.6
1990	15.0	14.0	21.0	-6.0	-7.0

\* National Saving Bank.

\*\* Commercial Bank.

Source: Central Bank of Sri Lanka, 1989-1990.



**APPENDIX 3.5 RESIDENTIAL LAND PRICE INCREASE IN GAMPAHA, 1980-1993**  
(per perch in Rupees)

Centres	1980		1985		1993		1996	
	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum
Peliyagoda	1,000	2,500	4,000	6,500	20,000	35,000	45,000	65,000
Dandigma	1,000	3,000	4,500	12,000	20,000	40,000	30,000	55,000
Kelaniya	1,000	2,500	6,000	15,000	25,000	50,000	50,000	75,000
Hendala, Wattala	2,000	6,000	8,000	15,000	20,000	40,000	50,000	75,000
Seeduwa	1,500	4,500	5,000	10,000	20,000	45,000	30,000	55,000
Negambo	3,500	15,000	10,000	30,000	25,000	60,000	40,000	70,000
Kiribathg- oda	NA	NA	NA	8,000	20,000	45,000	35,000	60,000
Katana	NA	NA	NA	7,500	15,000	40,000	20,000	50,000
Mahara	NA	NA	NA	5,000	10,000	35,000	12,000	40,000

Source: Unpublished data, Department of Valuation, 1980-1993.

Field Survey.

**APPENDIX 3.6 REASONS FROM FORMER FARMERS FOR SELLING THEIR AGRICULTURAL LANDS IN GAMPAHA DISTRICT** (number of former farmers affected by each factor, out of 15 farmers in each AGA Division. Total number of the former farmers in this survey were 135).

<b>Factors</b>	Biya-gama	Gam-paha	Ja-Ela	Kata-na	Kela-niya	Mah-ara	Min-uwa-ngoda	Neg-am-bo	Wa-ttala	Total	%
H.cost of pn	7	7	12	9	11	6	9	8	10	79	59%
Credit	8	6	5	13	5	11	9	7	9	73	54%
Market prob	5	3	2	8	2	8	10	4	4	46	34%
Lack of storage	2	1	2	6	2	1	3	9	2	28	20.4
Small plot size	5	3	6	4	7	2	4	6	8	45	33.3%
Irrigation prob.	3	2	5	11	6	5	9	4	6	51	37.7
Pollution	8	6	6	8	14	2	5	4	11	64	47.4
Flood	4	3	7	3	8	3	8	11	6	53	39.2
Lack of transport	2	1	0	5	2	5	2	1	0	18	13.3
Competition in market	2	3	5	2	6	1	2	12	7	40	29.6
Neighbouring areas sold	3	4	6	3	9	1	4	8	7	45	33.3
Attractive prices	4	5	6	5	9	1	5	6	8	49	36.2
Others (include. social factor)	0	1	0	3	2	0	1	4	3	14	10.3

Source: Field Survey.

**APPENDIX 3.7 PRESENT FARMERS' PROBLEMS IN AGRICULTURE UNDER THE NEW ECONOMY, IN GAMPAHA DISTRICT** ( The number of farmers affected by each factor out of 15 farmers in each AGA Division ( The total number of present farmers in this survey was 195)

Factor s	Att	Bi y	Di vi	Ga m	Ja- Ela	Ka tan a	Ke lan iya	Ma har a	Mi nu va	Mi rig am a	Ne ga mb o	W atl a	We ke	To tal	% of the tot al	
H. cost of pn	3	11	6	13	12	9	13	6	9	7	14	6	2	111	56	
Credit	5	7	9	4	5	9	2	11	5	9	3	1	11	81	41.5	
Market prob	6	2	12	3	2	4	1	9	3	6	1	2	7	58	29.7	
Lack of storage	1	3	1	2	2	2	5	1	2	1	7	4	3	34	17.4	
Small plot size	1	6	3	5	5	6	9	4	2	1	6	11	3	62	31.7	
Irrigati on prob	4	9	8	11	13	5	4	11	8	3	8	9	6	99	50.7	
po ll	* W	6	11	9	7	9	8	14	1	7	6	9	11	9	105	54
	+ S	1	4	2	1	5	4	8	2	7	3	4	9	5	55	28.2
Flood	2	3	2	4	7	9	11	9	6	1	8	3	3	68	34.8	
Lack of transp ort	4	1	5	1	2	3	1	6	2	7	2	1	4	39	20.0	
Compe tion in market	4	6	5	6	6	4	6	2	9	3	7	7	3	68	34.8	
Neibho urs' sold	1	6	1	3	9	5	9	2	7	3	8	8	2	64	32.8	
Attract ive prices	2	6	2	4	8	5	10	5	5	2	11	9	1	70	35.89	
Others **	2	1	1	3	4	2	4	3	1	1	6	5	2	35	17.9	

\* Water pollution

+ Soil pollution

\*\*including social factors

Source: Field Survey.

### APPENDIX 3.8 FERTILIZER PRICES 1978-1979 ( in Rupees per . metric ton)

Variety	September 1978	September 1979	Change %
Sulphate of ammonia.	1179	4270	262%
Muriate of potash	1132	2900	156%
Urea	1638	2785	70%
Triple super phosphate	1556	2685	73%
N.P.K. (S:15:15)	1548	2785	80%

SOURCE: Central Bank of Ceylon (1982)

### APPENDIX 3.9 COST OF PRODUCTION OF TEA, RUBBER, COCONUT AND PADDY IN SRI LANKA, 1974 to 1993 (in rupees)

Year.	Tea (per kg).	Rubber (per kg).	Coconut (per 1000 nuts).
1974	5.55	3.04	103.34
1977	8.63	5.45	173.55
1981	16.66	9.68	529.80
1984	35.56	14.54	634.16
1985	40.82	17.50	671.85
1988	48.10	24.82	-
1992	102.98	37.72	-
1993	97.10	49.34	-

Source: Department of Census and Statistics 1995c

### APPENDIX 3.10 FARMERS' CREDIT AND FINANCIAL SOURCES IN GAMPAHA DISTRICT

	Institutional credits		Other means of credits			
	Access	Inaccess	Private money lenders		Own savings	
	percentage	Percentage	Number	Percentage	Number	Percentage
Former farmers	18.5 %	81.5 %	93	68.5 %	17	13 %
Present farmers	21 %	79 %	123	63.0 %	31	16 %

Source: Field Survey.

### APPENDIX 3.11 LOSS OF FAMILY LABOUR TO NON-AGRICULTURAL ACTIVITIES IN GAMPAHA DISTRICT

	Family labour loss		Number of losses		
	Number	Percentage	One member	Two members	Three members
Former farmers	31	22.9	13.3 (18)	8.14 (11)	1.4 (2)
Present farmers	57	29	16.9 (33)	9.2 (18)	3.0 (6)

Source: Field Survey.

### APPENDIX 3.12 TYPE OF EMPLOYMENT OF THE FARMERS IN GAMPAHA DISTRICT

	Full-time farmers		Have a part-time job		Do agriculture part-time	
	Number	Percentage	Number	Percentage	Number	Percentage
Former farmers	41	30.0 %	55	41 %	39	29 %
Present farmers	99	51.0 %	45	23 %	51	26 %

Source: Field Survey.

### APPENDIX 3.13 DISTRIBUTION OF POLLUTING INDUSTRIES IN SRI LANKA AND IN THE WESTERN PROVINCE IN 1993

Type of industries	Island total	Western province				% of western province
		High	Medium	Low	Total	
Chemical	345	156	75	16	247	71
Textile & Leather	260	87	67	40	194	75
Base metal	108	18	55	24	97	90
Timber & wood	1361	99	206	276	581	43
Food	625	32	59	28	119	19
Mineral products	342	14	82	36	132	39
Paper & pulp	10	-	04	02	06	60
Service stations	95	03	28	06	37	40
Mechanical Industries	28	02	09	05	16	57
Total	3178	411	585	433	1429	45

Source: Ministry of Finance and Planning, 1993.

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