PEASANT RESPONSES TO POPULATION PRESSURE AND LAND SHORTAGE IN MIXED FARMING SYSTEMS: A CASE STUDY FROM SOUTHWEST OF LAKE CHAMO, ARBA MINCH ZURIA WEREDA

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SHUMYE MOLLA

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LIST OF ACRONYMS

CSA - Central Statistical Authority

DAs - Development Agents

FAO - Food and Agriculture Organization

ha - Hectare

kg - Kilogram

masl - Metre above sea level

MOA- Ministry of Agriculture

NGOs - Non - Govenment Organizations

PAs - Peasant Associations

PRA - Participatory Ruarl Appraisal

RRA - Rapid Rural Appraisal

SNNPR - Southern Nations, Nationalities and People's Region

SWMSP - Savannah Woodland Management Study Project

UNDP - United Nations Development Programme

Abstract

The study has closely examined the multiple responses on the part of the peasants of southwest of Lake Chamo to demographic pressure, land shortage and food supply - demand gap. The data sets for the study were mainly collected from the field through formal survey questionnaire administered to 160 randomly selected sample households and by informal and semi - structured interviews and group discussion with men and women, development agents, PA leaders and knowledgeable elderly persons using PRA / RRA methods and tools. The study has employed point score analysis technique to identify the most important socio - economic and psychological reasons for the demand for bearing large number of children as well as to diagnose the most commonly percieved negative effects of increasing population pressure on the local environment and food supply - demand gap. Moreover, descriptive techniques such as percentages, cumulative frequencies, cross tabulations, indices, graphs and inferential statistics like chi - square test have been used to summarize the important attributes of the mixed farming systems and peasant responses to population and land pressure.

In the study area, bearing large number of children and family size has been considered the norm for a large majority of the population. Point score analysis of peasants' perceptions revealed that continuity of the family/clan name, love of children, old - age security consideration, economic support before old age, social acceptance and marriage stability are the most important motives, in that order, for the desire for additional children among the interviewed farmers. It is presumed that the existing valid socio - economic and emotional values attached to large number of children and family size will continue to be a limiting factor to implement the national population policy until the prerequisite necessary attitudinal changes among the mass of the peasants are effected through appropriate family planing education and improvment of their quality of life by expanding socio - economic infrastructure services. Point score analysis of peasant perceptions has also shown that the major negative impacts of growing population pressure on the local environment are, in order of importance, progressive leveling down of peasant holdings, lack of long-term security of tenure over land, increasing gap between food grain production levels and consumption requirements, declining productivity of land, environmental degradation, incidence of landless peasant households, and fragmentation of agricultural land into smaller holdings. The peasants of the study area have developed quite several livelihood strategies to overcome these problems induced largely by demographic pressure.

In general terms, two complementary sets of pressure responses on the part of the local farmers were identified. The first is referred to as on-farm oriented responses. This group of peasant responses comprised progressive changes in the local farming systems (from semi-sedentary agropastoralism to mixed farming systems), cropland and settlement encroachements onto forest/ woodland and grazing resources, land use intensification (through increased cropping intensity, application of more labour inputs per unit area of land per growing season, and shifting to more labour-intensiveand high-value food and cash

crops), and devising local land transaction arrangements (to withstand the mismatch between key production factors such as land, labour and draught oxen). The second group of pressure responses has to do with increasing participation in rural non-farm activities and seasonal and permanent out-migration, and are thus termed as non-farm oriented responses. As a result of these interdependent sets of pressure responses labour is not generally underutilized in the study area, and most of the sampled households (about 86 percent) are still in favour of maximizing their household labour through bearing large number of children.

Although further multivariate statistical analysis may be necessary to empirically test the overall effects of farm-non-farm responses on levels of household food security, these complementary sets of livelihood strategies have significantly contributed to the statisfaction of households' annual food consumption requirements. The implication of the sutdy for rural development is that as farm and non-farm responses strongly contributed to rural livelihoods, rural policies should aim at diversification and intensification of agricultural and non-agricultural activities as well as promotion of production and consumption linkages between farm and non-farm sectors through investments in social, economic and institutional infrastructure. For rural non-farm activities to play their key role in relieving population pressure on agricultural land, it will be particularly essential to provide a complete package of financial, technical and management assistance to the land-hungry farmers.

INTRODUCTION

1.1. Background and Statement of the Problem

Agriculture in Ethiopia has continued and will continue to be the backbone of the national economy. It accounts for about 50 per cent of the gross domestic product , provides employment for about 85 per cent of the total labor force, and accounts for over 90 per cent of the total foreign exchange earnings of the country (CSA, 1996; E.I.U., 1996). It is plausible that the failure or success of the agricultural sector determines greatly the extent of the economic growth of the country.

The main form of agricultural production in Ethiopia is mixed farming or integrated crop-livestock farming. The results of the 1994/95 agricultural sample survey have show that 78 per cent of the total small holder farmers of the country were engaged in mixed crop and livestock production, 20 per cent in crop production, and the remaining 2 per cent in livestock keeping (CSA, 1995).

Although integrated crop-livestock farming systems have been the mainstay of the Ethiopian economy, in which small-scale peasant households represent about 93 per cent of the cultivated land and 98 per cent of the livestock population (Solomon, 1993), stagnation in agricultural yields and food grain production has been occurring in the country. Consequently, the country is facing several challenges, the most important of which include the problem of meeting the rapidly growing demand for food and other agricultural products (Mesfin, 1986; Tadesse, 1989; Gebre, 1995; Mulat et. al.,1996). The factors that limit the productivity of the mixed farming systems are virtually unlimited in number and variety.

Broadly speaking, the poor performance of the mixed farming systems has been interpreted as an outcome of the cumulative causation of demographic and non-demographic factors. Non-demographic factors that perpetuate environmental degradation

and declining productivity of land and have implications for the long term sustainability of the mixed farming systems include land tenure policies, inappropriate conservation and development strategies, low farm-gate prices, lack of affordable access to agricultural inputs, limited infrastructure, undermining the traditional resource management systems, etc. (Dessalegn, 1994; Mesfin, 1991; Shaw, 1989; Repeto and Holmes, 1983).

To a large extent, the most significant cause of environmental degradation and land use conflicts is thought to be the pressure of rapid population growth. On the bases of empirical investigations, many researchers have asserted that rapid growth of human population in Africa has resulted in the expansion of cultivation into marginal areas and steep hill slopes, high rates of deforestation, land degradation and desertification (Okafor, 1987; Ogutu, 1993; and Jarosz, 1993; all cited in Beyene, 1996; Shaw, 1989; Hurni, 1990).

In the Ethiopian context, there are some indicators that the rapidly growing population of some regions of the country has led to the degradation of the available natural resource base. According to Hurni's (1990) estimate, for instance, the annual loss of soil from the country partly due to population pressure is 1.5 billion tones while the estimate made by Ethiopian Highlands Reclamation Study shows a volume of loss of 2.5 billion cubic meter per annum (Jahnke, 1983).The total loss of crop output as a result of soil erosion in the country was estimated by Sutcliffe (1993) to be 8,760 mt in 1985 and was projected to reach 331,900 mt by 2010. Similarly, his estimate of crop land and pasture land losses for the year 2010 are 489,300 and 5,747,350 ha respectively. According to some recent studies conducted in southwestern (Gebre, 1995) and northeastern highlands (Mesfin, 1991; Holt and Lawrence,1993), areas covered by forests twenty or thirty years ago are now cleared for crop production and arable lands that used to be cultivated by a single farmer are now divided among several households.

With a current figure of over 57 million, the Ethiopian population is growing at a high rate of about 3.1 per cent per annum (CSA, 1995). Perhaps the most important factors that have exacerbated natural resource degradation in the country include the

history of settlement, the size, growth and spatial distribution of population (Beyene, 1996). Currently, the Ethiopian highlands account for about 88 and 60 per cent of the country's total human and livestock population, respectively (Hurni, 1990). Southward movement of population in search of arable land has been observed to be the general tendency, and the most densely populated districts of the country are now found in Shewa, north Sidamo, north Omo, and south Wello regions. The population densities of these regions vary between 200 and 400 persons per square kilometer (Beyene, 1996).

The influence of this high growth rate and density of population on mixed farming systems is far reaching. Among other things, increasing population pressure has resulted in diminishing farm size, fragmentation of land holdings, reduction in fallow periods, shifting in cropping patterns, reducing the time spent on farming, accelerating land use conflicts, and environmental degradation (Dessalegn, 1984; 1992; Jahnke, 1983; Mengistu, 1986; Fasil, 1980; Yibeltal, 1994; Tadesse, 1989). All these influences of population pressure would jeopardize the sustainability of the mixed farming systems and have implications for households' food security positions. The question 'what has been the response of the Ethiopian peasants to these intricate problems posed by population pressure?' would certainly warrant critical and in- depth investigation.

No doubt, peasant farmers respond to the problem of an increasing gap between food supply and demand in quite a number of different ways. As to the diversity of the responses of local people to population pressure, Pingali and Binswanger (1987) have asserted the fact that "far from being immobile and technologically stagnant, "traditional" societies have responded to changes in population densities and external markets with changes in farming systems and land use patterns, as well as technological change, in systematic and predictable patterns" (Quoted in Dejene, 1996:44). It is likely that while some of the responses of farmers may have negative effects on the environment, future carrying capacity of the land and sustainable development, others may have positive effects. Understanding and investigating these positive and negative effects would give insights into how to lessen the negative effects and promote the positive ones.

Though, studies of such kind in the Ethiopian context are limited in number, the few that have so far been carried out dwelt on land use intensification and out-migration as the responses to population pressure. For example, in southwestern Ethiopia, Muluneh (1994) showed that land use intensification and out-migration are the main responses of the local people to population pressure, while in Dejen wereda, Tadesse (1989) concluded that land use intensification is the most important response of farmers to population pressure. Similarly, in his study of North Central Ethiopia, Mesfin (1991) partly examined peasant farmers' response to population pressure, and the study indicated that out-migration from the highlands was 6.5 per cent of the total sampled population whereas in-migration was only 2.7 per cent. This implies that villagers as a whole have lost close to 4 per cent of their population, more than offsetting the natural rate of increase. Hence out-migration could be considered as one of the responses of the highland farmers to extreme population pressure in mixed farming systems.

Nevertheless, to view out-migration and agricultural intensification as the only responses of farmers to population increase in mixed farming systems is certainly an oversimplification of the current situation. This is mainly because in practice people respond in different ways depending upon local circumstances and external conditions, and adopt several coping strategies in order to maximize their food security position (Dejene, 1996). On the basis of Bilsborrow's (1987) suggestion, Beyene (1996) maintained that the range of possible responses to population pressure is much broader than usually perceived by economists and demographers. For example, some of the responses include crop encroachment into grazing and woodland areas, increasing involvement in rural non-farm activities, devising indigenous land tenure arrangements to overcome the problem of access to farmland, shifting to high yielding and high value crops and animals, motivation for family size restriction etc. Moreover, most of the existing empirical studies that have been undertaken in Ethiopia concentrated in the northern, drought-prone regions, and not much has been done in most of the densely populated districts of southwestern Ethiopia. As Beyene (1996:21) suggested "...many studies of farmers' responses need to be undertaken in different parts (agro-ecological zones) of the country with signs of growing

problems/potential problems of population pressure so that the problems could be tackled before they assume serious proportions and the transfer of positive responses and experiences could be encouraged."

It is precisely against this background that this study endeavors to make a comprehensive and detailed examination of farmers' responses to population increase in mixed farming systems in the context of selected peasant associations (PAs) from southwest of Lake Chamo, Arba Minch Zuria Wereda.

The main rationale for the selection of the study area are: first, southwest of Lake Chamo is one of the most densely populated areas of Arba Minch Zuria Wereda (see Chapter Three) in which mixed farming system is the dominant sector of the rural economy; and second, a cursory review of the related literature reveals that the mixed farming systems in general and the responses of the local people to population increase in the farming systems in particular are of the most neglected subjects by researchers and academicians in the study area.

The present study is, therefore, intended to address the following four basic research questions:

1. How do farmers of the study area feel about the effects of rapid population increase and large family size on farmland scarcity, security of tenure, food supply-demand gap, environmental degradation, declining productivity of land, incidence of landlessness and fragmentation of agricultural land?

2. Do the paesant households of the study area still want to maximize their family size? If yes, what are the underlying reasons for the demand for large number of children and family size?

3. To what level of intensity have the farmers been cultivating their farmlands, and what changes have they brought about in their farming systems in response to population growth? and

4. What are the main non-farm oriented responses of the farmers to population and land pressure that give support to farm oriented livelihood strategies?

1.2. Research Objectives

The purpose of this study is to describe and analyze the multiple responses of the local people to population pressure and land shortage in the mixed farming systems in the context of selected peasant associations from southwest of Lake Chamo, Arba Minch Zuria Wereda. The specific objectives of the study are:

1. To assess the natural resource base and socio-economic and demographic conditions of southwest of Lake Chamo;

2. To investigate peasant perceptions concerning the trends and levels of population growth in their localities; socio-economic and emotional values of children and perceived advantages and disadvantages of large family size; and about the adverse effects of growing population pressure on the local environment and food supply-demand gap; and

3. To explore the main on- and off-farm oriented livelihood strategies which the peasants used to employ to overcome land shortage and shortfalls in food supply in the face of growing population pressure. More specifically, the study aims at describing and analyzing changes in farming systems; cropland and built-up area encroachements onto grazing and forest/woodland resources; land use intensification; local land transaction arrangements; levels and patterns of peasant participation in rural non-farm activities; and volume, characterstics and patterns of labour out-migration in response to population pressure, land shortage and food supply-demand gap.

1.3. Significance of the Study

The role of traditional farming practices and natural resource management including the responses of the local people to population pressure in formulating ecologically sound, economically viable, and socially acceptable technologies and development strategies have recently acquired much attention and wisdom.

By identifying the multiple responses of farmers to population increase in the mixed farming systems of southwest of Lake Chamo, the present study would contribute to the efforts of balancing population - resource relationships of the country.

1.4. Data Sources and Methods of Acquisition

The relevant data inputs for the present study have been obtained from both primary and secondary sources.

1.4.1. Primary Sources

Primary data have beene assembled through an intensive field work by employing formal survey questionnaire, Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal (RRA) techniques.

(i) Sampling Procedure and the Questionnaire Survey

The size of the sample to be included in a survey depends very much upon the variability of the local farm conditions, the degree of precision desired, the types of tabulation needed, funds, personnel and time available for the survey.

Since the central theme of this study is to identify and analyze the responses of farmers to population increase in the mixed farming systems in the context of two Peasant

Associations (PAs) -Wezeka and Aelgo- located in southwest of Lake Chamo of Arba Minch Zuria Wereda, one stage simple random sampling technique have been used to select the required number of farm households. As has been mentioned before, the main criterion used to select Wezeka and Aelgo from southwest of Lake Chamo is that the population densities in the two PAs are sufficiently high while other characteristics are roughly similar. According to the results of the 1994 population and housing census of Ethiopia, the total number of farm households in Wezeka and Aelgo PAs were 583 and 1,037, respectively. In light of the limited fund and time available, 160 household heads (102 from Aelgo and 58 from Wezeka) which make up around 10 per cent of the registered peasant households have been randomly selected.

After selecting random sample households for each of the PAs, detailed primary data on various aspects of mixed farming systems, farmers perception on rapid population growth and large family size and its impacts on the local environment and food supply-demand gap , and on the on-farm and non-farm oriented responses of the local people to population pressure have been collected using the household questionnaire developed for this purpose.

(ii) PRA/RRA Methods

In order for developing countries to move out of the vicious cycle of poverty, the local people should involve in such processes as problem identification and need assessment, exploration of opportunities and alternative solutions, mobilization of resources, programming, implementation and evaluation of local development plans (Gebre, 1995; Mesfin, 1991; Waters-Bayer and Bayer, 1994). This implies the fact that the need for planning and implementing development projects with, rather than for, local people has become increasingly apparent. This is because "development only comes when we start dealing with real problems identified by the people -the communities themselves- and solutions are formulated with the full and active participation of the same people" (Mesfin, 1991:192).

Consequently, new research methods and approaches, which give more emphasis to local people in all phases of project planning, implementation, and evaluation in rural development and natural resource management, have been developed. Among these methods and approaches, PRA/RRA are the most prominent.

PRA/RRA are research methods in which interdisciplinary teams spend relatively short periods in the field together with the local people for purposes of learning from and with local residents; and collecting and analyzing data through group discussion, participant observation and informal interview using different and appropriate tools such as transect, mapping, ranking, matrices, diagramming, and so forth. These methods enable to integrate local perspectives and indigenous knowledge into the planning of development projects.

In this study, supplementary data on traditional mixed farming practices, farmers perception and attitude towards the effects of population increase and large family size on farmland scarcity, size and fragmentation of land holdings, diminishing areas of grazing and woodland resources and on farmers' response to population increase have been collected by conducting informal and semi-structured interviews and group discussion with men and women, development agents, PA leaders and knowledgeable elderly persons using RRA/PRA methods.

1.4.2. Secondary Sources

So as to upgrade the reliability of the primary data collected from the field, and to supplement the data missing in the study area secondary sources have been consulted. Relevant data on population growth, land use/land cover patterns, climatic conditions, geomorphology, soils etc. have been obtained from secondary sources such as the Ministry of Agriculture, local Development Agents, Central Statistical Authority, Non-Governmental Organizations etc.

1.5. Data Analysis Techniques

The data collected from primary and secondary sources have been analyzed through descriptive and cartographic techniques and PRA/RRA methods. The main analytical tools that have been utilized for processing and summarizing the data obtained by PRA/RRA exercises include transect, mapping, calendar, matrices, problem trees, ranking, flow-diagrams, and the like, as may be necessary.

Farmers' perceptions concerning the socio-economic and psychological reasons for the demand for additional children as well as their knowledge and awareness about the impacts of population pressure on the local environment and food sypply-demand gap have been assessed by employing point score analysis technique.

Various univariate descriptive techniques such as percentages, means, cumulative frequencies, cross-tabulations, non-parametric test as well as several indices and figures have been employed to summarize the important attributes of the mixed farming systems and peasant responses to population pressure and land shortage. Air photo interpretation technique has been used to empirically investigate the degree of cropland and settlement incursion into forest/woodland and grazing resources.

population is a dependent variable that grows in response to food supply. Malthus held the view that "populations at all times and places, unless deliberately checked, tend to go on expanding until they reach the 'limit of subsistence'; after which, they are kept in check by 'vice and misery'" (Clark, 1970:50). Putting it in a piece of mathematical equation, he claimed that population, when unchecked, increases in geometrical progression, while the growth of food production, on the other hand, can only be in arithmetical progression (Anthony, 1970). In this case, the rate of population growth tends to surpass the productive capacities of land resources which, in turn, exert a restriction to further increase in population size.

However, Malthus did not give evidences for this argument, and the majority of his contemporaries disagreed with him. They maintained that if population growth had been limited by the level of subsistence, "not only would most of us not be here, but also the world would have been a vastly different place in many respects; the British common wealth would probably not have come into existence, most of what is the United States would probably have been Spanish - Speaking, and Britain would probably have remained an essay - going eighteenth century agrarian society" (Clark, 1970:59).

Moreover, Malthus took no account of the advancement of technology in all sectors of the world economy, and he did not envisage how an increased number of people could be fed. As many scholars believe, Malthus is to be blamed for being apparently unaware of the agricultural, commercial and industrial revolutions going on around the present day developed countries, which not only enabled them to produce manufactured products to purchase food grown elsewhere but also greatly to increase agricultural production within their own territories (Boserup, 1965; 1990; Ahmed, 1987; Grigg, 1979; Clark, 1970).

Because of his pessimistic view about the balance between population growth and food production, Malthus emphasized the need for deliberate embarkation on "preventive" and "positive" checks to reduce population growth. He argued that delayed marriage and different methods of birth control can serve as essential preventive checks, while deaths due to disease, famine, malnutrition and war can be positive checks to restrain population explosion (Anthony, 1970).

The Malthusian solution of deliberate birth control as a means of regulating population growth, and bringing about sustained economic development has largely remained ineffective in most of the developing rural economies. In these countries, where population has been growing due to the gradual decline of death rates, fertility behavior has not been significantly affected by shortage of food supply.[1]

Malthus could also be considered as more pessimist in postulating population growth entirely as a serious constraint to economic development. Because large population, on whom investments in education and health have been made, could possibly be a great asset to economic development as they may have the caliber to create and bring about technical and technological changes which enhance overall development (Ahmed, 1987).

To sum up, in spite of the inherent short comings, the Malthusian thesis has had an appreciable contribution to the development of the concept of population pressure and the limits of carrying capacity upon which the neo-Malthusian scholars dwelt on. In the neo-Malthusian perspective, the capacity of land to produce food is limited, and exceeding a 'critical limit' of population density for a given land area would, in the long-run, lead to environmental degradation and declining productivity of land (Markos, 1997). Perhaps this is the point where the neo-Malthusian scholars appear, in some cases, to be acceptable though the carrying capacity of a given land area is very likely to be expanded under different socio-economic conditions and through application of technology. Following Markos's (1997) line of argument, the neo-Malthusian thesis on population - environment - agricultural development linkages should therefore be taken as a "conditional hypothesis" to be accepted or rejected after closely examining the case in point.

2.1.2. Boserup's Theory of Population Growth and Agricultural Development

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[1] *In fact, fertility decisions in rural areas are found to be functions of a complex interaction of socio-economic, cultural and environmental factors (see Menbere, 1993; De Vos, 1985; Yohannes, 1994).*

A more optimistic view of population-based theory of agricultural development was first propounded by Ester Boserup in 1965. On the basis of a close observation of the history of agriculture in tropical subsistence economies, she strongly maintained that population is not a dependent variable that grows in response to food supply, but rather it is the prime cause of changes in agricultural development (Boserup, 1965; 1990).

According her view, the prominent means through which peasant farmers improve their agricultural output and livelihood security in response to population pressure is via intensification of land use initially through shortening the length of the fallow period and then technological improvements (Boserup, 1965; 1990).

Boserup (1965; 1990) further argued that the Malthusian and neo-Mathusian observes did not take into account the possibility of progression of farming systems, in response to population pressure, from shifting cultivation to permanent cropping; and production technology from simple hand digging stick to plough cultivation, which, in turn, result in higher levels of food supply.[2]

The main philosophy of Boserup's thesis centers on the notion that population pressure, by natural growth and/or in-migration, is the deriving force that substantially determines agricultural changes from "extensive" to more "intensive" systems of production. Therefore, agricultural intensification and technological changes are the bases for food production to keep pace with population growth (Boserup, 1965; 1990).

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[2]*Boserup (1990) depicted five stages of "land-saving" production systems in which labour inputs and land-intensifying technology per unit area of land go on increasing due to the pressure of population growth. These are: (1) forest or long fallow (20 - 25 years between crops); (2) bush fallow (6 - 10 years); (3) short fallow (1 - 2 years); (4) annual cropping; and (5) multiple cropping (more than one crop per year on the same land.*

However, Boserup over looked other possible peasant responses to population pressure, land shortage and food supply-demand gap, such as extension of cultivated area at the expense of forest, woodland and grazing areas; production of high-productive crops (Grigg, 1979); diversification of income sources; and resorting to 'indigenous' land contract arrangements to overcome problem of access to agricultural land.

Moreover, when she wrote her first edition on the economics of agrarian change under population pressure, Boserup also disregarded demographic responses like out-migration, delayed marriage and family size restriction. But she gave a passing remark on the issue when she wrote her recent edition on economic and demographic relationships in development in 1990 (Boserup, 1990).

According to Boserup, individual households in sparsely populated areas with long fallow systems usually tend to have large number of children and family size. Because children perform several kinds of household chores ranging from domestic to farm operations. On the other hand, farmers'; attitude towards family size in densely populated areas with short-fallow systems may be different. With increasing population pressure and shortage of land, children's work with the time consuming tasks of supervising the scattered impermanent plots becomes less useful. furthermore, the substitution of hoe cultivation by the plough would probably reduce the need of help from child labour. As a result, child labour is very unlikely to provide a motive power for large family size unless the crop rotation includes more labour-intensive crops such as cotton (Boserup, 1990:183).

It should be noted here that although the smaller land area available per household enhances the desire for delimiting family size, the demand for child labour substantially increases with mounting intensification of agriculture. Because the use of intensive production systems requires that problems of soil fertility, weeds, plant diseases, irrigation-water management, etc. should be resolved (Boserup, 1990). In general, she concluded that "... in intensive agricultural system, children are likely to contribute more than they cost not only in families of landowning peasants, but also in landless families, especially if children work for wages in agriculture, separately or together with their parents. Landless workers also depend

upon support from children in old age" (Boserup, 1990:185). Therefore, it follows from Boserup's argument that both land shortage (land use intensification) and land abundance (long-fallow systems) encourage large family size in peasant agricultural economy; and whether or not this holds true in the context of southwest of lake Chamo deserves in-depth scrutiny.

2.2. Empirical Evidences on Malthusian and Boserupian Theses

As could be observed from the subsequent review of the literature, most of the researchers tend to follow either the Malthusian or the Boserupian or a combination of both paradigms to investigate population - environment - agricultural development linkages, and peasant responses to population pressure, land shortage and food supply-demand gap. In most instances, the adherents of the Malthusian viewpoint predominate the explanations for environmental degradation, declining productivity of land and falling per capita food production, while proponents of the Boserupian thesis seem to maintain that absence of land use intensification rather than exhaustion of resources beyond carrying capacity is the major reason for food deficit particularly in countries of sub-Saharan Africa.

2.2.1. The Experience of Sub-Saharan Africa

The existing accelerated rates of population growth, gloomy performance of the agricultural sector and the subsequent downward trends of per capita food production have currently initiated several researchers to explore the degree to which Boserupian land use intensification may or may not exist in Sub-Saharan Africa, and, in turn, what effects do agricultural intensification have on land degradation, on the one hand, and food supply, on the other.

With a major objective of searching for Boserupian intensification as well as shifts to income-sources diversification in response to population pressure, Hyden, et.al. (1993) carried out a study in five countries of Sub-Saharan Africa (Kenya, Uganda, Tanzania, Rwanda and Nigeria) during the 1980s. In concordance with Boserup's thesis, the results of the study indicated that "farmers have managed their lands, even under severe pressure, in a manner that

has permitted sustained use to date", and they claimed that quite "high levels of population density may be accommodated in many parts of the subcontinent before agriculture involves or stagnates" (Hyden et. al., 1993 cited in Markos, 1997:31). The researchers also found out that male out-migration, accompanied by female labour force agricultural intensification was the prominent type of economic diversification in response to population pressure.

In their study of six sub-Sahara African countries (Kenya, Tanzania, Cameroon, Malawi, Senegal and Nigeria), Lele and Stone (1989) also came up with grounds of Boserup's thesis. The authors identified two forms of population - induced intensification of production. The first is termed as "autonomous - intensification" in which the frequency of cropping increased only due to the effect of population growth. This type of population - induced intensification was said to have been widespread in all the countries under investigation. The second type is referred to as "policy-led intensification" in which the provision of government incentives permitted farmers to switch to higher value and yield crops. This latter type of intensification, according to the researchers, observed only in Kenya, Cameroon and Malawi in which government policy-support environments have existed (Lele and Stone, 1989).

Partly sharing the views of neo-Malthusian scholars, the authors further argued that limits existed to autonomous intensification under conditions of persistent population growth for it caused continual depletion of forest and soil resources. According to Lele and Stone (1989), addressing the issues of rapid population growth and environmental degradation in Sub-Saharan Africa greatly demands active government policy intervention to, among other things, equalize access to land, support high-yield crop research, and strengthen access to agricultural credit and fertilizer, so that policy-led intensification would occur.

Maro's (1990) investigation of agricultural land management under population pressure (Kilimanjaro area of Tanzania) also provides support to both Boserup's and Malthus's theses. On the one hand, he indicated that land use intensification, extension of cultivated area, crop diversification (which raised the carrying capacity of the land) were the most popular responses to demographic pressure. On the other hand, he asserted that due to the accelerated rate of population growth the carrying capacity of the land was outstripped again (Maro,

1990). In general, the researcher concluded that "... in the absence of land for expansion and of out-migration, population increase can result in either intensification of land use or in degradation of the natural resource base and declining agricultural output and standards of living (Maro, 1990:311).

Based on population census and land use survey data, Tiffen, et.al. (1994) also undertook a historical inquiry concerning the relationship between population growth, agricultural output and land degradation in the Machakos district of Kenya between the years 1930 and 1990. According to them, despite the low level of population density between the years 1930 and 1950 the degree of soil erosion and land degradation in the district was very severe. Since the 1950s, however, a high level of agricultural output was recorded without widespread soil degradation though population was increasing at the high rate of 3 percent per annum (Ibid). The authors suggested that this was accompanied through land extensification after the quit of colonial reserves; increased land investment (e.g., terracing, water and soil conservation practices); diversification of income sources; switching to higher degree of crop-livestock integration; societal and institutional changes that enhanced technological innovation and capital accumulation (Ibid). Following Boserup's line of argument, the authors came to the conclusion that population growth has induced technological innovation and land use intensification and productivity.

In the context of Mbeya highlands (Tanzania) Marshalla (1990) also investigated the human impacts on the natural environment. He argued that population pressure forced the local people to ignore ecological principles by extending cropland areas to steeper and marginal lands thereby causing deforestation, soil erosion and destruction of the productive environment. Unlike Boserup, Marshalla (1990) displayed that intensification of land use induced by growing population pressure has profound adverse effects on the production systems by disturbing the ecological balance, and this has resulted in environmental degradation and declining productivity of land. He also maintained that many socio-economic problems, such as shortages of fuel wood, arable land, grazing areas, and large scale out-migration to adjacent lowlands have accompanied the high rates of deforestation and soil erosion hazards.

The main findings of the study, therefore, seem to corroborate the neo-Malthusian paradigm and strongly underlined the negative impact of population pressure on the natural environment. Marshalla (1990) suggested the need to incorporate environmental protection strategies into the national overall development policy; and highlighted the cardinal role of the local people in the protection of the natural environment. In this regard, Marshalla (1990:335) warned that "with out cooperation from those who farm the land the problem of deforestation and land degradation will continue unabated."

To sum up, the foregoing review of the literature provides an important indication as to the kind of research that has been done on both the Malthusian and the Boserupian theses concerning population environment - agricultural development linkages and peasant responses among countries in sub-Saharan Africa. The lesson that may be learnt from this review is that it is hardly possible to come up with a specific conclusion at the level of theory regarding the issue of population growth in the subcontinent and its relationships with the environment and agricultural development.

2.2.2. The Ethiopian Case

Ethiopia is one of the countries in Sub-Saharan Africa experiencing a rapidly growing population and persistently declining per capita food production. In fact, the agricultural sector is not even able to fulfill its most basic function of providing food for a large and fast-expanding population in spite of the adequacy of potential resources (Abebe, 1996; Mesfin, 1991; Tadesse, 1989).

Scholars from different disciplines have been trying to investigate the core problems for the poor performance of the sector and the subsequent decline in per capita food production in the country. As may be observed from the succeeding review of the literature, most scholars, with few exceptions, belabored on assessing the negative impacts of population pressure on the environment and agricultural output with very little focus on peasant responses to the aspects.

In an exploratory study on production practices among the Ari community of southwestern Ethiopia, Gebre (1995) partly examined the adverse effects of population growth on the local environment and farmers responses to the problems. He found out that undeterred growth of human population in the study area has resulted in, among other things, scarcity of land and a reduction in crop output per household. The local people responded to the problem of land scarcity (both arable and pasture) by clearing forests and woodland resources which, in turn, led to ecological degradation through devastating water and wind erosion. The continuous loss of soil, deterioration in fertility, and decline in moisture holding capacity coupled with abandoning the practice of fallowing have negatively affected agricultural productivity. Generally, the author concluded that the most important adverse impacts of unregulated population increase in the Ari community include degradation of the environment, diminution of farm size, abandoning of fallowing, deterioration of land fertility, and the subsequent decline in agricultural output (Gebre, 1995).

In an historical account of land and the peasantry in Ambasel Awraja of South Wello region, Mengistu (1997) revealed that because of the long history of settlement and rapid population growth, farmland scarcity is very severe in Ambasel to the extent that precipitous slopes are brought under cultivation. The most important response mechanisms of the peasants are indicated to be extension of cultivation, increasing the intensity of cropping, reducing the length and frequency of fallowing, and shifting to double cropping. According to the researcher, however, these strategies resulted in devastation of natural forests which, in turn, aggravated the problem of soil erosion. This had adversely affected the micro-climatic condition and agricultural output which entirely depended on natural factors. Moreover, the study asserted that since family size greatly determined the size of land a household could acquire, early marriage was encouraged so as to have as many children as possible. This further accelerated the problem of population pressure on the land and hence led to widespread poverty. Mengistu (1997) argued that the peasantry should be helped to adopt modern farm inputs and technologies, and to switch from food grain production towards high-yielding and drought resistant root and tuber crops such as cassava, sweet potato and enset so as to sustain a large population, and maintain land conservation.

Yibeltal (1994) also investigated the adverse effects of population pressure and agricultural land fragmentation on land use in the context of Dale and shashemene Weredas of southern Ethiopia. According to the author, the "regressive" effects of population pressure in the study area comprise lack of security of tenure, environmental degradation, land fragmentation, underemployment of rural labour force, and proliferation of landless peasants, while the "progressive" effects include extension of cultivated area, increased cropping intensity, changes in crop mix and crop rotation (particularly towards food and perennial crops) and application of more agricultural inputs. The author strongly stressed the need for government intervention in the areas of formulating and implementing an appropriate land use, settlement and population policies in order to mitigate the regressive effects of population pressure (Yibeltal, 1994).

As has been indicated in the literature, unregulated population growth in the country has accelerated the demand for land far beyond what the supply could meet, and resulted in incidence of average landless and near-landless peasants. However, under increasing population pressure landless peasants adopt several traditional coping strategies to alleviate the problem of access to land. In this regard, Gavian and Amare (1996) indicated the prevalence of several informal farmer-to-farmer contract arrangements through which landless peasants and smallholder farmers in Tiyo wereda (Arsi region) manage to obtain crop fields. Renting on monetary payments, and sharecropping are shown to be the basic ways of acquiring farmland to be followed by gift and borrowing arrangements. The authors concluded that, in a condition where 98 percent of the overall respondents wanted to increase their holdings by an average of 2.5 hectares, the proportion of contracted fields, though small accounting for only 24 percent of all crop fields, is very likely to increase in the absence of land redistribution and presence of rapid population growth (Gavian and Amare, 1996). In their study on the impact of rapid population growth on farmland scarcity, and the coping strategies of the local people in north Shewa, Aklilu and Tadesse (1994) identified somehow similar results even if the researchers appear to mildly conclude that the traditional coping strategies are not viable any more to mitigate the problem of land shortage.

In a more recent inquiry, Markos (1997) addressed the issue of demographic responses to ecological degradation and food insecurity in eighty drought prone Weredas of northern Ethiopia. It has been shown in the study that population pressure is impeding agricultural development, and accelerating ecological degradation and household food insecurity. The researcher demonstrated that "... the traditional dictum which retains that large families (in subsistence economies) produce more than small families is no more holding in the communities under investigation. ... per capita production is decreasing and that large family sizes are not in an advantageous position in terms of production. On the contrary, households with large families are found to be more stressed than small families because the annual food requirements gaps are more in the former than in the latter" (Markos, 1997:346).

As to the attitude of the local people towards family size, the study revealed that many of the respondents are no more in favour of having large number of children, because labour is underutilized as it is in excess of the available land and livestock resource for which it was necessary, and therefore child labour is not essential any longer. Examination of demographic responses in the study area during the last decade indicated significant delay in the early entry into unions; a tendency of less stability in marriage; and a general tendency of approving family planning services. In general, the researcher came to the conclusion that "... demographic responses which can contribute to the commencement of fertility transition have started in the communities under investigation" (Markos, 1997:348).

In summing, it is apparent from the foregoing exposition that studies which have dealt with the subject of population-environment-agricultural development linkages in the country heavily dwelt on land use intensification and ecological degradation, and did not show the whole picture of pressure responses on the part of the farming community.

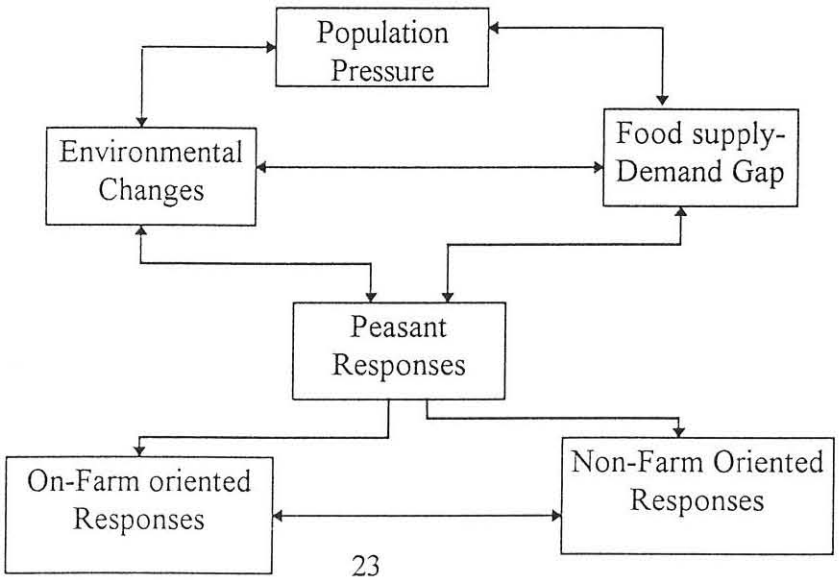
In fact, it is unlikely that peasants would passively accept the problems of population pressure, land shortage and food supply-demand gap over a longer period of time, but rather adopt livelihood strategies to mitigate the problems. A very systematic investigation of the pressure responses on the part of the peasantry and their roles and implications however is limited. The present study is therefore intended to narrow this gap.

2.3. Conceptual Framework

So far a critical attempt has been made to provide a broad spectrum of the theoretical debates and empirical evidences concerning population - environment - agricultural development interactions along with peasant responses to population pressure. Perhaps the study of peasant responses to population pressure in mixed farming systems may be well examined if it is guided by some sort of conceptualization of the possible responses. To this effect, a conceptual model of peasant responses to population pressure is developed to be used as a framework for the study.

The review of the related literature, though by no means exhaustive, reveals the fact that peasant farmers respond to the various consequences of population pressure in a number of different ways. It may be necessary to take a broader approach by categorizing pressure responses into two major groups: on - farm oriented responses, and non-farm oriented responses. A schematic representation of the interrelationships between the components of the model is depicted in figure 1. This conceptual framework originates from the impression of exploring the influence of population pressure on 'environmental changes' and household's 'food supply-demand gap', on the one hand, and from the idea of investigating the multiple responses on the part of the local people to the problems, on the other.

Figure 1. A Conceptual Framework of Peasant Responses to Population Pressure



land per growing season, shifting to higher level of crop-livestock integration, and resorting to local land transfer arrangements.

'Non-farm oriented responses' are peasant responses to the possible outcomes of population pressure in the domains of demographic adjustments and engagement in non-farm income generating activities. Demographic responses include higher levels of permanent and seasonal out-migration and developing negative attitude towards bearing large number of children and family size. Income diversification through participation in non-farm activities and use of different institutional and societal income transfer systems such as gifts and remittances from non-resident relatives and friends are all considered to be elements of non-farm oriented responses.

extension of the study area covers around 27 kms which includes the western portion of Lake Chamo. The geographical location as well as the topography and major physical features (e.g., rivers, roads, villages and settlement patterns) of the study area are depicted in figure 3.

3.1.2. Topography, Geology and Geomorphology

The surface configuration of southeast of Lake Chamo significantly varies from place to place and is characterized by a heterogeneous geomorphology, extending from the Rift Valley structure upto the Ethiopian highlands. As it is well known, the Rift Valley was the site of extensive volcanic activity particularly during the tertiary period of the Cenozoic era. The Rift Valley escarpment, mainly associated with tectonic faults, is the major source for the trap series, the earliest and most extensive groups of volcanic rocks. The Ashangi group, which consists predominantly of alkaline basalt with interbeded pyroclastics and rare rhyolites erupted from fissures (SWMSP, 1996), covers most of the central and western part of the area under investigation. On the other hand, the lower eastern portions of southwest of Lake Chamo, close to the lakeshore, consist of undifferentiated Pleistocene and Holocene deposits, mainly lacustrine sediments (SWMSP, 1996). The transition zone between the highlands and the plain areas, comprises of undulating alluvial / colluvial slopes and outwash funs (Geological Map of Ethiopia, 1973 cited in SWMSP, 1996).

According to the preliminary survey report of the Savannah Woodland Management Study Project (SWMSP, 1996), the topography of the study area is marked by a significant spatial variation. Broadly speaking, most of the physical landscapes in the northern and southern parts of the project area range from undulating mountains to moderate to high hills, and to dissected plateaus. Partly due to its topographic situation, this part of the study area is manifested by discernible signals of severe land degradation (e.g., gully and sheet erosion, rock outcrops on farmlands, deforestation except in very steep slopes and inaccessible areas), entailing a far reaching implications for land management techniques to be undertaken by the farming community. The eastern part of the study area, close to Lake Chamo, is predominantly lowlands with very flat topography. This flat plain which is little dissected is densely populated

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CHAPTER THREE

BOIPHYSICAL, SOCIOECONOMIC AND DEMOGRAPHIC CONDITIONS OF THE STUDY AREA

In this chapter, a general overview of the study area, southwest of Lake Chamo, is presented in terms of its biophysical, socioeconomic and demographic conditions. An assessment of the natural resource base and socioeconomic conditions of the area under study will help us grasp the dimensions of farming livelihood strategies, and responses of peasants to demographic pressure and land shortage.

3.1. Biohpysical Conditions of Southwest of Lake Chamo

This sub - section of the study seeks to highlight the geographical location and the various natural resource base of southwest of Lake Chamo. Aspects to be threated under this sub - section also include geology and geomorphology, soils and their spatial distribution, surface drainage and climatic conditions.

3.1.1. Geographical Location

According to the present regional administrative structure of Ethiopia, the study area, southwest of Lake Chamo, is situated in the Arba Minch Zuria Wereda of North Omo Zone in Southern Nations, Nationalities and Peoples' Region (SNNPR). Before the Derg's administrative restructuring of 1989, southwest of Lake Chamo was part of the Gardula Awraja under Gamo Gofa administrative region.

The northern border of the study area is located around 26 kms south of Arba Minch town, the capital of both Arba Minch Zuria Wereda and North Omo zone of SNNPR, where it stretches for about 30 kms to the south. The latitudinal location of southwest of Lake Chamo is approximated to range between 5° 15'N and 5° 40'N whereas its longitudinal location is estimated to be between 36° 34'E and 36° 56'E (SWMSP,1996). Therefore, the east - west

extension of the study area covers around 27 kms which includes the western portion of Lake Chamo. The geographical location as well as the topography and major physical features (e.g., rivers, roads, villages and settlement patterns) of the study area are depicted in figure 3.

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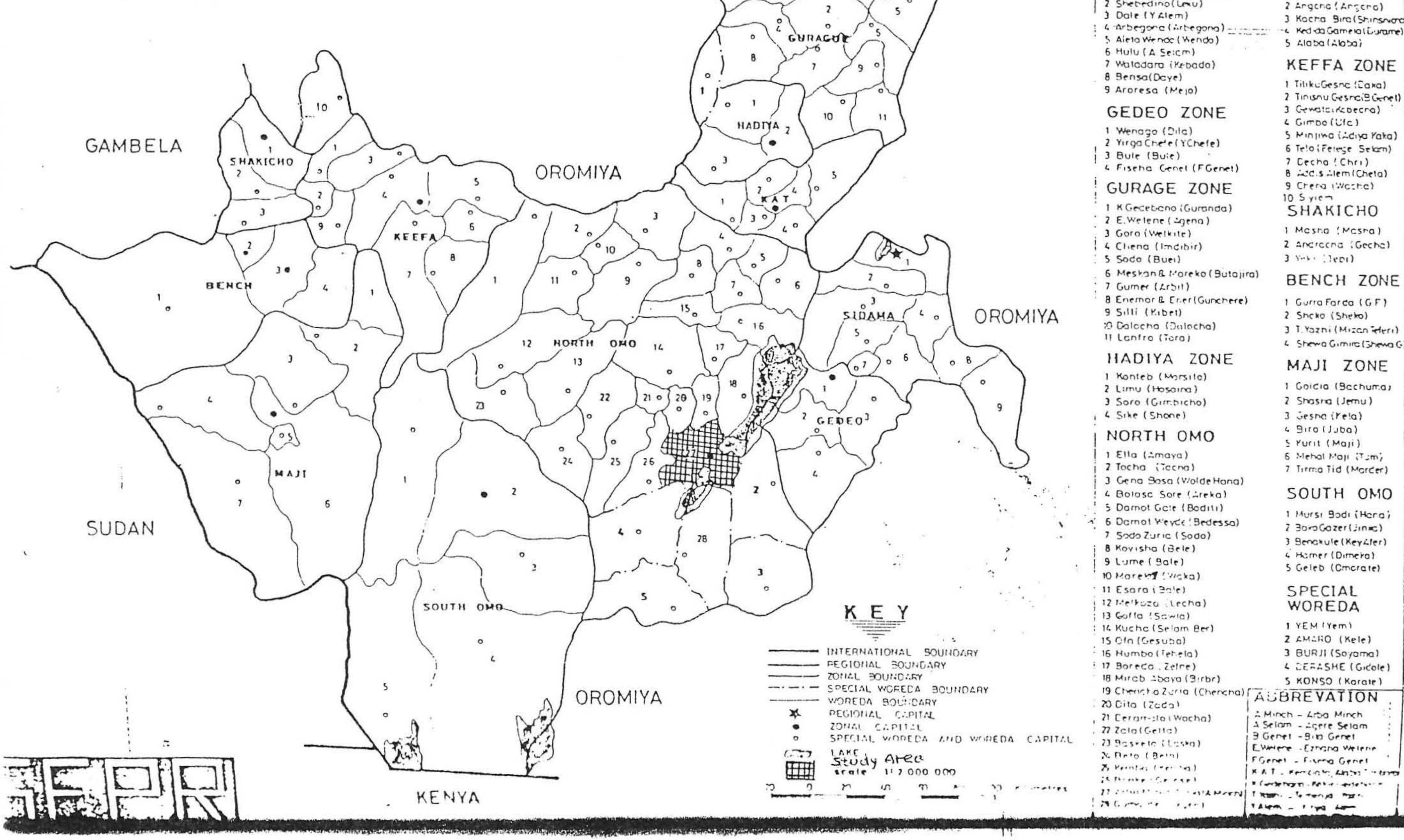
FIGURE 2. Location Map of the Study Area



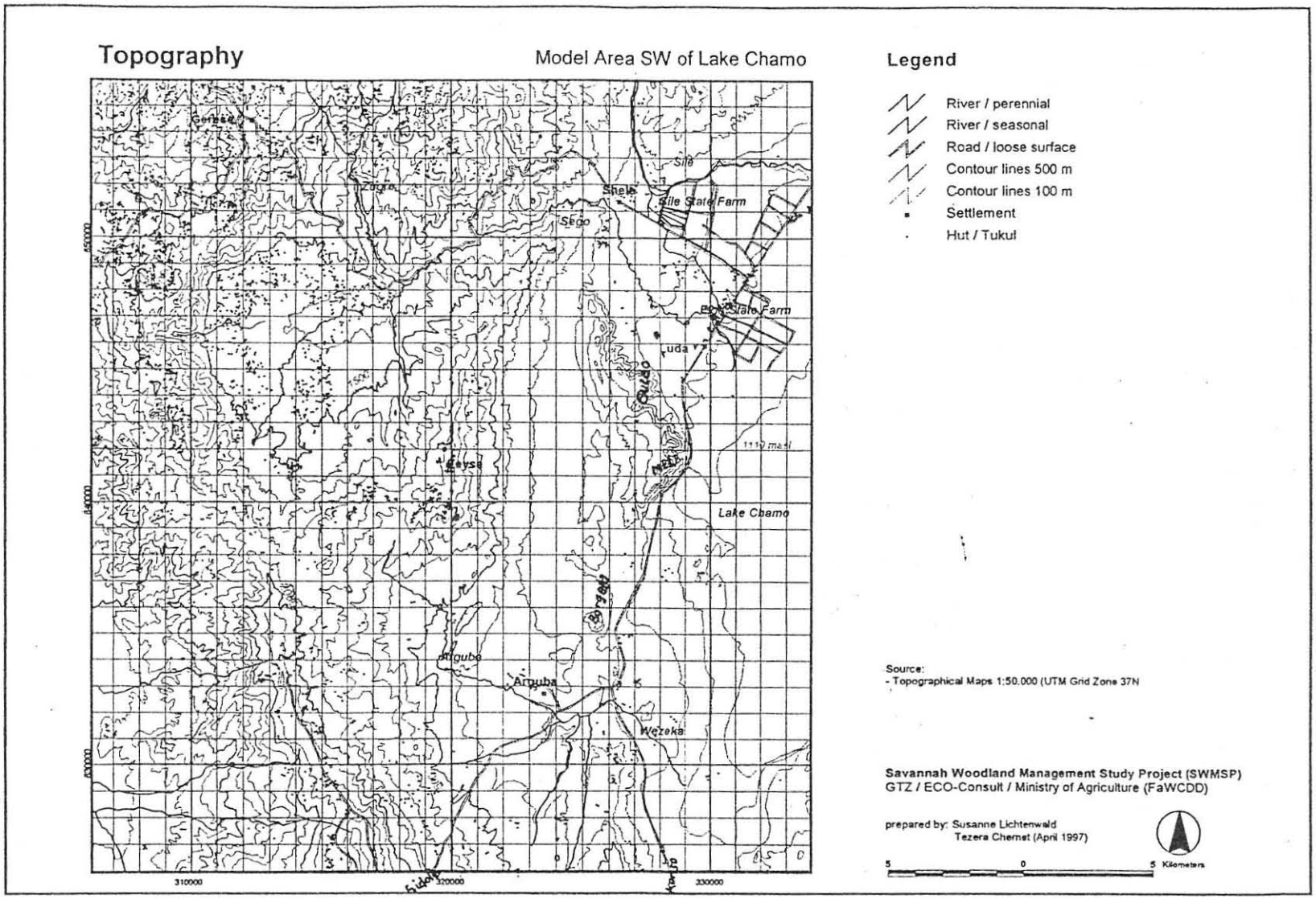


Fig.3 Topographic map of south west of Lake Chamo.

with intensive agricultural production via supplementary irrigation. On the other hand, a significant proportion of the transitional zone between the eastern lowland plains and the southern, northern and western highlands is of predominantly low plateau area with slight variation in elevation. In broader terms, the elevation of the study area progressively decreases as one goes from southern, northern and western parts towards the Chamo lakeshore, and Selle and Aelgo state farms.

The altitude of the area under investigation ranges from 1110 meters above sea level (masl) at the Chamo lakeshore to over 2500 masl in the south and west close to Gidole and in the very northern part of the area around Gerese. Therefore, the project area comprises the three major Agro - ecological zones of Ethiopia, i.e., Dega (>2400masl), Woina Dega (1700 - 2400 masl) and Kolla (<1700masl).

3.1.3. Major Soils of Southwest of Lake Chamo

There is a dearth of detailed information concerning soil types and classifications including their suitability for an efficient production of specific crop species and varieties in southwest of Lake Chamo. According to a preliminary survey report of Savannah Woodland Management Study Project (1996), however, three major types of soils are found.

On moderate to high hills, particularly in the central and western parts of the project area, the dominant soils are Chromic luvisols. This soil type covers more than 50 per cent of the study area with a reddish brown to dark reddish brown colour. The texture of chromic luvisoils of southwest of Lake Chamo is clay to clay loam, on the very steep to moderate slopes the surface is stony with high percentage of rock outcrops. Depending on the slope gradient, the effective soil depth varies from 50 to 100 cms, on moderate slopes the horizon may even reach 150 cms. Chromic luvisoils are quite acidic with a PH value of 5.5 - 6.7 (SWMSP, 1996).

supplementary irrigation from Sego and wezeka rivers is one of the most quintessential responses of the local farming community to food supply - demand gap (see Chapter Five).

3.1.5. Climatic Conditions

As it is apparent in the other regions of the country, altitude is, by and large the most significant variable influencing climatic conditions in southwest of Lake Chamo. As a consequence of the effect of elevation, three major vertically arranged agroclimatic zones are present in the study area. In the Dega agroclimatic zone, which is predominantly confined to mountain ridges and highlands of southern and northern parts, the mean temperatures during the growing season usually do not exceed 16°c. In the Kolla agroclimatic zone, mainly situated in the lowland plains close to Lake Chamo, the mean temperature records during the growing seasons may rise upto 26°c. Apart from these extreme mean temperature values, nearly 90 percent of the study area experience mean temperatures between 19 and 24°c. This is typically affiliated with the Woina Dega agroclimatic zone, which is an intermediary zone between the Dega and Kolla agroclimatic zones (SWMSP, 1996).

Within the study area there are two meteorological stations located both in the highlands (Gidole, 2520 masl) and lowlands (Selle, 1190 masl). The temperature records for both stations indicate little seasonal variation, whereas the rainfall pattern depicts two peaks, with the main rainy season in March and April and a second in August and September. In June and July the amount of rainfall has been on a steady decline; in Selle these months are among the driest. However, the driest months for both meteorological stations are December and January. The existing strong variation in the amount and distribution of annual rainfall greatly affects the cropping seasons. At Gidole station, for instance, the annual precipitation between 1980 and 1996 varied between 1800 mm and 700mm (SWMSP, 1996).

The context of the contemporary farming cycle in the study area can therefore be described as a bimodal rainfall regime. According to the villagers of the plain areas of southwest of Lake Chamo, a long and heavy rain season between early July and October

(locally identified by three vernaculars - *Hagayes/ Bolio/ Sila Kenaw)* is followed by a relatively short and light rain season in February and April (locally known as *Bargo*). It should be noted here that the local farmers have been taking advantage of this bimodal rainfall regime to make double cropping in a year. Double cropping practices, i.e., growing two crops in sequence - seeding one after the harvest of the other - are among the viable livelihood strategies of the peasant farmers of southwest of Lake Chamo under the prevailing scarcity of suitable land for cultivation.

3.2. Access to Social and Economic Infrastructure

Infrastructure investment is often deemed to be a *sinequa non* to and fundamental tool for sustained socio-economic development of regions (Mulatu, 1976, Tegegne, 1986). In spite of this general consensus, however, there has been variation as far as the meaning of infrastructure is concerned. Be that as it sounds, Wharton's (1967) definition seems to be more appropriate for the present inquiry as it is directly related to agricultural infrastructure. According to him, agricultural infrastructure denotes the physical, capital and institutional facilities that, directly or indirectly, provide services for the proper functioning of individual farm firm (Wharton, 1967).

For convenience of presentation and discussion, two major elements of agricultural infrastructure could be identified and dealt with. First, physical infrastructure comprising market outlets, road transportation and irrigation facilities. Second, social infrastructure consisting of educational and health facilities.

It is well understood that physical infrastructure particularly access to road networks play a key role in the progress of the agricultural economy of rural areas. In the first place, access to road transport networks enhances peasants' accessibility to modern agricultural technologies such as farm inputs, farm machineries and irrigation facilities from innovation centers. Secondly, access to road networks enables peasants to convey at least some portion of their agricultural products to market outlets and then purchase consumer goods. Moreover,

physical infrastructure particularly access to marketing outlets greatly influences the cropping patterns. The ability of peasants to incorporate new cash crops into the existing cropping systems and to adapt cropping systems to environmental conditions under population pressure is partly determined by market infrastructure.

Turning to the case of southwest of Lake Chamo, the local community has a very limited access to physical infrastructure, more particularly to road networks. A substantial majority of the farmers are spending more time walking to reach all-weather road. Except the Arba Minch-Konso road that passes through the eastern margin, there is no any other all-weather road that bisects the study area. The feeder road that runs from Arba Minch through Wezeka village to Gidole and Zeysie Benna is not in a good condition to provide regular transport services, let alone during the wet season even during the dry season.

On the basis of the survey data, the average walking distance between the homesteads of the studied peasant households and the nearest all-weather road was estimated at about 3 hours, ranging from 10 minutes (for those households residing around the Chamo plain area) to 4:30 hours (for those households living at the very north of the area). In general, as it is often the case for most rural areas of the country, transport infrastructure predicament has been one of the most fundamental problems worsening the general well-being of the study community.

Main marketing outlets to farming households are viewed in this context as areas where farmers could sell their farm products and could purchase consumer goods. Accordingly, there are three main market outlets (Tsenao, Selle and Zeysie Benna) accessible to the peasant households of the study area. The average walking distance between the homesteads of the studied households and the nearest main market outlet was estimated at about 45 minutes.

In terms of market infrastructure, the study area appears to be in a relatively better condition where a great majority of the farmers are accessible to local markets at a walking distance of not more than 45 minutes. Therefore, most of the farmers of the area have the

opportunity of managing seasonal food shortages through food grain purchasing from local markets.

Besides local open markets, peasant farmers of the study area used to sell part of their products at the nearby Arba Minch town (about 2 hours round trip by car) where the market price is relatively higher for certain products. It should be noted here the fact that although farmers have a good knowledge and the necessary information about the variations in market prices of crops, livestock and livestock products at different market places, the existing severe shortage of transport infrastructure in the area compelled them to sell their farm products at and purchase other basic necessities from local markets where selling prices and purchasing costs are relatively cheaper and expensive, respectively. This implies that access to transport infrastructure is, by and large, an essential precondition for rural development, spatial integration, proper functioning of political system and overall socio-economic well-being of the resident population.

The critical role of social infrastructure in the degree of socio-economic development of regions is not less important. Educational and health facilities are considered here as indicators of social infrastructure.

Several empirical investigations indicated the strong positive association between enrollment in educational institutions and the level of economic development. As to the main reason for the close relationship between expansion in educational enrollment and subsequent economic growth, Tegegne (1985) argued the very fact that education breaks the crust of custom in traditional societies and the culture becomes exposed to a more systematic means of obtaining and diffusing information about the production and distribution of goods and commodities.

Despite these crucial contributions of enrollment in educational foundations, the study area was observed to be poor in terms of educational facilities. During the survey period, there were only two primary schools (grade 1 - 6), one in each of the study PAs. The overall

average walking distance between homesteads of the sample households and primary school was approximately 30 minutes. Children in Aelgo PA have attended their Junior Secondary Education (grade 1-8) at Shelle Mele, a neighboring PA at an average walking distance of about 1 hour, whereas those in Wezeka PA have joined Arguba Junior Secondary School located at an average walking distance of about 45 minutes. For enrollment in senior secondary education, students in both study PAs had to go either to Arba Minch or Gidole, both at an average walking distance of 4 hours.

However, only few children from the better off segment of the peasantry were said to have been able to attend senior secondary education at Arba Minch and Gidole. For the resource - poor farmers of the study area, sending children as far long to Arba Minch and Gidole for education has become a waste of time and scarce resources. This is because parents had to arrange accommodations and provide all the basic necessities for their children as they could not commute daily to and from school. A study undertaken in north Shewa indicated that peasants who sent their children to school, only to produce unemployed and unskilled youngsters who are unwilling to return to the farm, were losing in two major ways: "(1) the resources spent in sending the children to school, and (2) the opportunity cost, that is, the help that the children could have provided if they had stayed on the farm." (Aklilu and Tadesse, 1994:50).

The other issue of worthy mentioning is the prevalence of sex differential in enrollment even in primary education. In this regard, a survey carried out by SWMSP (1996) revealed the fact that access to education was and still is more difficult for girls than boys. This has been related to the high work burden for women and the resulting need for girls to contribute not only to reproductive, but also to productive activities. Most women were illiterate, while a significant number of younger men have attended at least primary school (see Section 3.3.5).

Accessibility to improved health services (health institutions and health workers) has a significant effect on the overall socio-economic development of regions. As Tegegne (1985) noted efficient health facilities enhance the quality and productivity of existing labour force for

they reduce the level of absenteeism of labour thereby increasing the duration of man-hours of work. The level of productivity of labour, in turn, partly determines the regional patterns of economic development.

Nevertheless, the health sector in Ethiopia encounters deep problems largely because of the inability of the government to make the necessary allocations on account of financial constraints. This is reflected in the low per capita expenditure on health sector (which was about 2.9 Birr per head in 1994), and the resultant deterioration of the critical indicators of health conditions. The health worker - populations ratio was also among the lowest in the world (Abdulhamid, 1994).

Moreover, the existing health facilities and services are not evenly distributed among the regions of the country. They are biased in favour of the most urbanized regions. The primate city of Addis Ababa, for instance, accounted for about 48 percent of the doctors, 59 percent of the nurses, and 31 percent of the hospital beds in the entire country (Mulatu and Yohannes, 1988).

During the survey period, the study area was observed to be devoid of any form of health facilities. The overall accessibility situation regarding Junior Secondary Education holds true to health facilities as the available nearest health services such as clinics, health stations and drug shops are located at Shelle Mele and Arguba. For emergency cases sick people have often been treated at the aforementioned health service stations. For more serious cases, however, the local people had to travel as far long to Arba Minch hospital or Gidole hospital. In view of the widespread human diseases like malaria, which often causes high rate of child mortality, health problem appears to be more serious in the study area. Moreover, the inaccessibility of the Arba Minch-Konso road to a large majority of the households deprived the local people from even the minimum health services.

Farmers of the study area frequently complained about the acute problem of sweeping human diseases in the area and the predicament of access to health facilities. For instance,

according to farmers rating of nine general problems in Chichilla, one of the villages in Aelgo PA, during the PRA/RRA exercises, problem of access to clinic services was put at the third rank-order, only after shortage of livestock medicine and inaccessibility of the main road (Arba Minch - Konso) during rainy season.

3.3. Demographic Conditions

3.3.1. Population Size, Growth and Distribution

It has been continually cited that the size, growth and spatial distribution of population partially influence the degree of utilization of natural resources, the level of economic progress and the demand and scale of socio-economic services and overall development interventions in a region. On the other hand, agro-climatic and socio-economic conditions, being determinant factors for the predominant farming systems and productivity of a given region, affect the pattern of population settlement and its rate of growth.

Though for most PAs of Ethiopia the records from which we can obtain relevant data on population issues and resource endowment are extremely scanty or in some instances entirely lacking, the population size and densities of our study PAs were sufficiently high to level them under the most densely populated rural areas of the country. For instance, according to the results of the 1984 population and housing census, the total population of Aelgo and Wezeka were 3091 and 2154 whereas their areas were estimated at about 3195 and 909 hectares, respectively (CSA, 1990). The crude population density was then 96.7 persons/km^2 for Aelgo and 236.6 persons/km^2 for Wezeka. The average crude population density of the overall study area was computed to be about 127.8 persons/km^2, which was more than double the national average of 44 persons/km^2 (CSA, 1992).

Like most rural regions of the country, both the absolute and relative population growth rates and densities of the study area have been rising from time to time. The 1994 population and housing census of the country (CSA, 1996) put the total population of the

study area at about 7622 of which the two study PAs, Aelgo and Wezeka accounted for 59.7 percent (4552 persons) and 40.3 percent (3070 persons), respectively. The average rate of population increase between the two censal periods was calculated to be 3.8 persons per annum. The corresponding figure for Aelgo and Wezeka was 3.9 and 3.6 percent per year, respectively. These figures are indeed significantly higher than the national average which was about 3.1 percent per annum (CSA,1995) and other rural areas of the country, for instance, 2.8 percent per year for Munesa wereda of Arsi region (Degefa, 1996) and 3.1 percent per year for Meskan and Mareko weredas (Alemayehu, 1996). The study area therefore appears to exemplify a classic case of unregulated population growth in the country. It may also be deduced that as long as this high rate of population growth remains unaltered, the pressure of population on natural resources in general and agricultural land in particular will increase substantially.

The prevailing rapid rate of population growth in the area has resulted in an average crude population density of about 185.7 persons/km^2, the corresponding figures being 142.5 persons/km^2 for Aelgo and 337.7 persons/km^2 for Wezeka. In terms of agricultural population density, which is often held to be an appropriate proxy of relative population pressure on rural land resources, the values escalated to 297.5 persons/km^2 in Aelgo and 540.5 persons/km^2 in Wezeka, the average for the entire study area being 363.6 persons/km^2. Again these figures were by and large very high compared to the national average agricultural population density which was around 254.2 persons/km^2 (CSA, 1996).

The relative pressure of uncontrolled population growth on agricultural land becomes even more conspicuous when we examine the densities of the study PAs computed on the basis of the data collected throuhg the formal survey questionnaire.

Table 3.2. Cropland Area, Sample Population Size and Agricultural Density by PAs.

PAs	Sample Households	Sample Population	Area under Crops (ha)*	Agricultural density (persons/ha)	Agricultural density (persons/km^2)
Aelgo	102	653	69.13	9.45	945
Wezeka	58	336	56.51	5.95	595
Overall Total	160	989	125.64	7.87	787

** Area under crops also comprises areas under perennial crops*

Source: Field survey, 1997

According to the results of the survey of 160 sample households, the overall average agricultural population density of the study area was 7.87 persons/ha (787 persons/km^2), ranging from 9.45 persons/ha (945 persons/km^2) in Aelgo to 5.95 persons/ha (595 persons/km^2) in Wezeka. While our survey result for Wezeka PA was nearly compatible to the official data, the agricultural density in Aelgo appears to deviate substantially from what has been documented in secondary sources. The existing variations in agricultural population density among the study PAs during the survey period can be attributed to various agro-climatic and socio-economic factors.

In the first place, Aelgo PA, being in the main plain area of favorable agro-climatic condition, has been experiencing an extremely very high rate of population increase due partly to a relatively huge influx of immigrants from various areas. During the course of the survey, for instance, around 26.5 percent of the sample households in Aelgo were found out to be immigrants compared to 22.4 percent in Wezeka (see Chapter Five). In almost all villages of Aelgo, crop production has been taking place twice a year both under rainfed condition and supplementary irrigation and this appears to be one of the major factors why the area has supported such a huge population concentration. The other possible explanation for the disparities in population density between the study PAs could be their differences in the size of cultivated land with respect to the size of population. In this regard, Aelgo has had a relatively

small proportion of cultivated areas (47.9 percent) compared to Wezeka (62.5 percent) while the population figure of the former was much higher than the later. (See Table 5.1)

In the second place, some socio-economic factors have also further intensified the uneven distribution of population in our study area. Of particular note in this regard is the impact of the villagization program (1988-1991) on the pattern of population settlement, which was widely executed in Aelgo PA compared to Wezeka. Without due consideration of the proportion of population size and cultivable land, formerly scattered dwellings in Aelgo PA and neighboring areas were abolished and dense settlements, adjacent to the foot slopes in Aelgo, were constructed. This has further exacerbated the heavy concentration of population in Aelgo PA until recently compared to the actual situation in Wezeka. Moreover, as has been dealt with elsewhere in the thesis, a significant majority of the peasant farmers in Aelgo, for some cultural and economic reasons, have built up a very positive attitude towards large family size compared to their counterparts in Wezeka thereby inflating the pressure of population growth on agricultural land. Indeed, the population density variation among the study PAs in the project area has partly been a reflection of the differences in average family size as depicted in Table 3.3.

Table 3.3. Total population size by sex and Average Family size of the sample Households by PAs

PAs	Number of Sample Households	Male		Female		Total Sample Population		Average Family Size
		No.	%	No.	%	No.	%	
Aelgo	102	336	51.5	317	48.5	653	66.0	6.4
Wezeka	58	171	50.9	165	49.1	336	34.0	5.8
Overall Total	160	507	51.3	482	48.7	989	100.0	6.2

Source: Field Survey, 1997

Family size per household varied from 2 to 15 in Aelgo and 3 to 12 in Wezeka, with the average being 6.4 and 5.8 members, respectively. The average household size of the

overall respondents in the study area was 6.2 which was relatively greater than the mean family size in SNNPR (5.2) and Semen Omo zone (5.7) (Teller and Assefa, 1997). This may imply the experience of persistently high fertility levels among our study population where the use of contraceptives is very negligible. The other reason behind a comparatively large mean family size can be partially ascribed to polygamous marriage practices which would actually lead to high fertility rate per household. On the occasion of our survey, slightly over 4 percent of the interviewed households (Table 3.6) were living under polygamous marriage arrangements though the general tendency currently was said to have been sufficiently diminishing owing to the introduction and adoption of Protestant Christianity in the study area.

3.3.2. Age and Sex Structure

Needless to say, current age-sex composition of a population provides a valuable insights into the planning of overall socio-economic development projects for a community for it indicates the proportion of working population and their dependents as well as the potential population that would be envisaged to phase in and out of the productive age limits.

According to CSA's (1988) report, in developing countries the proportion of population distribution in each successive five years age-group is less than the value in the previous one unless and otherwise it is significantly affected by massive in-or out-migration or extreme changes in birth or death rates. Our survey results for the overall sample population, however, appear to diverge from this contemplation, particularly in four age groups (i.e., 5-9, 25-29, 60-64 and 65+).

The relatively small proportion of population in the age group 0-4 compared to its successive age-group can be possibly explained by the existing high rate of child mortality (see Section 4.2). Likewise, the possible explanation for a slightly large proportion of persons at the age groups 65+ and 60-64 with respect to their preceding five year age distribution could be ascribed to age exaggeration by old-age respondents as elderly people in most rural areas of the country have high social status and are often respected by their respective community.

Table 3.4. Age and Sex Structure of the Sample Population by PAs.

	Aelgo						Wezeka						Overall Total					
Age	Male		Female		Total		male		Female		Total		Male		Female		Total	
Group	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
0-4	52	15.5	54	17.0	106	16.2	27	15.8	28	16.9	55	16.4	79	15.6	82	17.0	161	16.3
5-9	60	17.9	61	19.2	121	18.5	31	18.1	32	19.4	63	18.8	91	17.9	93	19.3	184	18.6
10-14	48	14.3	50	15.8	98	15.0	24	14.0	25	15.2	49	14.7	72	14.2	75	15.6	147	14.8
15-19	28	8.3	26	8.2	54	8.3	14	8.2	13	7.9	27	8.0	42	8.3	39	8.1	81	8.2
20-24	26	7.7	24	7.6	50	7.7	13	7.6	14	8.5	27	8.0	39	7.7	38	7.9	77	7.8
25-29	27	8.0	26	8.2	53	8.1	14	8.2	13	7.9	27	8.0	41	8.0	39	8.1	80	8.1
30-34	24	7.1	23	7.3	47	7.2	12	7.0	11	6.7	23	6.8	36	7.1	34	7.1	70	7.1
35-39	23	6.8	20	6.3	43	6.6	11	6.4	9	5.5	20	5.9	34	6.7	29	6.0	63	6.4
40-44	18	5.4	12	3.8	30	4.6	9	5.3	8	4.8	17	5.0	27	5.3	20	4.1	47	4.8
45-49	10	3.0	7	2.2	17	2.6	5	2.9	4	2.4	9	2.7	15	3.0	11	2.3	26	2.6
50-54	5	1.5	4	1.3	9	1.4	3	1.8	2	1.2	5	1.5	8	1.6	6	1.2	14	1.4
55-59	3	0.9	2	0.6	5	0.8	1	0.6	1	0.6	2	0.6	4	0.8	3	0.6	7	0.7
60-64	4	1.2	3	0.9	7	1.0	2	1.2	2	1.2	4	1.2	6	1.2	5	1.0	11	1.1
65+	8	2.4	5	1.6	13	2.0	5	2.9	3	1.8	8	2.4	13	2.6	8	1.7	21	2.1
Total	336	100	317	100	653	100	171	100	165	100	336	100	507	100	482	100	989	100

Source: Field survey, 1997

Table 3.5. Sex-Ratio of the study population by Age Group

Age Group	Aelgo	Wezeka	Overall Total
0-4	96.3	96.4	96.3
5-9	98.4	96.9	97.8
10-14	96.0	96.0	96.0
15-19	107.9	107.9	107.9
20-24	108.3	92.9	102.6
25-29	103.6	107.9	105.1
30-34	104.3	109.1	105.9
35-39	115.0	122.2	117.2
40-44	150.0	112.5	135.0
45-49	142.7	125.0	136.4
50-54	125.0	150.0	133.3
55-59	150.0	100.0	133.3
60-64	133.3	100.0	120.0
65+	160.0	166.7	162.5
Total	105.9	103.6	105.2

Source: Field survey, 1997.

The median age of the sample population at the time of the survey was computed to be 15.2 years. The median age of males was higher than females by about two years, i.e., 16.4 and 14.4 years, respectively. The relatively low median age in the study area suggests the preponderance of young age population and the existence of high fertility levels. This in turn implies an increasingly large demand for food, clothing, health and educational facilities and better employment opportunities that meet the requirements of large number of infants and children.

3.3.3. Marital Status of the Sample Households

One of the most critical variables that determines fertility levels and the rate of population increase in a community, where the use of birth control methods is trivial, is the marital status of the population under question.

Table 3.6. Marital status of the sample Households by PAs

Marital Status	Aelgo		Wezeka		Overall Total	
	No	%	No	%	No	%
Married	75	73.6	40	69.0	115	71.9
Divorced	3	2.9	1	1.7	4	2.5
Widowed	21	20.6	11	19.0	32	20.0
Single	-	-	2	3.4	2	1.2
Polygamous	3	2.9	4	6.9	7	4.4
Total	102	100.0	58	100.0	160	100.0

Source: Field Survey, 1997

A significant majority of the overall respondents were married, with the widowed households being the next largest group. At the time of the survey the single and divorced people were found to be very few. The proportion of the overall sample households by current marital status was as follows: Married (both monogamous and polygamous), 76.3 percent; widowed, 20 percent; divorced, 2.5; and single, 1.2 percent. Of those households who disclosed to be married, 4.4 percent were polygamously married. All the households who engaged in polygamous marriage practices belonged to the Zeysie ethnic group who worshipped Mekane Jesus Church.

3.3.4. Ethnicity and Religion

The number and percentage distribution of the sample households by ethnicity and religion is presented in Table 3.7. As may be observed from the table, the Zeysie was by and large the predominant ethnic group in the study area, with three-fourth of the overall sample households belonging to this group. Amhara, Konso and Wolaita with a

percentage share of 9.4, 8.1 and 5.6 respectively were observed to be the next major ethnic group in the study area. The remaining 1.9 percent of the overall respondents were comprised by Gamo and Zergula ethnic groups.

The large majority of the overall respondents (63.8 percent) were adherents of Mekane Yesus (Lutheran) faith, followed by kalehiwot (Catholic) and Orthodox Christian which accounted for 19.4 and 16.8 percent of the interviewed household heads, respectively.

Regarding the relationship between ethnicity and religion of the respondents, all the household heads who belonged to the Zeysie ethnic group were affiliated to either Mekane Yesus (60 percent) or Kalehiwot (15 percent), whereas all the Amharas, who accounted for 9.4 percent of the entire respondents, were Orthodox Christian. The religious composition of the Konso household heads was as follows: 4.4 percent Orthodox Christian; 3.1. percent Mekane Jesus; and 0.6 percent Kalehiwot. Likewise, 3.1 percent of the Wolaytas were Orthodox Christian; 1.9 percent Kalehiwot; and 0.6 percent Mekane Yesus.

Table 3.7. Ethnicity of the Household Heads by Religion and PAs.

Religion / Ethnicity	Aelgo								Wezeka								Overall Total							
	Mekane Yesus		Kalehiwot		Orthodox Christian		Total		Mekane Jesus		Kalehiwot		Orthodox Christian		Total		Mekane Jesus		Kalehiwot		Orthodox Christian		Total	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Zeysie	64	62.7	11	10.9	-	-	75	73.5	32	55.2	13	22.4	-	-	45	77.6	96	60.0	24	15.0	-	-	120	75.0
Amhara	-	-	-	-	15	14.7	15	14,7	-	-	-	-	-	-	-	-	-	-	-	-	15	9.4	15	9.4
Konso	-	-	1	1.0	3	2.9	4	3.9	5	8.6	-	-	4	6.9	9	15.5	5	3.1	1	0.6	7	4.4	13	8.1
Wolayta	-	-	3	2.9	3	2.9	6	5.9	1	1.7	-	-	2	3.4	3	5.2	1	0.6	3	1.9	5	3.1	9	5.6
Others*	-	-	2	1.9	-	-	2	2.0	-	-	1	1.7	-	-	1	1.7	-	-	3	1.9	-	-	3	1.9
Total	64	62.7	17	16.7	21	20.6	102	100	38	65.5	14	24.1	6	10.3	58	100	102	63.8	31	19.4	27	16.8	160	100

Source: Field Survey, 1997 **Others comprised of Gamo and Zergula.*

Table 3.8. Educational Status of the Sample Population Aged Six and Above by Sex and PAs.

Education	Aelgo						Wezeka						Overall Total					
	Male		Female		Total		Male		Female		Total		Male		Female		Total	
Status	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Illiterate	93	39.6	138	64.5	231	51.5	53	42.7	77	69.4	130	55.4	146	40.7	215	66.2	361	52.8
Read & Write only	47	20	37	17.3	84	18.7	29	23.4	20	18.0	49	20.8	76	21.2	57	17.5	133	19.4
Grade 1-6	77	32.8	34	15.9	111	24.3	35	28.2	12	10.8	47	20.0	112	31.2	46	14.2	158	23.1
Above grade six	18	7.6	5	2.3	23	5.1	7	5.7	2	1.8	9	3.8	25	6.9	7	2.2	32	4.7
Total	23.5	100	214	100	449	100	124	100	111	100	235	100	359	100	325	100	684	100
Literacy Rate (%)	60.4		35.5		48.5		57.3		30.6		44.6		59.3		33.8		47.2	

Source: Field Survey, 1997

CHAPTER FOUR

PEASANT PERCEPTIONS OF POPULATION GROWTH AND ITS IMPACTS ON THE LOCAL ENVIRONMENT

An analysis of population - environment - agricultural development interactions must examine peasants' perception of population growth and the environment. This is because any development programme that aims at bringing about sustainable development through balancing population - resource relationships is certainly fruitless unless it is formulated on the basis of peasants' perception of the level of population growth and its actual and potential effects on the local environment (Masfin, 1991; Alemneh, 1990; Amanor, 1994; Dejene, 1996).

In what follows we shall therefore examine and evaluate trends of population growth and its impacts on the natural resource base and food supply - demand situation as perceived by the peasant households of the study area. Some of the specific research questions to be assessed are: How do the peasant households of southwest of Lake Chamo perceive and evaluate the rate of population growth since the land reform of 1975? What are the main perceived causes of fast population growth? What is the most commonly held view of the farming community concerning fast population growth and large family size? Do the peasants of Southwest Lake Chamo want to maximize their family size? If yes to the latter question, what are the underlying reasons for maximizing family size? How do the peasant households of the study area perceive and evaluate the impact of fast population growth on changes in the local environmental resources and on food supply - demand situation?

4.1. Trends and Levels of Population Growth: Peasant Perceptions

The results of the formal survey questionnaire indicated that regardless of the age and sex structure and educational background of the studied households, the population size of southwest of Lake Chamo was perceived as depicting an increasing trend since the 1975 Land Reform proclamation. Moreover, there exists statistically insignificant variations in the perception and wareness of the sample households among the study PAs concerning the level at which the population size of the area has been growing (see the X^2 test).

As the summary of the survey data (Table 4.1) clearly shows, a significant proportion of the overall peasant households interviewed (62.5 percent) mentioned that the human population of the area has been growing very rapidly. On the other hand, around 10.6 percent of the respondents perceived the level of population growth to be very low. The remaining 26.9 percent of the farmers argued that the rate of population increase since the Land Reform has been moderate. Farmers' perceptions of high population growth in the area matches well with the results obtained from secondary sources (see Section 3.3.1).

Table 4.1. Summary of peasant perceptions of 'levels' of population Growth by PAs

	Levels of Population Growth*					
PAs	Very High		Moderate		Very Low	
	No	%	No	%	No	%
Aelgo	68	66.7	25	24.5	9	8.8
Wezeka	32	55.2	18	31.0	8	13.8
Overall Total	100	62.5	43	26.9	17	10.6

* *Differences in the level at which the population of the study area has been growing with Chi-square 2.23 is insignificant at the 0.05 probabolity limit and 2 degree of freedom.*

to have additional children. The interviewed households have rated each of the specified reasons for having additional children as either very important, somewhat important or not important at all. In order to compare and diagnose the reasons, point score analysis was employed.

Table 4.3. Number and Percentage Distribution of Respondents by Type of Most Important Reasons for the Demand for Additional Children by PAs.

	Rate		Love of Children	Continuity of the family/clan name	The need for help before old age	Old age Security	Stability of Marriage	Social acceptance
Aelgo	A	No	43	51	46	39	27	35
		%	46.7	55.4	50.0	42.4	29.3	38.0
	B	No	45	38	34	48	32	28
		%	48.9	41.3	36.9	52.2	34.8	30.4
	C	No	4	3	12	5	33	29
		%	4.4	3.3	13.1	5.4	35.9	31.6
Wezeka	A	No	25	28	21	23	16	18
		%	54.3	60.9	45.7	50.0	34.8	39.2
	B	No	11	12	17	14	27	22
		%	23.9	26.1	36.9	30.4	58.7	47.8
	C	No	10	6	8	9	3	6
		%	21.8	13.0	17.4	19.6	6.5	13.0
Overall total	A	No	68	79	67	62	43	53
		%	49.2	57.3	48.6	44.9	31.2	38.4
	B	No	56	50	51	62	59	50
		%	40.6	36.2	39.9	44.9	42.8	36.2
	C	No	14	9	20	14	36	35
		%	10.2	6.5	14.5	10.2	26.0	25.4

Note: A = very important
B = Somewhat important
C = Not important at all

No. = Number of Respondents
% = Percent of respondents at PA level or overall in the case of overall total (N = 138, i.e., 92 for Aelgo and 46 for Wezeka, excluding up-to God responses and those wanted no more children)

Source: Field survey, 1997

As can be observed from Table 4.3, there seems to be a fair difference in the distribution of respondents among the specified reasons for the demand for additional children. From a cursory glance at the figures, by and large, the most important motive for bearing additional children among the interviewed farmers appears to be continuity of the family/clan name that accounted for slightly over 55, 61 and 57 percent of all the cases in Aelgo, Wezeka and the study area, respectively. In order to identify the degree of significance of each reason for reinforcing the demand for additional children, it is desirable to further analyze the data using point score technique. The results are presented in the table that follows.

Table 4.4. Summary of Point Score Analysis for the Socio-Economic and Psychological Reasons for the Demand for Additional Children by PAs.

Reasons	Peasant Associations[3]				Overall Total		Percent of Applicability[2]
	Aelgo		Wezeka		Total Score	Rank	
	Total Score	Rank	Total Score[1]	Rank			
Love of children	131	2	61	2	192	2	89.8
Continuity of family/clan name	140	1	68	1	208	1	93.5
The need for help before old-age	126	3	59	4	185	4	88.5
old-age security	126	3	60	3	186	3	89.8
Stability of marriage	86	6	59	4	145	6	74.0
Social acceptance	98	5	58	6	156	5	74.6

Source: Field survey, 1997

Note: 1. *Score values assigned to responses were: 2 for very important; 1 for somewhat important; and 0 for not important at all.*

- *Response values were then multiplied by the number of respondents in Table 4.3 above; and summed up to get total scores.*

2. *Percent Applicability - denotes the proportion of the farmers that responded the reason is important irrespective of the degree of relevance.*

- *It is simply the sum of the percent for the farmers reported very important and*

somewhat important.

3. *Difference between the total scores of farmers with chi-square 6.388 is insignificant at 95 percent confidence limit and 5 degree of freedom.*

The data presented in Table 4.4 throw light on the magnitude of significance of the prescribed reasons for the demand for additional children as recognized by the interviewed households. A substantial majority of the cases (93.5 percent) reckoned continuity of the family/clan name as the most important of all the incentives to their decisions to bear additional children. The second most vital reason that determines the demand for children was observed to be love of children (as reported by 89.8 percent of the overall respondents). In support of this finding, there is a substantial body of empirical research elucidating the emotional or psychological value of children in rural societies of developing countries. To take Menbere's (1993) research as a case in point, for instance, emotional and kin group benefit, which comprised love of children and continuity of the family/clan name, was reported to be by far the primary factor influencing the desire for additional children among the overall respondents of Cheha and Ezha-and-Welene weredas.

For the farmers of the study area, old-age economic security consideration and the need for economic support before old-age were of the third and fourth prominent reasons necessitating additional children (rated by about 89.8 and 88.5 percent of the overall cases, respectively).These households maintained that having many children is the best strategy to gain old-age economic support because having many children encreases the chance that at least one will achieve and help the family.

Particularly in developing countries where saving institutions and pensions or social security schemes are limited, the reliance of rural people on old-age economic support of children has been a common phenomenon. In this connection, the old-age security hypothesis states that the expectation of relying on children in one's old-age promotes the desire for large family size in traditional societies (De vos, 1985). This is

mainly because having many children results in a large pool of resources available to support elderly parents. In this regard, several empirical investigations indicated that old-age security consideration is an important reason for demand for additional children (De Vos, 1985; Cain, 1978; Rosenzweig and Evenson, 1977)

Most of the sample households were against the practice of bearing one or two successful children who will have the means to support parents. They appear to have had a good knowledge and awareness regarding the merits of having many children rather than procreating few successful children. Of particular note in this regard is the fear of child mortality. They explicitly argued that since child mortality is very widespread in the area, owing to several human diseases (e.g., malaria) and poor access to health facilities, bearing large number of children assures enough number of children to survive to adulthood and thus help the rest of the family. It is therefore plausible that the actual death and fear of child mortality necessitated additional children for insurance purposes, and this will increase the total fertility rate of couples in the area under investigation.

In the context of the study area, maximizing family labour via bearing many children has been claimed to be the custom for most of the local people. Children play a cardinal role in the household production system and livelihood strategies under conditions of population pressure and increasing intensification of agriculture (Boserup, 1990). The survey data indicated that children in the study community undertake the time consuming household chores ascribed to children from their early ages (on average 7 years). The most important domestic and farm operations performed by children of this age include fetching water, collecting fuelwood, bird scaring, herding, care for younger siblings, help with cooking, etc. All these activities are considered very essential for the smooth functioning of the household economy because without children the family would not be free to carry out more productive farm operations (Menbere, 1993).

On average, by the age of 15 children in the study area fully participate in more productive farm operations like land preparation, seeding, weeding, harvesting and threshing. For those living at the margin of survival, children also provide the household

with supplementary cash income from rural non-farming activities such as petty trade, handicraft, fishing, selling fuelwood and construction poles, etc. Therefore, it is possible to deduce that the need for economic support before old age is one of the most important variables determining rural people's attitude towards large family size.

Finally, the contribution of children to marriage stability and social status of parents was rated the sixth and fifth vital reasons for the demand for children by 74.0 and 74.6 percent of the cases, respectively. Menbere (1993) also found out that the effect of the social motives, which comprised marriage stability and social acceptance, on the demand for children was ranked last by the overall respondents in Cheha and Ezha-and-Welene Weredas. In this regard, Boserup (1990:183), however, pointed out that "since large families are both powerful and respected the status of the head of the family is often directly related to its size." Boserup's argument has, of couse, a partial validity in the case of southwest of Lake Chamo, but not as powerful as the other factors in influencing desired family size.

The foregoing discussion revealed that increasing family labour via bearing large number of children seems to be rational calculus for short-and long-term livelihood security among the peasants in the study area. In the course of the survey, many households claimed that in order to assure their survival under the existing condition of limited access to productive resources, particularly land and capital, they rely heavily on the various economic assistances of their children. From the peasants' perspectives, having many children and large family size reflects local people's livelihood strategies and responses to land shortage and food supply-demand gap. This is largely because peasants are increasingly resorted to selling part of their surplus family labour so as to meet the consumption needs of the household.

The interviewed peasant farmers strongly underlined the fact that family labour is, by and large, the prime determinant factor of production in the study area. This is perhaps the fundamental reason why most people have decided to maximize family size in spite of the inherent acute scarcity of agricultural land in the study area. In the context of the

study area, it was considered the general rule for most of the adult family members, with severe land shortage, to hire or sharecrop land. It was argued, however, that the success of households in the area to engage in sharecropping tenancy or hire land on monetary payment is largly determined by the availability of active family labour and capital in the form of draught oxen. This implies that bigger households with a large pool of active family labour and capital stock have far greater options to manage the problem of access to land through informal land contract arrangements than their counterparts.

Of particular importance at the Lake Chamo plain area, where average landholding size is very small, is the fact that many of the farmers claimed to have large number of children. Yet hardly most of them were residing in the area during the survey period. Most of them were said to have migrated out temporarily or permanently, usually when they reached their early 20s, in search of better economic opportunities elsewhere. It seems that under conditions of very small holdings, out-migration encourages large families since the parents have to reproduce additional children to carry out the households domestic and farm operations.

4.3. Impacts of Population Pressure on the Local Environment: peasant Perceptions

As it has been noted earlier, one of the main objectives of this sub-section is to investigate peasant households' perceptions towards the adverse effects of population pressure on the local environmental resources and their attempts to adopt strategies of resource management to address the problems. This emanates from the premises that investigating and understanding this knowledge may constitute a valuable cultural base for the formulation of new forms of sustainable resource management strategies. Moreover, evaluating local people's knowledge and attitude concerning population-environment-agricultural development linkages is crucial for the simple reason that the sussess of environmental protection programmes will in the final analysis be determined by their

willingness to implement these systems of resource management.

From what have been already documented in the related literature, the rapidly growing population in most rural areas of the country has resulted in degradation of the productive environment, high degree of agriculture land fragmentation, diminution of average farmland per household, incidence of landlessness, lack of security of tenure, declining productivity of land, and widening gap between food supply and demand of the farming community (Yibeltal, 1994; Daniel, 1990; Wood, 1990; Gebre,1995; Mesfin, 1991; and Holt and Lawrence, 1993).

Accordingly, these important detrimental effects of population pressure were presented to the interviewed households so that they would indicate their awareness of each impact as applied to their locality. Farmers have rated each impact of population pressure as either most important, somewhat important or not important at all. Point score analysis was employed to compare and identify the most commonly perceived adverse effects of growing population pressure on the local environment and food supply -demand situation of the local people. The main findings of the analysis is presented in Table 4.5 and 4.6.

Table 4.5. Number and percentage Distribution of Respondents According to Their Perceptions Towards Impacts of Population Pressure on the Local Environment by PAs.

			Impacts of population pressure						
PAs	Rate		Food Supply-Demand Gap	Environmental Degradation	Land Fragmentation	Diminution of Farm Size	Incidence of Landlessness	Lack of Security of Tenure	Declining Productivity of Land
Aelgo	A	No	43	18	16	76	20	68	25
		%	42.2	17.7	15.7	74.5	19.6	66.7	24.5
	B	No	51	34	40	14	35	24	15
		%	50.0	33.3	39.2	13.7	34.3	23.5	14.7
	C	No	8	50	46	12	47	10	62
		%	7.8	49.0	45.1	11.8	46.1	9.8	60.8
Wezeka	A	No	28	23	15	41	10	35	34
		%	48.3	39.7	28.8	70.6	17.2	60.3	58.6
	B	No	22	31	20	8	40	14	20
		%	37.9	53.6	34.5	13.8	68.9	24.1	34.5
	C	No	8	4	23	9	8	9	4
		%	13.8	6.8	39.7	15.6	13.8	15.6	6.9
Overall total	A	No	71	41	31	117	30	103	59
		%	44.4	25.6	19.4	73.2	18.8	64.4	36.9
	B	No	73	65	60	22	75	38	35
		%	45.6	40.6	37.5	13.8	46.9	23.8	21.9
	C	No	16	54	69	21	55	19	66
		%	10.0	33.8	43.1	13.0	34.3	11.8	41.2

Note: A = Very important *No. = Number of respondents*

B = Somewhat important *% = Percent of respondents at PA level or overall in the case C = Not important at all of overall total*

Source: Field Survey, 1997

4.4.1. Diminution of Farm size

Farm size may have an important bearing on efficiency of agricultural production, resource allocation, farmers' income, type of farming practiced, and cropping intensity (Grigg, 1984; Ahmed, 1987; Alemneh, 1987). Notwithstanding, the voluminous literature on the subject, the issue of the relationship between farm size and productivity has not been conclusive at the level of theory. The main findings of the majority of the studies seem to be adding evidence to the existence of an inverse relationship besteen farm size and productivity (Ahmed, 1987; Abedin and Bose, 1988), although some studies are also showing that productivity is higher on large farms than small farms (Dasgupta, 1977; Ghose, 1979).

According to Arnon (1987), however, farm size alone is of little significant unless and otherwise it is considered in terms of the fertility status of the land, the availability of capital and know-how, access to agricultural infrastructure, population pressure, the land tenure system, differential yield rate of individual crops and intensity of land use.

Be that as it may, the adverse effect of undeterred population growth, with a limited land fund available in the area, on diminution of holdings was very much realized by the sample households. Progressive diminution of average farm land per household has appeared the first ranking of all the detrimental consequences of population pressure in the study area.

Table. 4.6. Summary of Point Score Analysis of Peasants' Perceptions Towards the Major Impacts of Population Pressure on the Local Environment by PAs.

	Peasant Associations[3]						Overall Total		
	Aelgo			Wezeka					
	Total Score[1]	Rank	Percent of Applicability[2]	Total Score	Rank	Percent of Applicability	Total Score	Rank	Percent of Applicability
Food Supply-demand gap	137	3	92.2	78	4	86.2	215	3	90.0
Environmental degradation	70	6	51.0	77	5	93.3	147	5	66.2
Land fragmentation	72	5	54.9	50	7	63.3	122	7	56.9
Diminution of farm size	166	1	88.2	90	1	84.2	256	1	87.0
Incidence of landlessness	75	4	53.9	60	6	86.1	135	6	65.7
Lack of Security of tenure	160	2	90.2	84	3	84.4	244	2	88.2
Declining productivity of land	65	7	39.2	88	2	93.1	153	4	58.8

Source: Field Survey, 1997

Note: 1- Score values assigned to responses were: 2 for very important; 1 for somewhat important; and o for not important at all.

- Response values were then multiplied by the number of respondents in Table 4.5; and summed up to get total score.

2 - Percent of Applicability - denotes the proportion of the farmers who responded the impact of population pressure is relevant. It is simply the sum of the percent for the farmers reported very important and somewhat important.

3- Difference between the total scores of PAs with chi-square 35.568 is significant at 95 percent confidence limit and 6 degree of freedom.

About 87 percent of the overall respondents (88.2 percent in Aelgo and 84.2 percent in Wezeka) indicated that their agricultural holdings have been shrinking steadily because of the practice of inheritance and periodic land redistribution in response to rapid population increase and incidence of landless peasants. Although there is no comparable and comprehensive time series data before and after the 1975 Land Reform, informal discussion with elderly households disclosed that arable lands that used to be held by a farmer before the Land Reform are currently distributed among ten or even more households. The response of the peasant farmers of the study area is in line with the general situation in the country as the average holding size has diminished from 1.9 hectares in 1974/75 to about 1.29 hectares in 1994/95 (CSA, 1995).

During the survey period, relevant data on holding size of the sample households were secured and categorized under three broad farm size groups, i.e., small holding (less than 1 hectare), medium holding (1-2 hectares), and large holding (greater than 2 hectares) for convenience of comparison and analysis. The proportion of farmers and total areas of each farm size category by PAs are illustrated in Table 4.7.

Table 4.7. Farm size Category Distribution of Sample Households by PAS.

Farm size Category	Aelgo				Wezeka				Overall Total			
	Area		Households		Area		Households		Area		Households	
	ha	%	No.	%	ha	%	No.	%	ha	%	No.	%
Small (< 1 ha)	25.15	36.4	77	75.5	17.31	30.6	32	55.2	42.46	33.8	109	68.1
Medium (1-2 ha)	28.93	41.9	18	17.6	32.45	57.4	23	39.6	61.38	48.8	41	25.6
large (> 2 ha)	15.05	21.8	7	6.9	6.75	12.0	3	5.2	21.80	17.4	10	6.3
Total	69.13	100.0	102	100.0	56.51	100.0	58	100.0	125.64	100.0	160	100.0

Source: Field Survey, 1997

As the survey data summarized in Table 4.7 indicate, a significant majority of the overall farmers of the study area (about 68 percent) were classified as small land holders. Small holdings accounted for about 34 percent of the total farm area during the survey period. There exists a discernible variation in the farm size category distribution of

farmers among the study PAs. About three-fourth of the farmers in Aelgo were holders of less than 1 hectare, comprising only about 36 percent of the total holding area. On the other hand, around 55 percent of the farmers in Wezeka were the holders of less than 1 hectare which made up about 31 percent of the total farm area.

Medium farms from 1ha-2ha accounted for about 49 percent of the total holding area in the study area (42 percent in Aelgo and 57 percent in Wezeka). These farms supported almost one-fourth of the overall respondents. Farmers in the medium holding category were much greater in Wezeka (40 percent) than those in Aelgo (18 percent).

Large holdings over 2ha constituted 17.4 percent of the total farm area (21.8 percent in Aelgo and 12 percent in Wezeka). The proportion of farmers in the large holding category appears very negligible, comprising only about 6 percent of the overall respondents, and 7 and 5 percent of the interviewed farmers in Aelgo and Wezeka, respectively. The average landholding size of the farmers in large farms was computed to be 2.15 ha in Aelgo and 2.25 ha in Wezeka. This certainly implies the acute problem of land scarcity not only for small-scale land holders even for the holders of 'large farms' in the area under investigation.

Irrespective of farm size category, the overall average holding size in the study area was approximately 0.79 ha, while the corresponding figures for Aelgo and Wezeka were 0.67 ha and 0.97ha, respectively. These are extremely small compared to the national average (1.29ha) and findings of researchers for other areas; for instance, Degefa (1996) for Munessa wereda of Arssi region (2.36ha), Tadesse (1989) for Dejen in Gojjam (1.78ha) and Alemayehu (1996) for the most densely populated Meskan and Mareko Weredas (1.02ha). Therefore, it is tenable to argue that many family holdings in the study area are now too small to farm and most of the peasants are currently left with, what Dessalegn (1994) precisely termed, "starvation plots" which are very likely to reduce the proper utilization of peasant labour.

How do these near-landless peasant households, with mini plots, of the study area respond to the problem of land scarcity? To use Dessalegn's (1994:12) statement, " the increasing demand for land stimulated by population pressure cannot be accommodated by a static system of tenure. Peasants will constantly devise new transfer arrangements among themselves to overcome the problem of land scarcity." Likewise, the peasant farmers of southwest of Lake Chamo did not remain apathetic, but rather they responded to the problem through local forms of access to agricultural land (see Chapter Five).

4.3.2. Lack of Security of Tenure

Security of tenure plays a pivotal role in influencing the ways in which factors of production (land, capital and labour) are utilized. Moreover, farmers' decision making and willingness to innovate and adopt land quality improvement techniques and strategies are partially governed by security of tenure (Alemneh, 1987; Gavian and Amare, 1996; Beyene, 1996; Dessalegn, 1994; and May, 1991).

Lack of security of tenure in their holdings appeared the second most important regressive effect of growing population pressure in the study area. An overwhelming proportion of the overall peasant households (88.2 percent) perceived that increasing pressure of fast population growth since the 1975 Land Reform has resulted in feeling of insecurity over land among the peasantry. As the data presented in Table 4.6 clearly show, the magnitude of lack of security of tenure seems to be relatively more severe in Aelgo than that in Wezeka. Slightly over 90 percent of the interviewed farmers in Aelgo perceived lack of long-term security in their present holdings as the second most important negative impact of population pressure. This problem was ranked third in Wezeka PA by about 84 percent of the respondents. The existing slight variation in peasants' perception towards the impact of population pressure on security of tenure among the study PA could be largely explained by the frequency of land redistribution since the Land Reform of 1975.

According to farmers, the major cause for lack of security of tenure in the area was ascribed to the fear of periodic land redistribution and progressive leveling down of peasant holdings, which has been stimulated by fast population increase and incidence of high level of landlessness. Excluding minor reallocations, farmers of Aelgo and Wezeka disclosed that land redistributions have been carried out since 1975 on average 5 and 3 times, respectively. In this connection, a recent survey conducted in the study area underlined the fact that the livelihood security of each household, especially in the Lake Chamo plain area, is being seriously eroded by frequent redistribution of irrigable cropland and progressive shrinkage of average farmland owing to the growing population (SWMSP, 1996).

Lack of long-term security over land among the peasantry has become a disincentive and critical constraint to protect the land from further degradation and to make long-term investments in its productivity. As has been mentioned elsewhere in this manuscript, though some farmers of the study area have already observed trail of land degradation in the form of soil erosion on their crop fields they did not construct soil conservation structure partly due to fear of expropriation of the land and their labour and capital investments by periodic redistribution.

In general, any more redistribution of land in the area, if it continuous unabated, appears to end up with uneconomic peasant plots, and is very likely to further exacerbate the degree of insecurity of tenure among the farming community. Consequently, individual peasants may remain indifferent to undertake investments in land quality improvements. It should therefore be stressed that in order to encourage rural people to pursue sustainable resource management strategies and ameliorate their livelihoods, they ought to be secured over their holdings on which they are making a living.

4.3.3. Food supply-Demand Gap

Unregulated population increase in the area did not only result in diminution of holdings and insecurity of tenure but also diluted peasants' ability to satisfy their annual consumption requirements. Peasant households in the study area very well appreciated the aggravating effect of growing population on widening the gap between food supply and demand as it was ranked third by 90 percent of the overall respondents. It was found out that most of these households were unable to produce from existing very small holdings that could last them the whole year round owing to family size increment.

Surprisingly enough, most of the farmers of the study area have developed a strong positive attitude towards large family size in spite of their valid awareness of its effect on broadening the gap between households' consumption demands and food production levels from own farms. According to villagers, large family size maximizes a household's capability to cope with the problem of food shortfalls through numerous mechanisms such as intensification of production and engagement in rural non-farming activities. Large family was also perceived as security in old age where parents do have no access to social security schemes or pensions. Moreover, a large family was often served as a viable means of obtaining access to farming land via local land transfer arrangements.

Several researchers have empirically investigated the role of children in household production systems and livelihood strategies under conditions of land shortage and environmental degradation, and have come up with somewhat similar conclusion. In the case of Bangladesh and India, for instance, Cain (1981) asserted that having many children was perceived as one of the mechanisms households could cope with poverty. Large family size was also viewed as a coping strategy for livelihood options because the household resorted to selling at least part of its family labour (Cain as cited in Markos, 1997).

A study carried out in our study area used family labour even as wealth group differentiation criterion, and stressed the close association between available family labour and wealth status of households (SWMSP, 1996). Due to livestock diseases there is a permanent risk of losing draught oxen, a major production factor. The ability of households, even within same wealth group, to cope with this situation is related to wealth and family labour availability. In emphasizing the degree of relevance of family labour to differentiate households within wealth groups, SWMSP (1996:18)further indicated that:

> Rich households with many labourers are relatively stable. But there are also rich households with low family labour (small households or bigger households with young children). They are in a risky situation. If they lose their oxen they cannot cope as well as rich families with more family labour in a similar situation. They soon become poor because they have neither draught power to work on their fields, nor do they have sufficient family labour to work on neighbors'fields in order to have access to oxen.

In general, the economic value of children appeared as a critical interveining variable that profoundly governed the knowledge and attitude of the sample households towards family size and the effect of population increase on food supply-demand situation. It logically follows then that since very small holdings cannot support existing family members, shortage of land and the accompanying food supply-demand gap do not act as constraints on large family size. This is because the reproduction of the household is already dependent upon utilization of hired land and supplementary income generated from non-farm activities. The heavy labour requirements of the household can provide incentimes to reproduce large family despite constraints of land shortage. It was implicitly argued that "land can always be hired, but not children." Therefore, on small holdings farmers may place the emphasis on reproducing family labour and land hirers and non-farm income-generaters, rather than on nurturing a new generation of prospective petty landowners (Amanor, 1994). Hence, the demographic implication of the economic contribution and value of children to rural communities has to be seriously taken in to

account in all policies aiming at bringing about relative equilibrium between population growth and economic development.

4.4.4. Environmental Degradation and Declining Productivity of Land

In broader terms, farmers of the study area have had a fair knowledge and awareness concerning the important role played by growing population pressure in the process of depletion of natural resources and declining agricultural output and living standards. Of particular note in this regard is the adverse effect of unregulated human and livestock population increase on the degradation of land and forest resources. Land and forests, which are the very bases of economic sustenance of the local people, are being seriously degraded, whilst increasing population growth requires higher food yields.

Within the study area, however , the degree of environmental degradation and declining productivity of land varies between localities as do peasant perceptions and responses. A more closer observation of the physical landscape of the area reveals the fact that the adverse effect of population pressure on depletion of the natural resource base and declining productivity of land is more intimidating in Wezeka PA (where the proportion of highland areas with steep slopes is higher) than that in Aelgo PA. As it is clearly depicted in Table 4.6, the knowledge and awareness of the sample households is in line with the expectation as those residing in Wezeka rated environmental degradation and declining productivity of land as the fifth and fourth ranking of all the detrimental impacts of population pressure, respectively. On the other hand, these problems were ranked as the sixth and seventh negative outcomes of population pressure by Aelgo peasant farmers, respectively.

On average about 66 percent of the overall respondents indicated that the high level of population agglomeration in the study area has resulted in the high levels of environmeration degradation and its numerous consequences. Though peasants did not clearly mention, environmental degradation in the area appears to be the result of the cumulative causation of population pressure, very small holdings, shortage of grazing

lands for cattle (more particularly until the livestock epidemic of 1991), poor public concern for long-term soil quality, poor public awareness regarding the irreversibility of some of the degradation, etc. The roles played by fuelwood collection and by fire for grazing improvement in the process of forest resource depletion are also equally significant.

In response to family size increment and the accommodating shortage of household land, community forest and woodland resources were cleared to make available sufficient agricultural land. Moreover, as a result of fast population increase and formation of new households, pasture areas, more and more steeper slopes and marginal lands were also brought under cultivation in response to shortages. The net result of the competition among land uses has further accelerated the extent of environmental degradation in the study area. Among other things, the degradation of the productive environment has resulted in soil erosion, recurring droughts, fuelwood shortages and drastic decline of agricultural productivity. From the peasants' own perspective, the depletion of the natural resources in the area has been reflected in the inherent problem of declining productivity of crop yields from year to year. Slightly over 58 percent of the sample households mentioned that the declining level of crop output from their farms was one of the indirect outcomes of population pressure owing to increasing scarcity of household land, reduced fallow land and continous cultivation of land. The existing long-term continuous cultivation of land has led to depletion of soil fertility which, in turn, resulted in adverse decline in crop yields.

In the course of the survey, many peasant households, particularly those in Wezeka PA, complained that they are no longer able to produce a crop yield from their current holdings that could satisfy the yearly consumption needs and other basic expenses of the household. When asked why, most of the farmers used to ascribe the major cause to the severe shortage of productive land and deterioration of the fertility of the soil.

In the two study PAs, most of the crop fields in steep slopes were reported to have been degraded. In the case of Wezeka, for instance, slightly over 20 percent (35 out

of the total of 174 fields), which accounted for about 27 percent (15.26 ha out of the total of 56.51 ha), were reported to be slightly and/or highly degraded. Likewise, about 13 percent of the fields (37 fields out of the total of 285 fields), which comprised 16 percent of the area of the sample crop fields (11.06 ha out of the total of 69.13 ha) in Aelgo were reported to be slightly and/or highly degraded.

In general, it will not be easy to reverse the trend of environmental degradation and declining productivity of land in the short-run, since the problems are intricately linked to the satisfaction of the basic needs of the local community. Moreover, the problem of environmental degradation in the area is a consequence of poverty, unemployment and poor public awareness about the role of resources, particularly forest, as reflected in peasants' over emphasis on maximizing short-term benefits to the neglect of long-term consequences.

4.3.5. Incidence of Landlessness

Increasing pressure of population growth in the area has resulted not only in diminution of family holdings, insecurity of tenure, environmental degradation, declining productivity of land, and food supply-demand gap but also in proliferation of landless peasant households.

However, it should be admitted from the outset that the discussions made hereunder on various aspects of landlessness is based primarily on a review of documentation's of the respective Peasant Associations, since it was very difficult to collect a comprehensive data on the magnitude of landlessness during the course of the survey. In spite of this limitation, formal and informal interviews were conducted with the sample households and the PA leaders in order to understand their knowledge and awareness pertaining to the effect of unregulated population increase on incidence of landlessness.

At the data illustrated in Table 4.6 indicate, 65.7 percent of the overall respondents were very much aware of the key role played by fast population growth in intensifying the level of landlessness in the area. Disparities in farmers responses to the effect of accelerated population increase on landlessness might have been influenced by the rare case of complete landlessness in their localities. This is because, though landless peasants had no household land of their own, they have been dependent upon the annual hiring and/or share cropping of someone else's land.

Be that as it sounds, the level of landlessness as obtained from records of the study PAs is illustrated in Table 4.8. Both written and verbal applications for land were utilized as a proxy-indicator for the official accepted levels of landlessness.

Table 4.8. Reported Incidence of Landlessness in the Study PAs.

	Total Number	Landed Households		Applicants for Land	
PAs	Households	No.	%	No.	%
Aelgo	1363	1037	76.1	326	23.9
Wezeka	640	583	91.1	57	8.9
Overall Total	2003	1621	80.9	383	19.1

Source: Unpublished PAs' Records, 1997

As the data summarized in Table 4.8 reveals, there were 326 and 57 landless peasants in Aelgo and Wezeka PAs, respectively. The level of landlessness was thus 23.9 percent and 8.9 percent of the total farming households in Aelgo and Wezeka, respectively. The magnitude of landlessness appears to be, by and large, much more acute in Aelgo than in Wezeka. The problem of Landlessness becomes even more glaring and disguising in the case of Aelgo when one takes the very small average landholding size of 0.67 ha into consideration. The knowledge and awareness of the sample households

concerning the effect of population growth on incidence of landlessness is, in fact, concordant with the officially recognized levels of Landlessness in the study area. This is because the point score analysis of the perceptions of the respondents put the incidence of landlessness under the fourth and sixth rank-order among the possible effects of population pressure in Aelgo and Wezeka, respectively.

The average level of landlessness in the study area was computed to be about 19 percent. According to an interview made with each of the Pa leaders, landless people were those newly married couples and single adult males above the age of 20 years (the reported minimum average year of males in the area to engage in marriage) who applied for land, but did not have yet direct access to land, but who were permanent residents in the area. The PA officials also mentioned that because of an ever-increasing rate of population growth and the making of a "new peasantry", to use Desalegn's (1994) term, they are no longer able to respond to new applicants for land. This is said to have been due to severe shortages of "vacant land" compared to the large number of new applicants for land. It was also elaborated that under the existing condition of rapid population growth and farmland scarcity, the magnitude of landlesssness will increase dramatically.

4.3.6. Agricultural Land Fragmentation

Although agricultural land fragmentation as an outcome of population pressure was perceived by about 57 percent of the overall respondents, point score analysis ranked it as the least important of all the impacts. A closer look into the peasants' own views and expressions clearly disclosed the fact that population increase in the area was and still is an indirect, but the root cause of agricultural land fragmentation. Farmers of the study area mentioned that, by and large, the most fundamental causes of fragmentation of peasant holdings have long been frequent land redistribution which on average carried out five and three times since the Land Reform in Aelgo and Wezeka, respectively. Equally important is the crucial roles played by indigenous land contract arrangements such as hiring on monetary payments, sharecropping tenancy, and land borrowing to relatives and friends in

prime exception of further expansion of plough cultivation, cropland and settlement areas in the lowlands of southwest of lake Chamo.

During the brief Italian invasion (1935 - 1941), however, the local Zeysie people moved to the highland areas partly because of the unsuitability of the rugged topography for the soldiers. As a result, the lowland and plain areas of southwest of lake Chamo were not utilized for either cropping or herding purposes during the Italian invasion of the area.

As a consequence of the increment in human and livestock population, land shortage and degradation became conspicuous in the highland parts of the study area. The cultivators have developed several response strategies to the negative outcomes of population pressure such as environmental degradation, land shortage and food supply-demand gap. One of the most important responses on the part of the local people during the immediate post-Italian liberation period was to resume land use systems in the lowlands and lake Chamo plain areas. The other most articulated peasant farmers response to the problems of land degradation and declining crop output has been the adoption of traditional soil conservation techniques such as manuring, terracing, contour ploughing which have evolved stable systems of land management.

Towards the end of the imperial period of Emperor Haile Selassie, the question of suitable land for crop production began to be felt by the local people. The land question has been exacerbated by such factors as the natural increase of the local population, relative overpopulation of the resettlers from south Wello and north Shewa regions, recurrent outbreak of drought in the more fragile lowland areas, and the big herds of livestock over the rangeland resources with concomitant effects on overgrazing and deterioration in soil fertility.

In response to the growing demographic pressure and land shortage the farming community has developed new agricultural lands from communal forest, woodland and rangeland resources in the lowlands which, during the dry seasons, used to serve as relief belts for the then big livestock herds. As a result of the relative scarcity of permanent pastures, livestock started to rely increasingly on small patches of grazing within the landscape situated

along river banks and the lakeshore areas, in uncultivated hillsides and along roadsides and near village settlements. Moreover, arable lands have gradually become important supplementary sources of fodder, with field-edge grazing and crop residues being key to dry season livestock nutrition, particularly for lactating cows and ploughing oxen.

In this conjunction it should be argued that the degree of integration between the cropping and the livestock sub-sectors has further strengthened in which crop residues being crucial supplementary cattle diets, and draught oxen being an essential input in crop production. Indeed, this is a second bench-mark and paramount historical event in the transition of the farming systems of the study area towards a fully-fledged mixed farming systems.

In response to the inherent problems of land scarcity and food supply-demand gap which have been intensified by uncontrolled population increase, rainfed farming with supplementary irrigation has been devised by the local people at the end of the post-Italian period of king Haile Selassie. Rainfall has been mainly used for land preparation, planting and supporting the germination of crops. For sustained growth and development of crops, the use of supplementary irrigation in the lowland parts of the study PAs has become indispensable.

Irrigation schemes have employed traditional techniques of river water diversion. The Sego (Aelgo PA) and Wezeka (Wezeka PA) rivers have been used for this purpose. Farmers have secured irrigation water using locally constructed diversion weirs, canals and distributrary ditches. Location of diversion weirs and gradients and direction of ditches have been selected and constructed with the knowledge of farmers and local materials such as stones and woods.

The practice of rainfed farming with supplementary irrigation in such a highly variable lowland environment has certainly provided the foundation for land use intensification and crop diversification which could possibly raise the carrying capacity of the land. The most important cash and food crops cultivated with supplementary irrigation include cotton, maize, sorghum, sweet potato, sugarcane, banana, teff, papaya, mango, pepper, coffee, lemon, chickpeas, cassava, Moringa olifera, cabbage, beans, onions, groundnut and sesame.

More remarkable changes in land tenure and farming systems, settlement and cropping patterns, socio-economic conditions and livelihood strategies of the farming community in southwest of lake Chamo have occurred after the revolution in 1974. The post-Italian period of Emperor Haile Selassie (1941-1974) came to a dramatic close when the Emperor was disposed by a military government.

Private ownership of land (which was effected by king Haile Selassie during the post-Italian liberation period) and the *gebar* system were abolished by the Derg land reform proclamation in 1975. Like in the rest of the country, the nationalization of land in the study area necessitated redistribution of land among the farmers, which involved a readjustment in the size and location of individual households land. Since then land has been administered through different government structures.

After fiercely compelling the remaining Zeysie households to leave their highland villages and resettle in the lowland areas, the Aelgo and Wezeka PAs were formed in 1977 by the Derg administration in an effort to create bigger political units, penetrate its administration down to village levels and administer, distribute and redistribute land whenever necessary. However, it should be noted that even if a large majority of the highlanders were moved down to the lowland and plain areas west of Lake Chamo the relation to the original homesteads still remain intact and land resources have been used as before.

During the first land distribution each household in the Chamo plain area was said to be provided with two hectares of irrigated cropland irrespective of its family size. Owing to rapid population growth the average size of irrigable farmland has been increasingly shrunk. In an attempt to accommodate landless peasant households land redistribution has been frequently effected with the result of worsening the livelihood security of individual households.

During the Derg regime the next transition started with the villagization program in which formerly dispersed dwellings were demolished and nucleated settlements were established adjacent to the foot slopes as of 1988. In the walk of the change of government in

1991 the villagization program was terminated and some households have returned to their former homesteads.

5.1.2. Cropland and Settlement Incursion into Forest/Woodland and Grazing Areas

In order to empirically investigate the degree of settlement and cropland encroachments onto grazing and forest/woodland areas in response to population pressure, monitoring of land use/land cover changes in the area was carried out at two time intervals, i.e., 1985 and 1997.[4] Such an analysis would enable us to appreciate the real picture of the human impact on the natural resource base of the area.

Prior to the interpretation of the aerial photograph, preliminary land use/land cover classes were set out. In the course of the air photo interpretation, however, some classes were condensed together for ease of analysis and comparison to the major land use/land cover classes of 1997, as in the case of forest land and woodland, Bush and shrubland, and grazing land, burned areas and wetlands. Hence, it should be admitted from the outset that the merging of these distinct land use/land cover types was largely dictated by the availability of comparable statistical data for the year 1997. The two data sets may not be perfectly comparable, and it would have been better to use aerial photos in the two periods. However, this was unfortunately constrained by absence of aerial photograph for the year 1997. The attempt hereunder is simply to illustrate the general trend of major land use/land cover changes and the results should therefore be interpreted with caution.

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[4] *This was made possible by aerial photo interpretation that was taken on 23rd of March 1985. Comparable statistical data on major land use/land cover classes for the year 1997 were obtained from official estimates of the Arba Minch Zuria Wereda Agriculture Bureau and the office of the Agricultural Development Agents (DAs) in the respective study PAs.*

In the meantime, six major land use/land cover classes were categorized and indicative figures on area coverage for each of the study PAs were extorted on the basis of digital planimetric measurements.

Table 5.1. Major Land Use/Land Cover changes from 1985 to 1997 and Their Percentage Values by the Study PAs.

Land use/ Land Cover Classes	Aelgo				Wezeka				Overall Total			
	1985		1997		1985		1997		1985		1997	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Cultivated Land	1225	38.4	1530	47.9	505	55.6	568	62.5	1730	42.2	2098	51.1
Forest/Wood land	1105	34.6	925	29.0	149	16.4	130	14.3	1254	30.6	1055	25.7
Grazing Land	524	16.4	365	11.4	53	5.8	40	4.4	577	14.0	405	9.9
Bush & Shrubland	199	6.2	194	6.1	116	12.8	70	7.7	315	7.7	264	6.4
Degraded land	68	2.1	75	2.3	51	5.6	63	6.9	119	2.9	138	3.4
Settlement	74	2..3	106	3.3	35	3.8	3.8	4.2	109	2.6	144	3.5
Total	3195	100	3195	100	909	100	909	100	4104	100	4104	100

Source: Interpretation of Aerial photograph (1985) and Unpublished Documents of the Arba Minch Zuria Wereda Agriculture Bureau (1997).

As may be observed from Table 5.1, as of 1985 42.2 percent of the overall land area were cultivated land; 30.6 percent forest/woodland; 14 percent grazing land; 7.7 percent bush and shrubland; 2.9 percent degraded land; and the rest 2.6 percent were under settlement. These major land use/land cover categories have exhibited remarkable changes either by gaining or losing their prior functions. By the year 1997, cultivated land accounted for about 51.1 percent of the total area to be followed by forest/woodland and grazing areas with a percentage share of 25.7 and 9.9 percent, respectively. Likewise, 6.4 percent of the area was covered by bush and shrubland, while degraded land and settlement comprised the remaining 3.4 and 3.5 percent, respectively.

Table 5.2 Spatio-Temporal Changes in Major Land Use/Land Cover Classes, 1985-1997

Land Use/ Land Cover Classes	Aelgo		Wezeka		Overall Total	
	Total Change (%)	Percentage Change/Year	Total Change (%)	Percentage Change/Year	Total Change (%)	Percentage Change/Year
Cultivated Land	24.9	2.08	12.5	1.04	21.3	1.78
Forest/Woodland	-16.3	-1.36	-12.8	-1.07	-15.7	-1.31
Grazing Land	-30.3	-2.53	-24.5	-2.04	-29.8	-2.48
Bush & Shrubland	-2.5	-0.21	-39.7	-3.31	-16.2	-1.35
Degraded land	10.3	0.86	23.5	1.96	16.0	1.33
Settlement Area	43.2	3.6	8.6	0.71	32.1	2.68

Source: Computed from Table 5.1

The prominent changes that had occurred in land use/land cover classes could be seen from two different perspectives, i.e., those that exhibited an increasing trend, and those that depicted a decreasing trend during the study period.

As the data summarized in Table 5.2 indicate, there were three major land use/land cover types that had shown an upward trend, namely cultivated land, built-up area and degraded lands. Indeed, the biggest changes observed during the study period concerned very much with expansion of settlement and cropland areas.

In line with the writer's expectation, areas under settlement and cultivation, at the expense of forest/woodland, grazing and bush and shrubland areas, increased by about 32.1 percent (35 hectares) and 21.3 percent (368 hectares), with an annual rate of expansion of 2.68 and 1.78 percent, respectively. This, in turn, connotes the fact that within the twelveth-year period around 30.7 hectares and 2.9 hectares of new land areas had been brought under cultivation and construction of buildings annually.[5]

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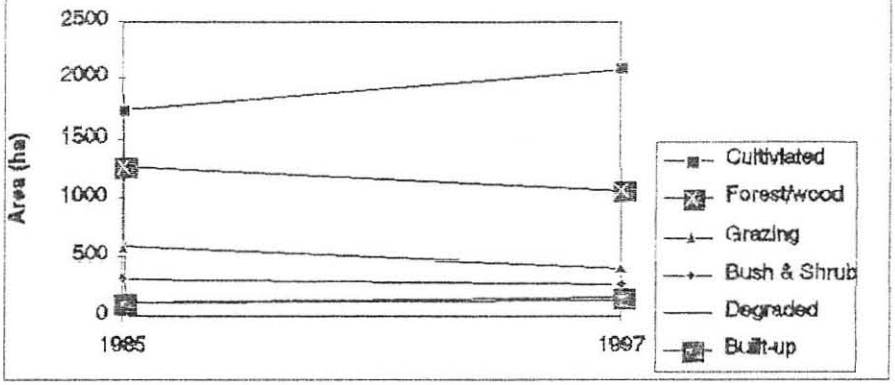
[5] *If this trend (i.e., expansion of settlement and cropland areas by 33.6 hectares per year) continues for the years to come, and if all the remaining forest/woodland, grazing, and bush & shrubland areas (i.e., 1724 hectares) are assumed as potential expansion areas irrespective of their quality, suitability and topographic situation, it will take only half a century (i.e., 51 years) for the available "land fund" to be entirely exhausted at the cost of cropland and built-up areas.*

Fig. 5 Comparison of Major Land use / Land cover changes in Southwest of Lake Chamo, 1985 - 1997



Similarly, degraded areas, i.e., areas which had gone out of crop production or had turned into bad lands or rock outcrops, had also exhibited an increasing trend. During the period under investigation degraded areas increment amounted to about 16 percent (19 hectares), i.e., at a rate of 1.33 percent per annum.

At another extreme, all the grazing areas, forest/woodlands, and bush and shrubland areas had shrunk at an alarming rate of 2.48, 1.31 and 1.35 percent yearly, in that order, during the last twelveth-year period. In the entire study area, grazing lands declined by about 29.8 percent (172 hectares) to be followed by bush and shrublands, and forest/woodland areas with an aggregate change of 16.2 percent (51 hectares) and 15.7 percent (199 hectares), respectively.

There exists quite a valid spatial variation in the degree of changes in major land use/land cover patterns among the study PAs. It can be inferred from Table 5.2 that the highest degree of settlement area expansion had taken place in Aelgo PA compared to Wezeka. Built-up area increased from 2.3 percent (74 hectares) in 1985 to 3.3 percent (106 hectares) in 1997 in Aelgo compared to Wezeka, which increased from 3.8 percent (35 hectares) to 4.2 percent (38 hectares) in the same period. Therefore, build-up area increased by about 43.2 percent (32 hectares) with an annual growth rate of 3.6 percent in Aelgo compared to only 8.6 percent (3 hectares) with a rate of 0.71 percent per year in Wezeka.

This differential rate of settlement area extension among the study PAs could be attributed to the corresponding variation in the rate of population growth and the 1988-91 villagization program. As has been noted in Chapter Three, the rate of population growth was much higher in Aelgo (about 4 percent per year between 1984 and 1994) than in Wezeka (about 3.6 percent per annum). Likewise, the effect of the Derg's villagization program, which actually necessitated settlement area encroachment onto unoccupied areas, was largely implemented in Aelgo PA compared to Wezeka.

The rate of expansion of cultivated area and deforestation was also considerably high in Aelgo. During the period 1985-1997, cropland area expanded by about 24.9 percent (305

hectares) or 2.08 percent per annum in Aelgo where the biggest deforestation (16.3 percent, i.e., 180 hectares, or 1.36 percent per year) and decline in grazing areas (30.3 percent, i.e., 159 hectares or 2.53 percent per annum) took place. In Wezeka PA, cropland area expanded only by about 12.5 percent (63 hectares) with an annual rate of 1.04 percent, while forest/woodland areas declined by about 12.8 percent (19 hectares), and grazing areas by 24.5 percent (13 hectares) at a rate of 1.07 and 2.04 percent per annum, respectively, in the same period.

The existing variation in spatio-temporal changes in land use/land cover patterns especially cropland area, in our study area was directly related to the rate of population growth and the period of agricultural colonization. The relatively low pace of reclamation of cultivable land in Wezeka PA can be explained by the inherent shortage of land fund. As could be observed in Table 5.1, in 1985 areas of potential agricultural expansion, such as grazing areas, forest/woodland, and bush and shrubland areas accounted only about 34.5 percent (318 hectares) whereas in Aelgo these possible expansion areas made up slightly over 57 percent (1828 hectares) of the total area in the same year. Thus, in Wezeka PA, where highland areas constitute the highest share, the available land fund was nearly exhausted owing to age old land occupancy. By the year 1985, for instance, of the total cultivable land 61.4 percent was already under cultivation in Wezeka PA, while it was only about 41.1 percent in Aelgo.

Moreover, the process of settlement and cropland incursion into forest/woodland and grazing areas was heavily influenced by the interaction of agro-climatic and demographic factors. Because rural population in general have a tendency to congregate in certain areas with relatively better soil conditions, which are not difficult to till and contain sufficient moisture for sustained crop production. In Wezeka PA, the degree of settlement and cropland encroachment onto grazing and forest and woodland areas was relatively small compared to that in Aelgo. This is because most of the grazing and forest/woodland areas in the former were and still are concentrated in marginal areas which are not conducive either for human settlement or cropland expansion. Perhaps the most suitable areas for settlement and cropland area extension in Wezeka PA had been the available bush and shrublands. At the benefit of cropland areas and in few cases built-up areas, bush and shrublands in Wezeka declined by

about 39.7 percent (46 hectares) with an annual rate of 3.31 percent during the period 1985 - 1997. In Aelgo PA, however, the area under this land use/land cover class had depicted negligible change (bush and shrublands shrank by only about 2.5 percent or 5 hectares).

The other possible explanation for the high degree of settlement and cropland incursion into grazing and forest/woodland areas in Aelgo PA had to do with the down slope movement of people from the highly populated and degraded adjacent highland areas. On the occasion of the survey period, for instance, 36.3 percent the sample households in Aelgo were born outside the current PA, while the corresponding figure in Wezeka was only about 25.9 percent (see section 5.2.2.).

In both of the study APs, degraded areas had shown an increasing trend during the period under consideration. However, the highest rate of expansion of degraded land areas was observed in Wezeka PA (23.5 percent, i.e., 12 hectares with an annual increase of 1.96 percent). In Aelgo degraded land areas increased by only about 10.3 percent (i.e., 7 hectares) at an annual rate of 0.86 percent during the period 1985-1997 (Table 5.1 and 5.2).

There are two fundamental reasons accountable for the observed disparities in the pace of degraded land expansion among the study PAs. In the first place, the extremely high degree of degraded area expansion in Wezeka has been significantly associated with its topographic condition. The proportion of highland areas with more steep slopes is substantially high in Wezeka, while Aelgo is of comparatively a vast plain area with little variation in elevation. Therefore, the former PA is more susceptible to the forces of erosion than the latter. Secondly, the extent of previously cultivated and grazing areas that had gone out of production in Wezeka had been further accelerated by the comparatively age old history of population settlement and agricultural land colonization. In this regard, the pressure of population in Wezeka was nearly saturated as early as 1984 (236.6 persons/km^2 as against 96.7 persons/km^2 in Aelgo), and this probably had an additive effect on expansion of degraded areas.

On the other hand, the history of human settlement and the practice of sedentary agriculture in Aelgo PA is relatively a recent phenomena though population pressure has been

growing at an exceptionally accelerated rate due to the down slope movement of people from adjacent areas and some other over populated regions of the country.

Indeed, the main findings of the monitoring of spatio-temporal changes in land use/land cover patterns among the study PAs give support to the absolute validity of peasant farmers knowledge and awareness concerning the adverse effect of population pressure on environmental degradation and declining productivity of land discussed in Chapter Four. This is so because the negative outcomes of population pressure such as environmental degradation and declining productivity of agricultural land were very much appreciated by an overwhelming majority of Wezeka farmers (93.3 percent) as compared to only 55 percent in Aelgo (Table 4.6)[6]

In summing, the study area has undergone considerable changes in its land use/land cover patterns during the period 1985 - 1997. According to Boserup (1965), land use/land cover patterns are phases in a process of economic development. Solomon (1992) also noted that changes in land use/land cover patterns are reflections of the dynamics in socio-economic development and changes in the local environment.

In our study area the interaction of demographic, agro-climatic and political (more particularly the resettlement and villagization programs) factors have played cardinal roles in the process of changes in major land use / land cover patterns. As has been discussed in Chapter Three, the population size and pressure in the area has been growing at an accelerated rate. This in turn, has intensified the ever - increasing demand for food, shelter, fuelwood and construction poles, implying the need on the part of the local people to take their own measures.

One of the most important livelihood strategies of the peasants has been the extension of cultivated and settlement areas at the cost of community forest/woodland, grazing, and bush

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[6]*Note that the rate of degraded lad area expansion during the last twelfth-year period was much higher in Wezeka than that in Aelgo.*

and shrubland areas. Indeed, this response mechanism appear not to be very surprising, since the expansion of settlement and cultivated areas is the quickest and easiest way of dealing with population pressure (Ahmed, 1987). Moreover, under traditional subsistence farming practices, low level of technological development and inefficient networks of extension and input supply services, high level of food production would largely be attained through extension of cultivated areas. In this regard, Alemneh (1987) found out that 80 percent of the increase in agricultural output in Africa has been made possible through expansion of cultivated areas.

What is interesting to note, however, is that the extension of settlement and cultivated areas, in response to demographic pressure, has resulted in various intricately linked and multi-dimensional problems. In fact, the most notable one is that the increasing population size in the area has exerted an excessive pressure on the community forest and woodland resources. In order to satisfy the growing demand for agricultural land, construction pole and fuelwood, the local people have been forced to exploit the available forest and woodland resources indiscriminately.

Indiscriminate cutting down of such vital resources, in turn, has further aggravated the degree of environmental degradation and declining productivity of land due to soil erosion. The need to feed growing population has also necessitated the reduction in the length and frequency of land fallowing practices, which would adversely affect the fertility of the soil. The cumulative outcome of environmental degradation in terms of soil erosion, and progressive shortening of the length of the fallow period has been the successive decline in crop yields that would be obtained from a plot of land, particularly in the highland areas of Wezeka PA.

Nevertheless, the peasant farmers of the study area have been adjusting themselves to the existing conditions through several response mechanisms such as green manuring, agroforestry practices, double-cropping, local land contract arrangements, etc. Discussion with the farmers revealed that, currently, the scope of extension of cultivated land into the aforesaid communal resources becomes very limited. As a result, expansion of cultivated areas, in response to population pressure, has been realized mainly through increased double - cropping.

Broadly speaking, as it appears now, the potential expansion areas which can be ploughed with existing traditional farm implements are already exploited in the study PAs. Most of the forest/woodland, grazing and bush and shrubland areas at present are squeezed to marginal areas. Such potential expansion areas may not be brought under cultivation by peasants' own efforts and existing traditional technologies, even though the population growth exerts pressure on the local community.

Furthermore, as most of the agricultural land in the project area has been brought under Plough cultivation some times in the past decades, it would perhaps be interesting to closely examine whether or not changes in the cropping patterns and land use intensification have been taking place in response to growing population pressure, land shortage and food supply - demand gap.

5.1.3. Land Use Intensification in Response to Population Pressure

Since Boserup (1965) seminal work on the subject, the notion that population pressure is a determinant factor of the growth of output in peasant agricultural economy has been gaining evidences (Grigg, 1976; Tadesse, 1989; Muluneh, 1994) though some other authors (Ahmed, 1987; Yibeltal, 1994) have held the view that there is limited scope for increasing output through endogenous technical changes as the density of population becomes too high.

This section of the thesis searches for grounds of intensification of agricultural practices in response to growing demographic pressure and food supply-demand gap in the face of limited opportunities for expansion of cultivated areas. To this effect, it is hypothesized that the increasing pressure of population growth provides a positive impetus to land use intensification by maximizing the demand for food and the supply of labour inputs.

In order to testify the aforesaid research hypothesis, the present inquiry, following Ahmed's (1987:93) line of analysis, has employed the following three fundamental ways of making intensive utilization of the available land:

(i) increasing the intensity of cropping, i.e. , cultivating the land more frequently within a given growing season;

(ii) intensive cultivation of the land per cropping season through greater application of labour inputs per hectare of land; and

(iii) cultivation of more labour - intensive and high value crops.

5.1.3.1.Increased Cropping Intensity

With the limited possibility of expansion of cultivated areas, peasant farmers of southwest of Lake Chamo have responded to the problems of farmland scarcity and food supply- emand gap induced by population pressure through an intensive utilization of the already cultivated land.

Though the lack of comprehensive time series data severely constrained the analysis of the trend of cropping intensity in spatio - temporal perspective vis-a- vis population growth, the degree of the intensity of cropping on the already cultivated land during the survey period appears to be comparatively very high. As the summary of the survey data (Table 5.3) indicates, the intensity of cropping in the area (measured in terms of percentage proportion of gross cropped area to net cropped area) was found out to be 163.1 percent. Indeed, this figure is much greater than the reported cropping intensity in the most densely populated Weredas of Shashemene (132 percent) and Dale (143 percent) (Yibeltal, 1994: 132).

Table 5.3. Agricultural Population Density and Cropping Intensity by the Study PAs.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PAs	Agricultural Population Density (Persons/ha)	Total Holding Area (ha) (4) + (6)	Net Cropped Area (ha)	Area Sown More Than Once (ha)	Area Under Current Fallow (ha)	Gross Cropped Area (ha) (4) + (5)	Intensity of Cropping (%) (7) ÷ (4)
Aelgo	9.45	69.13 (102)	64.78 (102)	50.68 (67)	4.35 (17)	115.46 (102)	178.2
Wezeka	5.95	56.51 (58)	51.68 (58)	22.84 (25)	4.83 (15)	74.52 (58)	144.1
Overall Total	7.87	125.64 (160)	116.46 (160)	73.52 (92)	9.18 (32)	189.98 (160)	163.1

* *Numbers in parentheses under columns 3 to 7 denote reporting farmers*

Source: Field Survey, 1997

There were at least two major explanations for the comparatively high level of cropping intensity in our study area. First, the high degree of intensive utilization of the already cultivated land has been achieved through increasing the land area under double and multiple cropping practices realized by rainfed farming with supplementary irrigation. It was found that 57.5 percent of the overall sample households or 58.5 percent of the overall cultivated area were cropped more than once during the 1997 harvesting season. According to the survey data, slightly over 63 percent of the overall respondents (i.e., 101 households out of the total of 160) or around 52 percent of the total cultivated areas (i.e., 65.18 hectares out of the total of 125.64 have had access to irrigation water from Sego and Wezeka rivers. Secondly, the reduction of the frequency and length of the fallow period and of the proportion of the land area under current fallow has provided a significant effect on increasing the intensity of cropping. During the survey period, land area under current fallow accounted for only about 7.3 percent (practiced by about 20 percent of the overall respondents) of the total holding area. In fact, the highest intensity can be attained, as has been noted by Ahmed (1987:93), by reducing the length of the fallow period to the minimum possible.

There appears to be significant variation in the degree of cropping intensity among the study PAs. On average , the intensity of cropping was computed to be 178.2 percent in Aelgo PA and 144.2 percent in Wezeka. In addition to population pressure, there were three important physical factors possibly accountable for the observed variation in the cropping intensity among the PAs under investigation. These comprised of the physical landscape, and the proximity of individual farms to Sego and Wezeka rivers and their suitability for irrigation agricultural practices.

As it has been shown in Table 5.3 and discussed in chapter Three, the average agricultural population density during the survey period was substantially higher in Alego PA than Wezeka. When the man-land ratio increased with subsequent positive effect on the demand for food and the supply of agricultural labour, the peasant farmers of the study area responded to the aspects by increasing the intensive utilization of the already cultivated land. The intensity of cropping appears to be directly proportional to the man-land ratio as the correlation coefficient between the two variables was found out to be 0.8865 for the overall sample households. In support of the findings of this study, Yibeltal (1994:137) reported a correlation coefficient value of 0.7343 and 0.9455 between man-land ratio and cropping intensity in Shashemene and Dale Weredas of southern Ethiopia, respectively. It is therefore plausible to conclude that the growing population pressure has catered an appreciable incentive to increase the degree of cropping intensity by escalating the demand for food and the supply of agricultural manpower in the study area.

However, it should be argued that the level of cropping intensity is not a function of population pressure *per se*. The influential roles played by the aforementioned physical factors in the existing differential rate of the cropping intensity have also been equally significant. In fact, the best double and multiple cropped farmlands were and still are those situated in the plain areas of Lake Chamo with easy access to irrigation practices and relatively shorter distances from Sego and Wezeka rivers.

Looking closely into the conditions of the physical factors in Alego and Wezeka PAs, the former is, by and large, at an advantageous position in terms of access to irrigation water,

activities as in the case of harvesting of Meher crops and seeding of Belg crops, the interviewed peasant households were found to be heavily overloaded almost throughout the year. In order to evaluate and understand the conditions of family labour supply and levels of utilization by major farm operations, the sample households were asked whether or not they have encountered family labour shortage during the 1997 cropping seasons.

As the data summarized in Table 5.4 clearly show, around 56.7 percent of the overall respondents have faced shortage of family labour supply to undertake the different kinds of agricultural activities. There exists a considerable variation in the magnitude of family labour shortage among the study PAs and across the different farm operations. Shortages of family labour supply was felt by a large proportion of the respondents in Alego (61 percent) compared to those in Wezeka PA (49.1 percent). This appears to be somehow surprising, at least for an outside observer, in view of the very high agricultural population density and the relatively small holding size in Alego PA compared to the situations in Wezeka. However, a closer examination of the contemporary farming cycle in both of the study PAs attests the validity of our findings.

In the first place, the intensity of land use in Alego was much greater than that in Wezeka. Following Boserup's (1990) line of argument, the need for family labour supply becomes much greater with increasing intensification of agriculture. Because the use of intensive agricultural systems requires that the problems of soil fertility, weed infestation, plant diseases and irrigation-water control should be solved. These problems cannot be resolved by fallowing due to high population pressure; but the choice remains between the application of either industrial inputs (such as fertilizers, herbicides, insecticides, improved seeds) or labour-intensive methods. such as employing traditional methods of managing soil fertility and intensive weeding.Since peasant farmers of our study area, as in other regions of the country, do have very limited reliance on industrial inputs owing to poor public awareness and low purchasing power, the latter alternative (i.e., labour-intensive techniques of production) is the most preferred one; and this could be one of the reasons for family labour shortage to be perceived by a large number of farmers in Alego PA.

Table 5.4. Family Labour Supply and Levels of Utilization by Major Farm Operations and the Study PAs.

	Aelgo				Wezeka				Overall Total			
Farm Operation	Shortage of family labour		Adequate or surplus family labour		Shortage of family labour		Adequate or surplus family labour		Shortage of family labour		Adequate or surplus family labour	
	N	%	N	%	N	%	N	%	N	%	N	%
Land preparation	65	63.7	37	36.3	32	55.2	26	44.8	97	60.6	63	39.4
Weeding	76	74.5	26	25.5	33	56.9	25	43.1	109	68.1	51	31.9
Harvesting	24	23.5	78	76.5	13	22.4	45	77.6	37	23.1	123	76.9
Threshing	84	82.5	18	17.6	36	62.1	22	37.9	120	75.0	40	25.0
Average		61.0		39.0		49.1		50.9		56.7		43.3

Source: Field Survey, 1997

In the second place, farmers in highly populated areas with a severe shortage of land usually fail to close the gap between food supply and demand even though the pressure of population growth provides a positive stimulus to agricultural changes by increasing the demand for food and the supply of labour (Ahmed, 1987 and Yibeltal, 1994). This implies the need on the part of the peasants to increasingly supplement their farm output by participating in non-farm employment opportunities. The peasant farmers of our study area are not exceptional to this general argument as a substantial number of them were found to be engaged in rural non-farming pursuits in order to strengthen their livelihood security (see section 5.2.1). Thus high level of peasants' particpations in non-farm activities could be one of the reasons for such labour shortages."

Table 5.5. Cropping Calendar and Farm Operations Under Rainfed Farming with Supplementary Irrigation for Belg and Meher Growing Seasons.

Agricultural Practices	J	F	M	A	M	J	J	A	S	O	N	D
Clearing	XX					XX	XX					XX
1st ploughing	XX	XX					XX					
2nd ploughing		XX					XX					
3rd ploughing		XX					XX	XX				
Seeding			XX	XX	XX			XX	XX	XX		
Weeding (Three - Wise)				XX	XX				XX	XX		
Harvesting	XX					XX	XX	XX			XX	XX
Threshing	XX						XX	XX	XX		XX	XX

Note: XX denote the months during which the farm activity takes place.

Source: Field Survey, 1997

Among the various agricultural activities, threshing and weeding were reported to have been the most labour-intensive operations. About 75 and 68.1 percent of the overall respondents have experienced serious family labour deficiency to carry out threshing and weeding operations on the right time, respectively. The prime reason for labour shortage to be seriously felt during threshing has to do mainly with the livestock epidemic in the region since 1991. Before this period threshing was done by driving cattle around the threshing floor near each homestead. Since then, however, some farmers, owing to the shortage of cattle, have done threshing of grains by human labour, either family, hired or organized from labour-exchange parties such as *debo* and *wonfel*. This may also be due to the relatively limited period in which threshing has to be accomplished.

Weeding is an indispensable farm operation that must be done on time for it determines crop performance and amount of output. Since careful weeding helps increase the yield substantially, farmers in the study area have applied more labour inputs on three-wise weedings on almost all field crops per cropping season. Indeed, farmers' rating of the cropping activities in accordance with their time and labour requirements put weeding operation at the first rank-order (SWMSP, 1996).

The third most important agricultural practice in which family labour shortage encountered (by 60.6 percent of the cases) was reported to be land preparation. Land preparation involves clearing the fields from crop residues and shrubs, ploughing and irrigation-water management. Once again, the main justification for family labour shortage to be noted by a significant number of the farmers could be due to the severe scarcity of farm oxen as most of the crop fields have to be ploughed on average three times per cropping season so as to create favorable soil conditions. Exchanging human labour for draught oxen, locally known as *Gazo*, has been by and large the major option for oxless-farmers for ploughing their fields. The normal exchange rate in this non-monetary arrangement was said to have been two to three days of labour on fields of oxen-owner farmers (only grown-up men accepted) for one oxen pair a day on own fields. This suggests the extremely high level of manpower requirements of land preparation per unit of land area per growing season.

To sum up, the pressure of population growth in the study area has catered a positive influence on the utilization of family labour inputs per unit of land per cropping seasons. With increasing intensity of cropping induced by population pressure, land shortage and food supply-demand gap, more labour has to be employed for land preparation, intensive weeding, harvesting and threshing so that the level of land productivity would remain at least constant. In general, it may be safe to argue that the level of labour utilization in the study area, particularly in Aelgo, has kept pace with the increase in the supply of labour as most of the farmers have perceived seasonal shortage of family labour supply to undertake the various farm operations.

The research finding appears to deviate substantially from the major findings of Yibeltal's (1994) investigation in the most densely populated areas of Shashemene and Dale Weredas. He argued that the increasing population pressure on agricultural land and the concomitant effect on diminution of holdings have created a society of underemployed and unemployed peasants. However, it is worth mentioning here the fact that in the face of growing population pressure, land shortage and food supply-demand gap, 'underemployed' peasants do not remain passive but rather adopt livelihood strategies including engagement in non-farm employment opportunities and seasonal and permanent out-migration. Hence, the effects of

population pressure on the farm and non-farm responses of peasant households need to be fully investigated before concluding whether or not population growth would bring about a society of unemployed or under employed peasants. In view of this therefore, Yibeltal's (1994) findings appear to be inconclusive since the "peasant model which views peasants' livelihood as being depend only on access to land is no longer adequate to describe the rural economy" (Smith, 1989 cited in Tegegne, 1996:8).

5.1.3.3. Change and Continuity in Cropping Patterns and Production

The cropping patterns in the study area have undergone considerable change and continuity over the last 100 years. In fact, today's cropping patterns and production in southwest of Lake Chamo, similar to the farming systems in general, are products of the past history, being altered by a matrix of factors ranging from agro-climatic conditions to socio-cultural, economic and demographic factors. Perhaps Scoones's et.al. (1996) expression hereunder precisely clarify how much a myriad of variables come into play in peasants' 'degree of freedom' or options of choices of crop species and varieties under conditions of risk and uncertainty:

> Crop choices are influenced by risk and uncertainty in different ways. Different crops have different levels of susceptibility to drought, pest attack or poor soil conditions; different crops have different levels of input requirements, whether seed, fertilizer or labour for production or processing; different crops have different properties of taste or storage for home consumption, or market price and sale potential for cash income; and different crops have different socially defined roles and status levels (Scoones et-al-, 1996: 86).

Given these intricately linked influential factors, the central concern here is therefore to explore systematically the partial roles played by demographic pressure, land shortage and food supply-demand gap in spatio-temporal changes and continuity in the patterns of cropping and production in the study area.

As it has been outlined earlier, the major economic activity and source of livelihood for the Zeysie community in the area until the turn of the 19th century was livestock keeping.

During this period, open grazing system with a small vertical transhumance was extensively practiced. Before the diffusion and adoption of the plough cultivation system in the study area, land holding size per household was said to be relatively small but produced comparatively higher yield. In these days, the cropping pattern was heavily dominated by few cereals, especially maize and sorghum. A significant proportion of the area was covered by "thick" forest vegetation (as perceived by informants), and human settlements were dispersed over an extensive area on higher elevation. However, currently almost all these aspects of the local economy have changed significantly as a result of the cumulative effects of population pressure (resulting from both natural increase and in-migration), widespread outbreak of animal diseases, the introduction and large-scale adoption of oxen-ploughing technology, successive government policy interventions and institutional changes, frequent drought occurrence, highly variable rainfall patterns and increased moisture-stress.

In response to these complex set of factors, significant transformations in the patterns of crops cultivated have arisen. According to Zeysie elders, at the turn of the 19th century cereals (teff, barley), pulses (beans and peas) and cash crops (cotton and coffee) were gradually incorporated in the < maize-sorghum-dominated > cropping patterns of the local community. This was largely made possible by the arrival and large-scale adoption of the plough cultivation technique. Several exploratory investigations have also displayed the simultaneous adoption of such crops, especially cereals, and the plough culture by the southern people of the country in general (Dereje, 1997; Gebre, 1995; Dejene, 1996). There are at least two fundamental justifications as to why cereals and high-value cash crops were easily adopted following the diffusion and adoption of the plough cultivation system. First, the plough cultivation technology created the opportunities for expansion of cultivated areas per household as compared to the hoe-based cultivation. This has in turn provided an ideal production condition for the relatively <large area-demanding> cereals. Second, the then government policy during the last period of the *gebar* system, which compelled the *gebars* to pay tribute in cereals and cash rather than in labour, increasingly forced the local people to grow these crops (Guluma, 1995 cited in Dejene, 1996:38).

At the end of the imperial period of Haile Selassie, uncontrolled population growth has accelerated the demand for agricultural land, while, on the other hand, frequent outbreak of drought and increased moisture-stress have constrained food production level to keep pace with population growth rate. In response to this problem, the peasants of southwest of Lake Chamo have introduced innovatory forms of traditional irrigation practices by making use of Sego and Wezeka perennial rivers. Rainfed farming with supplementary irrigation has enabled the local people to incorporate quite a large variety of fruit trees, root crops and vegetables in the existing <food grain-dominated> cropping patterns.

From what has been already documented in the literature, the most formidable changes in the patterns of crops grown in response to population pressure appear to include allotment of a greater proportion of the available cultivated land to more labour-intensive food crops at the cost of cash crops, and the selection, mixture and rotation of such crops in order to sustain the fertility level of the soil (Ahmed, 1987 and Yibeltal, 1994). Of course, the predominance of labour-intensive food crops in the cropping patterns of densely populated areas might be incontestable in light of the fact that the supply of labour input and the demand for food production considerably increase with growing population pressure.

However, it should be noted that the demand for cash income escalates with increasing population pressure in order to fulfill short- and long- term investment plans as well as numerous cash payments required by both government and social institutions. This entails that peasant fields in most cases are not exclusively allocated for food crops; and that a peasant farmer needs to allot a reasonable part of his crop fields to high-return cash crops.[7] In this connection, recent empirical investigations underlined the paramount importance of certain cash crops in the cropping patterns of densely settled rural areas, especially in regions where there is a high degree of integration between farm and non-farm activities (Tegegne, 1996; Dejene, 1996).

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[7]*Nevertheless, farming is only one of a number of income earning options, making up a viable proportion of rural people's livelihood portfolio. Coping with income insecurity means having a comprehensive portfolio of income sources, derived from both farm and non-farm*

The range of annual, root and perennial crops and vegetables cultivated by the sample households in the survey PAs is set out in Table 5.6. At the time of the survey, more than twenty different food and cash crops were grown by the respondents, indicating the high degree of crop diversification and adaptations to changing environmental and demographic conditions.

With a share of close to 65 percent of the gross cultivated area (i.e., 63.2 percent in Meher season and 68.4 percent in Belg), cereals were predominant crops grown in the area. At the time of the survey, the main cereal crops grown were, in order of importance, maize, sorghum, teff, barley and wheat. Peasant experiences displayed that since the early history of agricultural practices maize and sorghum have remained staple food grains. These crops have gained grounds over all other crops and currently accounted for more than 25 and 23 percent of the gross cultivated area under cereals respectively. According to informants, the ever-lasting dominance of maize and sorghum in the cropping patterns of the area has to do mainly with their distinctive feature of tolerating drought and moisture-stress as well as their lower levels of susceptibility to pre- and post-harvest losses than other cereals such as teff, barley and wheat. Maize and sorghum have had also a favoured taste as a result of the traditional consumption habits and preferences of the local community. The increased importance of maize and sorghum may be taken therefore as evidence of the relative continuity of the cropping patterns thought a significant number of other crops, such as root crops and fruit trees has been increasingly introduced in the study area.

A closer look into the cropping patterns of the study PAs reveals that barley and wheat were widely grown in Wezeka compared to in Aelgo. This could be explained by the existing spatial disparities in agro-climatic conditions. Largely being a highland area with cool weather conditions wezeka PA appears suitable for production of cool weather crops such as barley and wheat compared to Aelgo which is mainly marked by warm weather conditions owing to its low elevation.

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activities. Building a portfolio of income sources, however, requires assets, both material and human (Scoones et. al., 1996)

Table 5.6. Cropping Patterns* During Meher and Belg Growing Seasons by PAs.

	Aelgo						Wezeka						Overall Total					
	Meher		Belg		Total		Meher		Belg		Total		Meher		Belg		Total	
Crop	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
CEREALS	39.46	60.9	33.97	67.0	73.43	63.6	34.18	66.1	16.33	71.5	50.51	67.8	73.64	63.2	50.30	68.4	123.94	65.2
Maize	13.27	20.5	7.96	15.7	21.23	18.4	7.58	14.7	3.15	13.8	10.73	14.4	20.85	17.9	11.11	15.1	31.96	16.8
Sorghum	10.26	15.8	8.97	17.7	19.23	16.7	6.97	13.5	2.56	11.2	9.53	12.8	17.23	14.8	11.53	15.7	28.76	15.1
Teff	9.73	15.0	4.32	8.5	14.05	12.2	6.43	12.5	3.32	14.5	9.75	13.1	16.16	13.9	7.64	10.4	23.80	12.5
Barley	3.46	5.3	6.51	12.8	9.97	8.6	7.45	14.4	3.25	14.2	10.70	14.4	10.91	9.4	9.76	13.3	20.67	10.9
Wheat	2.74	4.2	6.21	12.3	8.95	7.8	5.75	11.1	4.05	17.7	9.80	13.2	8.49	7.3	10.26	14.0	18.75	9.9
PULSES	10.02	15.5	4.55	9.0	14.57	12.6	8.91	17.2	2.39	10.5	11.30	15.2	18.93	16.3	6.94	9.4	25.87	13.6
Beans	4.27	6.6	2.17	4.3	6.44	5.6	5.56	10.8	1.14	5.0	6.70	9.0	9.83	8.4	3.31	4.5	13.14	6.9
Peas	5.75	8.9	2.38	4.7	8.13	7.0	3.35	6.5	1.25		4.60	6.2	9.10	7.8	3.63	4.9	12.73	6.7
Cotton	7.91	12.2	4.54	9.0	12.45	10.8	5.32	10.3	1.45	6.3	6.77	9.0	13.23	11.4	5.99	8.1	19.22	10.0
ROOT CROPS	1.95	3.0	2.18	4.3	4.13	3.6	1.52	2.9	0.92	4.0	2.44	3.3	3.47	3.0	3.10	4.2	6.57	3.5
FRUITS & VEGETABLES	5.44	8.4	5.44	10.7	10.88	9.4	1.75	3.4	1.75	7.7	3.50	4.7	7.19	6.2	7.19	9.8	14.38	7.7
Total	64.78	100.0	50.68	100.0	115.46	100.0	51.68	100.0	22.84	100.0	74.52	100.0	116.46	100.0	73.52	100.0	189.98	100.0

Note: . Root crops comprise sweet potato, enset and cassava

. Fruits and vegetables comprise banana, papaya, mango ,orange, avocado, lemon, pomelon, coffee, sugarcane, cabbage, and <Shiferaw> (Moringa olifera).

** Cropping Pattern refers to the share of area under major crops to the total cultivated land in an area arranged in the descending order of magnitude (UNDP/FAO, 1986, cited in Degefa, 1996:89).*

Source: Field Survey, 1997.

Pulses such as beans and peas (including groundnut) took the second-rank order covering around 13.6 percent of the gross cultivated area. Pulses have been grown mainly during meher season as the area given to pulses accounted for 16.3 percent in meher growing season as against 9.4 percent in belg season. (Table 5.6). Pulses have a relatively considerable importance in the cropping patterns in terms of areal coverage in wezeka. Pulses by their nature require much space to produce relatively higher returns (Degefa, 1996) in which the peasant of heavily populated areas seem not afford to allocate for such crop because of scarcity of agricultural land. In this connection the peasants in Aelgo PA argued that pulses are appearing to phase out of production because of their low yield responses, while new root and perennial crops are being introduced in the patterns of crops cultivated. This may imply that, in the face of family size increment, farmers with very small fields make optimal use of limited space and intensively manage their farms with a range of diverse cropping patterns by incorporating high value and high yield crops at the expense of old ones with comparatively lower returns.

Cotton, which has been the most important labour-intensive cash crop, made up 10 percent of the gross cultivated area(i.e., 11.4 percent in meher and 8.1 percent in belg). The apparently significant relative position of cotton in the overall cropping patterns of the study area correspond to the researcher's initial assumption that peasant households in densely populated areas allocate a signified part of their crop fields to grow more labour-intensive and high return cash crops in order to meet the increasing demand for household money supply.

Perennial crops such as banana, papaya, mango, orange, avocado, lemon, pomelon, coffee, sugarcane, 'Shiferaw' (Moringa olifera) including vegetables (cabbage, onion, pepper) altogether accounted for about 7.7 percent of the gross cultivated area. However, there appears a significant difference in the percentage of area covered by fruits and vegetables among the study PAs (Tables 5.6). This variation could be well justified by the inherent differences in the percentage of farmers with access to irrigation water as well as the share of cropland areas suitable for traditional irrigation agriculture among the PAs investigated.

The peasants in the study area used to cultivate land-saving and more productive root crops in response to population pressure, land shortage and growing demand for food. At the time of the survery, root crops such as sweet potato enset and cassava accounted for about 3.5 percent of the overall gross cultivated land. Root crops, particularly enset are very important food-security crops. The advantage of enset as labour intensive and food-security crop, as well as one of the reasons for heavy population concentration in the study area is perceived by farmers, and this is frequently documented in the literature. It should be noted here that the areal coverage of root crops was too much underestimated as farmers did not report the actual area covered by these crops under mixed cropping conditions. Personal field observation at the time of the transact walk, as well as the farmers themselves revealed that root crops, especially sweet potato were crucial components in the seemingly complex intercropping practices in the study PAs. The same condition appears valid to vegetables since cabbage, onion and pepper were observed to be intercropped with annual crops in both home garden and crop fields.

It may be worth noting here that the existing small holdings seem not allow the farmers to produce all the aforementioned food and cash crops. In order to economize the limited space the local farmers have created new agrarian activities with promising potentials for sustainability and intensification of agricultural production. Of particular importance in this connection is the traditional agroforestry practices in which annual and root crops are intentionally intercropped together with farm and fruit trees.

Agroforestry practices were observed to be important components in the integrated crop-livestock farming systems of southwest of lake Chamo. The practice of cultivation of annual crops together with fruit crops and farm trees is carried out both in old home gardens and in crop fields where there is a better supply of water through traditional irrigation channels.

The most important perennial crops which are often intercropped with annual crops in the plain area of south west Lake Chamo include banana, coffee, papaya, orange, Moringa olifera. The peasant farmers in the study area also deliberately promote natural regeneration of trees and retain the useful natural trees in their crop fields. The most important indigenous farm trees found in crop fields include Cordia africana, Terminalia indica, Croton spp., Ficus

spp., Pliostigma, "Shuluro"(Zeysie language), "Duduba" (Zeysie), "Wasalako" (Zeysie). "Pule" (Zeysie), etc. In the highland part of the study area and in some lowland villages in Wezeka PA, farmers also intentionally plant Moringa olifera, Cordia spp., Eucalyptus camaldulensis, Leucaena leucocephala, Schinus mole, and Jacaranda mimisifolia (SWMSP,1996).

According to the information obtained through a qualitative approach in the form of group discussion and semi-structured interview, a diversity of annual and perennial crops and farm trees, i.e., agroforestry practices have multivariate functions for the resource-poor farmers. Crop diversification via mixed cropping in the face of limited agricultural land addresses the critical question of livelihood security of the local people. It provides a balanced diet, spreads risks across a wide-range of crop combination and spreads labour requirements and harvest over the year. Farm tree components in agroforestry land use systems benefit the farming community in several ways. Of particular importance of farm trees in this regard include provision of shade and construction poles, materials for making farm implements and household equipment's, and meeting the escalating demand for fuelwood.

Moreover, traditional agroforestry practices have a cardinal role to play in the domains of agricultural intensification and ecological sustainability as well as putting marginal lands under cultivation. The function of traditional agroforestry in the long-term sustainability of the agroecosystem in the area is immensely reflected in its progressive effect on soil fertility management through supply of localized inputs of rich humus to the soil. It also possibly curtails the degree of soil loss through wind and water erosion. In general, traditional agroforestry in the study area has served multipurpose functions in all aspects of rural livelihood security, environmental protection and conservation of biodiversity.

Suffice it to say here that the cropping strategy in the study area is generally marked by diversification. The peasants often choose their cropping techniques so as to avert risks and uncertainties of complete crop failure. They ascertain this through the cultivation of a large number of annual, root and perennial crops, each known for its capacity to grow and give high returns under changing environmental and demographic conditions. Indeed, crop

diversification has allowed to smoothout the flow of food and cash income during the year. High degree of crop diversification under agroforestry land use systems could be therefore taken as one major pressure response mechanism through which peasants produce almost all types of food and cash crops needed for consumption and money supply with proper consideration to the suitability of agro-climatic factors and the cost-benefit of certain crops.

5.1.4. Local Land Contract Arrangements: Coping Strategies to Mitigate the Dislocation of Production Factors

It is known that the availability of household land, family labour and capital significantly determine the capacity of peasants to produce food grains and cash crops required for their short-and long-term survival. In a highly populated areas labour may not be, at least in theory, a limiting factor of production. In such areas access to agricultural land seems to play a critical role in rural people's livelihoods. Indeed, in a predominantly agricultural society, such as that of southwest of Lake Chamo, land appears as an important resource for the sustenance of the household economy and acquisition of wealth. The function of capital in the form of draught oxen and seed on the viability of the peasant economy is not less important.

Nonetheless, not all households in the area have had a fair balance between the key factors of production. More particularly, the existing rapid human population growth has brought about proliteration of landless and near-landless peasants, and has generally escalated the demand for land in relation to what the supply could meet. The overall average land holding size in the area at the time of the survey was found to be close to 0.79 hectare, which is much lower than the mean land size in the country. This was the average of the total area of land available to a household for its use, including both land under annual and perennial crops and land under current fallow.

The basic issue that deserves special focus is perhaps to uncover the coping strategies which landless and near-landless peasants devised in order to manage the problem of access to land. Broadly speaking in areas where sufficiently high density of agricultural population per unit of cultivated land and static form of land tenure co-exist together, near-landless peasant

Table 5.8 also illustrates the number and percentage of farmers who cultivated household land only, supplemented the household land by hiring and sharecropping arrangements as well as those who leased out and/or sharecropped out part of the household land for tenants (hereafter referred as tenancy land givers) in the 1997 cropping season. Slightly over 51 percent of the farmers did not make farms on either hired or share cropped land and were entirely dependent upon their own household land for their crop-farming activities.[8]

Table 5.8. Number and Percentage Distribution of Farmers by Patterns of Access to Land in the 1997 Cropping Season.

Household category by land Tenure	Aelgo		Wezeka		Overall Total	
	No.of Farmers	%	No.of Farmers	%	No.of Farmers	%
Owner-operators	53	52.0	29	50.0	82	51.3
Supplementary land Hirers	9	8.8	7	12.1	16	10.0
Supplementary Share croppers	32	31.4	12	20.7	44	27.5
Tenancy Land Givers	8	7.8	10	17.2	18	11.2
Total	102	100.0	58		160	100.0

Source: Field Survey, 1997

[8] *In fact, if those who gave part of their PA allocated land to tenants were included in the category of 'household land only' operators the figure would have risen to about 63 percent, further reflecting the pervasive role of PA allocated fields in the livelihoods of the peasants.*

Of the overall sample households 10 percent have supplemented their household land by hiring at least one plot from tenancy givers on the basis of monetary payments, while 27.5 percent have contracted supplementary land on a sharecropping tenancy. On the other hand, 11.2 percent of the farmers interviewed have leased out part of their PA allocated land on advanced cash payments and/or on sharecropping tenancy.

A closer examination of the data in Table 5.8 reveals the prevalence of significant variations in the patterns of land hiring and sharecropping for the 1997 cropping seasons among the survey PAs. At Aelgo only 8.8 percent of the sample farmers hired land as compared to 12.1 percent in Wezeka. At another extreme, 31.4 percent of the peasants in Aelgo sharecropped as compared to only 20.7 percent in Wezeka. Tenancy land givers were comparatively more numerous in Wezeka (17.2 percent) than in Aelgo (7.8 percent).

A complex set of factors were accountable for the existing disparities in the patterns of land hiring and sharecropping. In Aelgo there has been a more severe shortage of land and a more marked differentiation of holdings among the farmers. For instance, there were a few farmers with large holdings and a small number of farmers in the medium holding category. Therefore, the high demand for land and the expense of hiring at Aelgo resulted in a lower incidence of land hiring. In contrast, at Wezeka a large majority of the farmers were holders of medium farms with 1 to 2 hectares and these farmers may not need to rely as much on sharecropping as in Aelgo PA. The cost of leasing land for monetary payments was relatively cheaper at Wezeka than at Aelgo, which was directly related to the differential fertility rate of the land and the relative variation in the demand for land. Since yields were lower at Wezeka than at Aelgo, sharecropping arrangements provide much lower returns to both the landowner and the tenant in the former PA than in the latter. Moreover, most of the farm plots in Aelgo have had direct access to supplementary irrigation and therefore yields are less erratic as compared to Wezeka. Suffice it to say here that sharecropping tenancy arrangements are more

rewarding for both partners at Aelgo PA than hiring land for monetary payments since the small-scale farmers cannot afford to pay the ever-increasing land-leasing prices.[9]

The terms under which land is sharecropped vary substantially between the survey PAs and among individual villages within the PAs depending upon quality of land (the best crop fields are those situated close to Sego and Wezeka rivers for supplementary irrigation purposes) and market demand. However, the main sharecropping arrangements during the survey period were a half share system and a third share system. In the former case, both the landowner and the cultivator receive equal division of the crop output. In the latter sharecropping arrangement, the tenant receives two-thirds and the landowner one-third of the crop output. In both of the cases, both the landowner and the tenant are expected to contribute the seed in accordance with the terms under which the land is sharecropped.

There is also significant variations in land-leasing arrangements between the PAs and among the villages within the PAs, reflecting the extent of land shortage, quality of land and the need of the landowner for cash. At the time of the survey, on the average the rental value of crop fields was calculated to range from a minimum of 69 birr per timed of land at Wezeka to a maximum of 84 birr per timed of land for a single-year lease at Aelgo. Assuming four timed of land to be equivalent to a hectare, land-leasing prices at Wezeka and Aelgo were about 276 and 336 birr/hectare/year, respectively. Both land-leasing and sharecropping tenancies have been arranged not for more than a year. When tenancy givers asked why not crop share or lease out land for longer periods they used to attribute the main reason to fear of appropriation of the land by the tenants and of expropriation by PA leaders for reason of failure to operate the land properly by themselves. In spite of this, local land contract arrangements, such as renting and sharecropping were commonly viewed as viable strategies which assure widespread temporary access to land among the land-hungry smallholders, and which serve to mitigate the problem of dislocation of other key production factors such as draught oxen and labour.

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[9]*According to one farmer who used to regularly hire land in Aelgo PA, the rental value of the best crop land (average birr/hectare/year) has increased from about 250 birr in 1990 (the time when the then government permitted land rental) to about 350 birr in the 1997 cropping season.*

The basic questions worthy of assessing are perhaps: Do we dare to consider the aforementioned farmer-to-farmer contractual arrangements as responses to farmland scarcity? And as long as we claimed that there is a general land shortage in the study area, why do some farmers leased out or share cropped out part of their land to tenants; do they really have done so because of surplus household land or do they have other limiting factors to operate their land by themselves? In order to unveil these questions the sample households (i.e., owner-operators, land hirers, share croppers and tenancy land givers) were closely examined with respect to their average farm size, number of family labour and draught oxen ownership.

Table 5.9. Household category by land Tenure vs Farm size Catogory (Percent Farmers).

Farm Size Category	Aelgo			Wezeka			Overall Total			Average
Households by Land Tenure	<1ha	1-2ha	>2ha	<1ha	1-2ha	>2ha	<1ha	1-2ha	>2ha	
Owner operators	51.9	44.4	71.4	50.0	56.5	0.0	51.4	51.2	50.0	51.3
Land Hirers	9.1	0.0	28.6	12.5	0.0	100.0	10.1	0.0	50.0	10.0
Share croppers	39.0	11.2	0.0	37.5	0.0	0.0	38.5	4.9	0.0	27.5
Tenancy Land Givers	0.0	44.4	0.0	0.0	43.5	0.0	0.0	43.9	0.0	11.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases	77	18	7	32	23	3	109	41	10	160

Source: Field Survey, 1997

Of the total number of small holder farmers (with less than one hectare) 51.4 percent were owner - operators, while the remaining 48.4 percent augmented their PA allocated fields by land-leasing and sharecropping arrangements; none of them were found out to be under the 'tenancy land givers' category. The proportion of small-scale peasants who hired-in land on monetary payments was substantially lower than those who contracted land on the basis of sharecropping tenancy. This might be attributed from shortage of money for land-leasing arrangements. An examination of the patterns of land hiring among large farm holders (over two hectares) in both of the survey PAs substantiates the above argument (Table 5.9). This indicates that land hiring on the basis of cash payments occurred frequently among those with relatively large farm holders.

Although large farm holders appear to have comparatively 'sufficient' household land to meet their requirements 50 percent of them were engaged in land leasing arrangements during the 1997 cropping season, because more landed peasants often have more scope to do so owing to the fact that they have more options to secure the money, the seed and the draught power necessary to hire additional land. In line with the present findings, Yared (1995:106) found out a strong positive correlation between the size of rented in land and the total land controlled and livestock owned by households in the context of Wogda area in north Shewa. On the other hand, a significant share of farmers in the medium holding category (43.9 percent) were observed to be tenancy land givers due to their inability to operate their household land fully for certain reasons.

In general, as a result of increasing demand for land in the study area land-leasing prices have escalated significantly, and this has made land leasing arrangement open mainly to more landed peasants. Farmers under the large holding category have been increasingly turning to engage in hiring the best fertile crop fields situated close to Sego and Wezeka rivers and thus are feasible to traditional irrigation agricultural practices. On the other hand, sharecropping arrangements have become the principal means through which small land holders manage to obtain additional land for making a viable livelihood. Against this background, it is safe to conclude that sharecropping arrangements in the study area are

responses of small holder farmers (with less than one hectare of PA allocated land) to growing land shortage, while land-leasing arrangements on advanced cash payments are responses of more landed peasants (with over two hectare) to scarcity of high quality land or the need for land in specialized niches.

Table 5.10. Housheold Category by Land Tenure vs Number of "Male Workers"* (Percent Farmers)

No. of Male Worker	Aelgo				Wezeka				Overall Total				Average
Households by Tenure Class	0	1	2	≥ 3	0	1	2	≥ 3	0	1	2	≥ 3	
Owner operators	60.0	82.8	53.1	0.0	0.0	81.8	60.0	15.4	42.9	82.4	55.3	5.9	51.3
Land Hirers	0.0	0.0	12.5	23.8	0.0	0.0	13.3	38.5	0.0	0.0	12.8	29.4	10.0
Share croppers	0.0	17.2	34.4	76.2	0.0	9.1	26.7	46.1	0.0	13.7	31.9	64.7	27.5
Tenancy Land Givers	40.0	0.0	0.0	0.0	100.0	9.1	0.0	0.0	57.1	3.9	0.0	0.0	11.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases	20	29	32	21	8	22	15	13	28	51	47	34	160

** Male workers refer to the number of male household members aged between 15 and 64 years, and are used as indicators of the level of family labour availability.*

Source: Field Survey, 1997

Comparing the data summarized in Tables 5.9 and 5.10, it becomes certainly clear that farmers who gave part of their crop fields to tenants have done so not because of surplus household land, but partly because of lack or shortage of economically active male family members. Thus 57.1 percent of the overall sample households without a male household member (aged between 15 and 64 years) have given at least one of their plots to tenants on either sharecropping arrangements or advanced monetary payments, while only 3.9 percent with one male labour have done so. None of the sample peasants with two or more male household members within the working age limits have leased out and sharecropped out part of their PA allocated farm plots during the 1997 cropping seasons. From Table 5.11, it is also quite vivid that the scope of small holder farmers to work on someone else's land on both land-leasing and sharecropping arrangements substantially increases with increasing number of male household members in the working age limits.

Table 5.11. Households by Tenure Class vs Number of Draught Oxen Ownership (Percent Farmers).

No. of Farm oxen	Aelgo					Wezeka					Overall Total					Average
Households by Tenure Class	0	1	2	3	4	0	1	2	3	4	0	1	2	3		4
Owner operators	75.0	91.3	38.1	17.4	18.2	40.0	89.5	53.3	0.0	0.0	64.7	90.5	44.4	14.3	10.0	51.3
Land Hirers	0.0	0.0	4.8	8.7	54.5	0.0	0.0	6.7	40.0	44.4	0.0	0.0	5.6	14.3	50.0	10.0
Share croppers	0.0	0.0	57.1	73.9	27.3	0.0	0.0	33.3	40.0	55.6	0.0	0.0	47.2	67.8	40.0	27.5
Tenancy Land Givers	25.0	8.7	0.0	0.0	0.0	60.0	10.5	6.7	20.0	0.0	35.3	9.5	2.8	3.6	0.0	11.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases	24	23	21	23	11	10	19	15	5	9	34	42	36	28	20	160

Source: Field Survey, 1997

5.2.1. Patterns of Rural Non-Farm Activities and Levels of Peasant participation

Before embarking on an appraisal of the patterns and levels of peasants' engagement in non-farm activities, it is necessary to specify what we mean by "non-farm" activities. Rural "non-farm" activities (also referred to as "off-farm" activities) include all economic pursuits other than crop and livestock production, encompassing trading (in grains and livestock), handicrafts (such as weaving, blacksmithing, pottery and wood crafts), casual wage labour, cooked food and liquor selling, wood selling and fishing.

Table 5.12 illustrates the whole range of rural non-farm activities along with percentage of farmers engaged in and total and mean annual income generated from each of the activity in the study area. Thus, rural non-farm activities provided seasonal and part-time employment opportunities for about 65 percent of the households while the remainder exclusively relied on crop and livestock production. The highest level of engagement in non-farm income-earning activities was in Aelgo, with 68.6 percent of the survey households involved. This compared with 58.6 percent in Wezeka. Figures for both PAs should be viewed as minimum estimates because they exclude part-time and occasional non-farm employment's such as fishing in lake Chamo, and casual wage labour where such pursuits also generate significant rural employment. Therefore, in a highly populated areas such as southwest of Lake Chamo, rural non-farm activities help relieve the pressure on the land and reduce the degree of rural unemployment and underemployment.

Table 5.12. Non-Farm Income-Earning Activities: Number and Percentage Distribution of Household and Mean Annual Income Generated

Non-Farm Activity	Aelgo(N= 102)				Wezeka(N=58)				Overall(N=160)			
	Hoseholds		Non-farm income		Hoseholds		Non-farm income		Hoseholds		Non-farm income	
	No	%	Total (Birr)	MAIHH (Birr)	No	%	Total (Birr)	MAIHH (Birr)	No	%	Total (Birr)	MAIHH (Birr)
Trades	22	21.6	15890	722.27	11	19.0	7505	682.27	33	20.6	23395	708.94
Grains	15	14.7	10676	711.73	8	13.8	5145	643.13	23	14.4	15821	687.87
Livestock	7	6.9	5214	744.85	3	5.2	2360	780.67	10	6.3	7574	757.40
Handicraft	25	24.5	15323	612.92	18	31.0	7595	421.94	43	26.9	22918	532.98
Weaving	12	11.8	8580	715.00	8	13.8	2848	356.00	20	12.5	11428	571.40
Blacksmith												
Pottery	5	4.9	3750	750.00	4	6.9	3257	814.25	9	5.6	7007	778.56
Woodcrafts	2	2.0	375	187.5	6	10.3	1490	248.33	8	5.0	1865	233.13
	6	5.9	2618	436.33	-	-	-	-	6	3.8	2618	436.33
Food & Liquor Selling	18	17.6	13720	762.22	5	8.6	2974	594.80	23	14.4	16694	725.83
Wood Selling	5	4.9	1229	245.80	-	-	-	-	5	3.1	1229	245.80
Total	70	68.6	46162	659.46	34	58.6	18074	531.59	104	65.0	64236	617.65

Note:- No = Number of households engaged in the activity

MAIHH = Mean Annual Income per Hoseholds

Source: Field Survey, 1997.

Secondly, it could be possibly ascribed to the differential stress of population pressure and land shortage. Higher levels of population density may limit the number of households able to sustain from agricultural output alone, thus forcing some into non-farm activities as income supplements. While high agricultural population density necessitates land use intensification, it may also instigate expansion and development of non-farm sector. According to Haggblade, Hazell and Brown (1989:1184), for population density to play a discernible role in stimulating rural non-farm activities a threshold level of perhaps 50 - 100 people per square kilometer is necessary. Lending credence to this notion, the majority of peasants in Aelgo PA, where there prevail comparatively a very severe shortage of land and a high agricultural population density, supplemented their farm income by increasingly participating in a large number of non-farm income-earning opportunities.

The structure of the rural non-farm economy (Table 5.12) reveals that handicrafts typically predominate, employing, on the average, close to 27 percent of the overall cases (or about 41 percent of the households involved in non-farm activities). Within handicrafts, weaving clearly stands out as the largest source of part-time employment. About 46.5 percent of the total artisanal households were engaged in weaving. The local environment (i.e., the farm economy) provides sufficient raw material (cotton) that can be spinned to produce clothes sold on the local and external markets. Blacksmithing appears the most lucrative source of off-farm income, rewarding a mean annual income of birr 778.56 per practitioner. The degree of importance of blacksmithing within the community has substantially increased, according to informants, since the time when the plough culture was adopted in the area. Because the introduction of plough cultivation technology generated a volume of demand sufficient to support even full-time blacksmith production such as plough share, sickle, machete and axe. Local blacksmiths are increasingly relied upon old farm implements to reforge them for recycling. Farmers displayed that blacksmithing activity reaches its peak during the height of the main agricultural season because of the demand for repair services. Thus, by supplying farm implements required by farmers, blacksmithing activity enhances the magnitude of the farm-non-farm linkages in the area. Clay pot making for sale is a specialist activity of only women in the area. Five percent of the overall households (or 18.6 percent of the artisanal

households) were engaged in pottery. This non-farm activity was mainly practiced in Wezeka PA. Pottery generally appears to provide very low returns to labour. However, since the labour is often non-competitive with other productive activities this means that pottery provides relatively stable income for women with other tasks such as child care.

Trading activity is another important source of seasonal and part-time employment opportunity. Grain and livestock trading activity was taken up by members of 20.6 percent of the overall sample households. It involves purchase and resale of grains and livestock (particularly small ruminants) at local markets. In fact, in terms of cash income generation, trading activity takes the first rank-order, with mean annual income of birr 708.94 per practitioner, or 36.4 percent of the total cash income from non-farm sources (Table 5.12)

The sale of cooked food (bread, *injera*, roasted grains) and brewed local drinks (*cheka, tella, tej, areke*) at market days in particular was a significant source of monetary cash for about 14.4 percent of members of the overall cases. This activity was important again in Alego PA where 17.6 percent of the interviewed households were involved as compared to only about 8.6 percent in Wezeka , with average annual income from this source being birr 762.22 and 598.80 per household respectively. The high level of engagement in food and liquor selling activity among Alego peasants has to do with its locational advantages along the Arba Minch - Konso road as well as its proximity to Alego and Selle state farms in which passengers and agricultural workers provide a large demand for cooked food and local drinks.

When asked the reasons for engagement in rural non - farming activities, the practitioners indicated one or a combination of several reasons summarized in Table 5.13. In both of the survey PAs, food insecurity due to family size increment clearly emerges as the fundamental factor for peasants' participation in non - farm income - earning activities.

Table 5.13 Reasons for Peasants' Engagement in Rural Non-Farm Activities: Percent Farmers Responding 'Yes'.

	Aelgo		Wezeka		Overall Total	
Reasons	Yes	%	Yes	%	Yes	%
Food Insecurity due to family size increment	48	68.6	22	64.7	70	67.3
Household land shortage due to large family size	43	61.4	14	41.2	57	54.8
Increasing demand for cash due to large family size	27	38.6	25	73.5	52	50.0
Inherited from family	29	41.4	18	52.9	47	45.2
Learnt from friends and neighbors	17	24.3	5	17.6	23	22.1
Number of cases (i.e., total No. of Households engaged in non-farm activities)	70		34		104	

Source: Field Survey, 1997

Thus for 67.3 percent of the overall cases engagement in non-farm activities is a response to food supply -demand gap brought about largely by fast population growth. Rural non-farm activities as viable strategies against under employment (due to household land shortage) and household income insecurity were carried out by about 55 and 50 percent of the households. In deed, household land shortage as one of the crucial reasons for peasants' participation in non-farm activities in Alego PA matches very well with the survey data discussed in chapter four. Some non-farm activities, especially handicrafts, require specialized skill and apprenticeship training. Hence for 45.2 and 22.1 percent of the respondents, handicraft activities were mainly inherited from their families and learned from friends and neighbors, respectively. Learning from friends and neighbors as reason for engagement in non-farm activities appears more significant among farmers in Alego where 24.3 percent of the practitioners involved in handicrafts due to this reasons as against only 17.6 percent in Wezeka. This may suggest that higher levels of demographic and land pressure may stimulate some households to engage in non-farm activities by learning the appropriate skills required from friends and neighbors.

Table 5.14. Patterns of Non-Farm Income Expenditure: Percent Farmers Responding 'Yes'

	Aelgo		Wezeka		Overall Total	
Type of Expenditure	Yes	%	Yes	%	Yes	%
Purchase of food grains	55	78.6	28	82.4	83	79.8
Purchase of clothes, household items and exp. for family	62	88.6	24	70.6	86	82.7
Paid for land use taxes, loans, Iddir, Equb...	31	44.3	19	55.9	50	48.1
Purchase of Oxen, breeding animals and livestock medicine	14	20.0	8	23.5	22	21.2
Purchase of farm inputs (fertilizer, improved seeds...)	4	5.7	3	8.8	7	6.7
Number of cases	70		34		104	

Source: Field Survey, 1997

Rural non-farm earnings were utilized for several purposes (Table 5.14). About 82.7 percent of the respondents spent a portion of their non-farm earnings for purchase of clothes and other household furniture such as cooking pots, as well as for schooling and health care services. For about 80 percent of the cases the cash demands for purchase of food grains were met by earning from non-farm activities. This implies that the household food economy in the study area is, in most cases, articulated with markets and non-farm income earning pursuits. The local market is vital for the functioning of the domestic food economy as it constitutes an alternative source of household food supply and other basic needs. Non-farm income appears as one of the most important factors determining peasants' capacity to purchase what they cannot produce and/or are in short supply from the local market. Therefore, rural non-farm earnings help stabilize household income over the agricultural calendar year and provide livelihood security in lean crop years.

Moreover, the cash income generated from such activities was utilized for paying land use taxes, loans and Iddir (reported by 48.1 percent of the cases), purchase of farm oxen, breeding animals and livestock medicine (21.2 percent) and for purchase of farm inputs (6.7 percent) (Table 5.14). However, the positive impact of non-farm earnings on productivity-enhancing investments in agriculture seems to be negligible as only about 7 percent of the overall respondents reported to have used non-farm income for acquisition of productive farm inputs such as fertilizer, herbicides, insecticides and improved seeds. This is in contrast to Damotgale and Kachabira Weredas in southern Ethiopia in which intensity of fertilizer use was proved to be positively and significantly influenced by earnings from non-farm activities (Tegegne, 1996:72). In this regard, what could be said is that the great majority of the farmers in the study area are not in a position to make decisions about fertilizer application because they have neither deep experience of it nor any effective and affordable access to it. Indeed, at the time of the survey, the cost-effectiveness and appropriateness of industrial fertilizers were matters of some debate amongst farmers in Aelgo PA.

In addition to the aforementioned non-farm activities, casual wage labour and traditional bee-keeping are of major importance for people's livelihoods in the study area. Labour markets exist mainly during the main cropping season and some women and young people are hired for such tasks as weeding, harvesting or threshing, but wage levels are said to be very low. As far as bee-keeping is concerned, a survey conducted in the study area revealed that an average bee-keeper hangs five beehives and harvests about 20 kilograms of honey per hive annually. This brings him an income of about 500 birr per annum (SWMSP, 1996).

5.2.2. Migration Behavior in Response to Population and Land Pressure

Migration is one of the three demographic attributes (i.e., along with deaths and births) that influences the rates of changes in population size, growth, density and age - sex structure both at origin and destination areas of migrants. Because of the most evident historical trend, especially in developing countries, most researchers automatically think of migration as a one - way process (usually rural-to-urban). However, it should be recalled that a closer observation of migratory processes discloses that they are not exclusively one-way. This implies that

Table 5.15. Birth Place of Sample Household Heads by the Study PAs.

Birth Place	Aelgo		Wezeka		Overall Total	
	No.of HHs	%	No.of HHs	%	No.of HHs	%
Current PA	65	63.7	43	74.2	108	67.5
Other PA in the same Wereda[1]	10	9.8	2	3.4	12	7.5
Other Wereda in North Omo Zone[2]	12	11.8	13	22.4	25	15.6
Other Regions (Outside of SNNPR)[3]	15	14.7	-	-	15	9.4
Total	102	100.0	58	100.0	160	100.0

Note 1. Largely from Zeysie Benna PA within Arba Minch Zuria Wereda.

2. Konso special Wereda, sodo Zuria Wereda and Gamo Wereda.

3. *North Shewa and South Wello zones of Amhara Region.*

Source: Field Survey, 1997.

It is evident from Table 5.15 that about 67.5 percent of the respondents were borne in the current PA of permanent residence, while 7.5 percent at another PA within Arba Minch Zuria Wereda and 15.6 percent at other Weredas in North Omo Zone. The latter case suggests that there has been significant in-flux of population from different Weredas within the zonal administration. On the other hand, about 9.4 percent of the sampled households were migrated to the study area from outside of SNNPR, all of which, in fact, originated from south Wello and north Shewa and concentrated in Alego PA. All the in-migrants were borne in rural areas. The in-migrants' duration of stay at current permanent residence home PA ranged from 34 years to 10 years.

Rates of in-migration from other Weredas or regions and downslope movement of people from neighboring highland PAs in Arba Minch Zuria Wereda (which may be referred to as downslop migration) were significantly high in Aelgo (36.3 percent) compared to in Wezeka

(25.8 percent). One of the most fundamental consequences of fairly high rate of in-migration over the last two or so decades has been the tremendous population growth which progressively resulted in land scarcity, food supply-demand gap, environmental degradation and declining productivity of land (see Chapter Three). Concerning intra-wereda and inter-wereda migration, Teller and Assefa (1997:13) maintained that the downslope migration of people is "likely to be contributing to a more rational redistribution of population, given the high rural population densities in this part of the Southern region." The results of our analysis, however, suggest that this general notion does not seem to hold true any more in the context of the study area. On the contrary, the downslope mobility and in-migration of people from other weredas within north Omo zone appear to be increasingly adding to a more irrational mismatch between population and resources.

As a result, the general trend of population mobility in the study area is currently reversed in favour of out-migration even though the rate is not as high as the recent past in-migration (Table 5.16). It was found out that of the overall sample households interviewed, slightly over 11 percent (i.e., 18 households out of the total of 160) were involved in temporary out-migration. Of the total seasonal migrants, about 83 percent reported to be short-distance (i.e., intra-Wereda) out migrants, while the remaining 17 percent were long-distance (inter-Wereda) out-migrants. Sixty three households (which made up about 39 percent of the total) reported that at least one member in the household, although not necessarily the household heads, have temporarily out-migrated. Moreover, the interviewed households were asked to report the number of their family members (aged between 15-64 years) who have temporarily migrated towards other PA in the same wereda and/or other wereda. Accordingly, amongst the total working population (i.e., 476), as many as 81 which accounted for about 17 percent were away from home PA temporarily during the 1997 production year; of which 70.4 percent involved in short-distance migration and 29.6 percent in long-distance migration. In almost all cases, short-distance temporary out-migrants were more numerous than long-distance migrants. This is again contrary to Teller and Assefa's (1997) initial findings, though the researchers did not treat temporary out-migration independently. The predominance of intra-wereda temporary out-migrants over their inter-wereda counterparts may be possibly explained

by the "positive selectivity" behavior of migration and availability of seasonal labour markets within the wereda. The proximity of Aelgo and Selle State farms, which largely produce the most labour-intensive cash crop, i.e., cotton, to the study PAs has enabled the peasants to considerably reduce the costs (transport, family separation, etc.) of migration to long-distant areas.

The data in the third row of Table 5.16 reveals that none of the household heads involved in permanent out-migration. But about one-fifth of them claimed that they had at least one family member who has been permanently away from home. This is substantially low compared to the Sebat Bet Guraghe land in which about 46 percent of the sampled households reported to have at least one out-migrant household member (Muluneh, 1994). Of the total working age population (between 15 and 64 years old), close to 9 percent were permanent out-migrants (52.4 percent residing in rural areas and the rest 47.6 percent in urban areas). This figure is again relatively low compared to the proportion of out-migrats (12.1 percent) in Sebat Bet Guarage land (Muluneh, 1994). The highest rate of permanent out-migration was recorded for Aelgo, with nearly 10 percent of the economically active population being permanent out-migrants. This is compared to only about 7 percent in Wezeka. In the case of Wezeka, out-migration towards urban areas over dominates migration towards rural areas, while the inverse is true to Aelgo (Table 5.16).

Of the total household heads who claimed to have at least one non- resident member, 31.2 percent reported that they only provided some sort of assistance and economic support (mainly food grains) to their migrant relatives (those who have gone mainly for education), while 50 percent only received remittances (usually clothes, money, livestock and human health medicine, etc.) from non-resident household members. The remainder (i.e., 18.8 percent) both provided and received remittances. The large majority of the households in Aelgo (62.5 percent) were only receivers of remittances, while the majority in Wezeka (62.5 percent) were providers of economic support and assistance to their non-resident relatives. The frequency of remittance provision to rural parents in the area is generally marked by lack of regularity; and a significant number of the household heads reported that they received occasionally, especially

Table 5.16 continued

Overall Total					
HH.Heads		P_{15-64}		HH_{1MFM}	
N	%	N	%	N	%
18	11.3	81	17.0	63	39.4
15	83.3	57	70.4	42	66.7
3	16.7	24	29.6	21	33.3
-	-	42	8.8	32	20.0
-	-	22	52.4	17	53.1
-	-	20	47.6	15	46.9
32	100.0	-	-	-	-
10	31.2	-	-	-	-
16	50.0	-	-	-	-
6	18.8	-	-	-	-
160		476		160	

during emergency cases like severe food shortfalls, health problems and other important family events such as marriage, funeral and holidays.

Though it is certainly contestable to attribute migration to a single factor, population mobility is generally believed to be a response to livelihoods stress. Several empirical studies have shown that migration is instigated by spatio-temporal changes in job opportunities, socio-economic services, marriage arrangements, natural calamities, political and demographic factors. Almost all reasons for migration may be well placed in two sets of factors as "push" and "pull" factors. Thus "push" and "pull" factors are those factors (economic, demographic, socio-cultural, political and natural) which activate respectively in repelling and attracting potential migrants from areas of origin to destination.

The migrant household heads were asked the reasons for both temporary and permanent out-migration as well as for in-migration. For almost all immigrants the most important reason was reported to be the resettlement program of the former government and search for better economic opportunities.

For temporary and permanent out-migrants , the most fundamental reasons were fairly distributed among land shortage (23.9 percent) and food supply-demand gap, life hardship and poverty (22.6 percent) on the one hand, and among marriage and family related factors (19.7 percent) and lack of seasonal and part-time wage labour markets within their. localities (18.3 percent) on the other (Table 5.17).

Table 5.17 Reasons for Out-migration: Percent Farmers Indicated the Reason as the First and Strongest Push Factor

	Aelgo		Wezeka		Overall Total	
Reasons	No.of HHs	%	No.of HHs	%	No.of HHs	%
Fast population growth	10	17.9	1	6.7	11	15.5
Shortage of household land	15	26.8	2	13.3	17	23.9
Food shortage, life hardship and poverty	12	21.4	4	26.7	16	22.6
Marriage and family related factors	8	14.3	6	40.0	14	19.7
Lack of seasonal and part-time wage labour-market	11	19.6	2	13.3	13	18.3
Total	56	100.0	15	100.0	71	100.0

Source: Field Survey, 1997.

Farmers who perceived fast population growth as the first and strongest push factor for out-migration were comparatively few, accounting for about 15.5 percent of the overall respondents. It should be remembered here that when the peasant households asked the reason for household land shortage and food supply- demand gap, they directly related it to high population growth (see Chapter Three). It logically follows then that population pressure is one of the push factors that stimulate the rate of out-migration in the study area. Moreover, the fairly even distribution of respondents among the possible reasons for migration corroborates the fact that migration is a complex process determined by a matrix of intricately linked demographic, economic, social and political factors.

In summary, whatever the cause may be, temporary and permanent out-migrations in the area, though the rate is of less fascinating, emerge as a "safety valve" for growing demographic and land pressure, which partly relives the stress created by heavy population agglomeration. Moreover, the cash remittances obtained from non-resident relatives are of crucial supplement to the household cash demands and farming economy for the remitted cash, in few cases, is invested in the cropping and livestock sub-sectors.

Table 5.17 Reasons for Out-migration: Percent Farmers Indicated the Reason as the First and Strongest Push Factor

	Aelgo		Wezeka		Overall Total	
Reasons	No.of HHs	%	No.of HHs	%	No.of HHs	%
Fast population growth	10	17.9	1	6.7	11	15.5
Shortage of household land	15	26.8	2	13.3	17	23.9
Food shortage, life hardship and poverty	12	21.4	4	26.7	16	22.6
Marriage and family related factors	8	14.3	6	40.0	14	19.7
Lack of seasonal and part-time wage labour-market	11	19.6	2	13.3	13	18.3
Total	56	100.0	15	100.0	71	100.0

Source: Field Survey, 1997.

Farmers who perceived fast population growth as the first and strongest push factor for out-migration were comparatively few, accounting for about 15.5 percent of the overall respondents. It should be remembered here that when the peasant households asked the reason for household land shortage and food supply- demand gap, they directly related it to high population growth (see Chapter Three). It logically follows then that population pressure is one of the push factors that stimulate the rate of out-migration in the study area. Moreover, the fairly even distribution of respondents among the possible reasons for migration corroborates the fact that migration is a complex process determined by a matrix of intricately linked demographic, economic, social and political factors.

In summary, whatever the cause may be, temporary and permanent out-migrations in the area, though the rate is of less fascinating, emerge as a "safety valve" for growing demographic and land pressure, which partly relives the stress created by heavy population agglomeration. Moreover, the cash remittances obtained from non-resident relatives are of crucial supplement to the household cash demands and farming economy for the remitted cash, in few cases, is invested in the cropping and livestock sub-sectors.

CHAPTER SIX

SUMMARY, CONCLUSION AND POLICY IMPLICATION

61. Summary and Conclusion

The study has been instigated by the premise that peasant households generally do not accept passively the problems of household land shortage and food supply-demand gap induced largely by population pressure, but rather try to offset the problems by adopting and creating multiple livelihood strategies. By taking two peasant Associations (PAs) - Aelgo and Wezeka - from southwest of Lake Chamo, Arba Minch Zuria Wereda, as a case study, modest attempts have been made to testify this rather broad hypothesis.

The main rationale for selecting the two PAs has been their 'exceptionally' fast population growth rates and sufficiently high population density. By the year 1984, for instance, the total population in both PAs was recorded to be 5349 and after ten years latter (in 1994) it reached 7622 persons, implying an average annual growth rate of about 3.8 percent. This figure was indeed substantially higher than the national average of 3.1 percent. On the other hand, the average agricultural population density in 1984 was 309.2 persons/km^2 and the figure culminated to 363.6 persons/km^2 in 1994, suggesting an annual rate of increase of nearly 1.8 percent. The relative pressure of fast population growth on agricultural land has become even much more conspicuous by the year 1997. According to the results of the survey of 160 randomly selected households, the overall average agricultural population density was found out to be close to 787 persons/km^2. Thus, southwest of Lake Chamo clearly emerges as a classic case to investigate peasant responses to population pressure and land shortage.

The findings of the study have indicated that the observed fast population growth was an outcome of the cumulative causation of in-migration and natural rate of increase. More than one-fourth of the sampled household heads were found to be in-migrants from Konso special Wereda, Sodo Zuria Wereda and Amhara lands, particularly from north Shewa and south

It should be stressed here that despite the peasants' valid awareness and consciousness toward the significant effect of fast population growth on broadening the gap between food supply and demand, they have surprisingly developed a strong positive attitude towards large family size. A closer look into peasant reasoning has displayed that large family size generally maximizes the parents' options to manage problems of food shortfalls and household land shortage through numerous strategies presented and discussed in length under Chapter Five. Indeed, peasant experiences have shown that having many children and large family size (within the economically active age limits) reflects local people's livelihood strategies and responses to land shortage and food supply-demand gap. This contrasts with the researcher's prior expectation as well as the research findings of Markos (1997) in the context of the drought - prone Weredas in northern Ethiopia in which he maintained that the sampled households are no more in favour of bearing large number of children, and child labour is not essential any longer due to labour underutilization.

However, our research findings have confirmed that under the existing conditions of limited `ownership' of productive resources such as land and draught power the farmers in the area have relied heavily on various economic support and assistance from their able-bodied children. Moreover, because of the high degree of cropping intensity labour is not generally underutilized, and the demand for family labour supply is increasing with intensification of agricultural production practices. This goes in line with Boserup's (1990) argument that states under intensive agricultural systems children are likely to contribute more than they cost not only in families of landowning peasants but also in landless families. This is also because peasant households with insufficient household land are increasingly resorted to selling part of their family labour as well as engage in rural non-farm activities and in land hiring and sharecropping arrangements to supplement their cash demands and household land. The success of households in the area to engage in sharecropping tenancy or hire land on monetary payment is partly determined by the availability of active family labour, more particularly male workers (see section 5.1.4). In generally, in contrast to Markos's (1997) findings, the results of the study lead to the conclusion that bigger households with a large pool of active family labour have far greater options to mitigate the problems of land shortage and food deficit

Wollo. The major reasons for in-migration were reported to be the resettlement program of the previous government and search for better economic opportunities in the area. The in-migrants have plainly disclosed that the general situation in the area has not been in the state of affairs they have anticipated before their decision to migrate out of their birth places, and the extent of land scarcity has become even much more severe than before. The role played by natural rate of increase appears fascinating, since it has been generally considered the norm to have as many number of children as possible. The most crucial reasons for the desire to bear additional children, in order of importance, were observed to be continuity of family/clan name, love of children, old-age security, the need for help before old-age, social acceptance, and marriage stability. The degree of significance of these reasons were confirmed by the results of point score analysis technique (section 4.2.). Therefore, an important conclusion that can be drawn from these findings is that the strongly attached psychological values to children as well as the need for socio-economic support both before and during old-age are of paramount importance in determining rural people's attitude towards large family size. The positive and significant attitude towards maximizing family size to the largest extent possible among the large majority of the peasant households would also remain as a severe constraint to diffuse and implement family planning services and programs. Hence, a great deal of efforts in the domain of family planning education are needed to make the peasant farmers aware of the necessity to limit large family size and fast population growth through a fairly articulated system of fertility regulation.

The findings of the study have shown that the majority of the sampled households were knowledgeable and appreciative of the various adverse effects of increasing population pressure on the natural resource base of the area. Point score analysis of peasants' perception has indicated that the existing high demographic pressure has played a crucial role in exacerbating, the problems of diminution of holdings (for 87 percent of the farmers), lack of security of tenure due to frequent redistribution (88.2 percent), food supply-demand gap (90 percent), declining productivity of land (58.8 percent), environmental degradation (66.2 percent), and agricultural land fragmentation (56.9 percent) (see section 4.3).

induced partly by growing population pressure than their counterparts. It generally seems that under conditions of population pressure and very small PA allocated holdings, land use intensification, commercialization of productive factors and labour out-migration encourage large families since the parents have to reproduce additional children to carry out the household domestic and farm operations.

This thesis has also attempted to investigate two complementary sets of demographic and land pressure responses (on-farm and non-farm related responses) on the part of the peasants to secure a viable livelihoods. One of the most important on-farm oriented responses of the farmers is found to be progressive changes in their farming systems (Section 5.1.1). Prior to their incorporation in the Ethiopian kingdom in the 1890s, the local farming systems were more of semi-sedentary agropastoralism, and the major source of livelihood for the Zeysie community was livestock production supplemented by shifting cultivation of maize and sorghum. The plough cultivation technology was not introduced in the area during this time, and the degree of integration of the cropping sub-system with the livestock sub-sector was very negligible. In this days land among the local people was a communal resource and land allocation to members of the group was executed by community land administrators known locally as *magas*, who had been headed by a chief *maga* known as *Kati*. As a result of the intervention of Menelik's forces in the 1890s the existing mode of life including the farming systems, political organization and the settlement patterns were altered. The *Kati* was transformed to *balabat* to serve as intermediary between the local people and the imperial order. The *magas* were transformed to *chiquashum*, and the mass of the local people were considered as *gabars*, and they were required to turn over grains, cash and labour services to the imperial officials. The introduction of the plough cultivation technology by northern settlers and gradual adoption by the local people has made crop production very important subsistence strategy. This has also marked the beginning of integration of the cropping sub-system with the livestock sector (i.e., mixed farming systems) since cattle have become increasingly crucial production input through the expansion and large-scale adoption of draught oxen. The large-scale adoption of the plough technology has also created an optimal condition for expansion of cropland areas towards rangeland resources in the area. Particularly at the

end of the reign of emperor Haile Sellasie a relative scarcity of permanent pasture was felt, and arable lands have gradually become important supplement to livestock fodder, with field-edge grazing and crop residues being key to dry season livestock nutrition, initially for lactating cows and ploughing oxen. Indeed, this is a second bench-mark and paramount historical event in the transition of the local farming systems towards a fully-fledged crop-livestock integration or mixed farming systems. Thus it is suffice to argue that the farming systems of southwest of Lake Chamo have evolved from an "extensive-subsistence-agropastoral" systems to an "intensive-subsistence-mixed farming" systems in response to demographic pressure, land shortage and food supply-demand gap. It should be stressed, however, that the partial roles played by external factors such as successive government interventions in the transformation of the local farming systems and peasant responses are not less important.

The other most important peasant response to population pressure, land shortage and food supply-demand gap particularly during the period 1985 to 1997 was found to be cropland and settlement areas encroachment onto forest/woodland, bush/shrubland and grazing resources. Monitoring of major land use/land cover patterns during the last 12th year study period has depicted that cropland and built-up areas have increased by about 21.3 percent (or 368 hectares) and 32.1 percent (35 hectares) respectively with an annual rate of expansion of 1.78 and 2.68 percent at the cost of the aforementioned land use/land cover patterns. It is estimated that if this trend continues unabated for the years to come, it will take only half a century (nearly 51 years) for the available "land fund" to be entirely exhausted at the benefits of cultivated and built-up areas (section 5.1.2). This pressure response has in turn resulted in several intricately linked socio-economic problems such as environmental degradation, declining productivity of land and fuel wood shortages. The peasants have attempted to adjust themselves to the changing environmental and demographic conditions by creating and/or adopting new agrarian systems which have effected a sustained livelihood and intensification of land use. These include traditional agroforestry practices, supplementary irrigation practices (by making use of Sego and Wezeka perennial rivers), green manuring, mixed cropping and crop rotation practices.

As hypothesized in the study, the existing high population pressure has provided a strong positive impetus for land use intensification by maximizing the demand for food and the supply of labour inputs. This confirms the validity of Boserup's (1965, 1990) thesis as well as the findings of other researchers (Ahmed, 1987; Yibeltal, 1994; Muluneh, 1994; Tadesse, 1989) which suggest that population growth is a determinant factor for land use intensification and growth of output in peasant agricultural economy. There are three most crucial ways of making intensive utilization of the available land. These are:

(1) Increasing the intensity of cropping, i.e.; cultivating the land more frequently within a given production year. The intensity of cropping in the area (measured in terms of the percentage proportion of gross cropped area to net cropped area) was found out to be 163.1 percent. The relatively high level of cropping intensity in the study area was achieved by increasing the area under double and multiple cropping practices (realized by rainfed farming with supplementary irrigation) and by reducing the frequency and length of the fallow period and of the proportion of land under current fallow (see section 5.1.3.1).

(2) cultivation of more labour intensive and high yield crops such as cotton, enset sweet potato etc. The cropping strategy in the area is generally marked by diversification. More than twenty different food and cash crops (including cereals, pulses, root crops, fruits and vegetables and cotton) were grown by the respondents, indicating the high degree of crop diversification and adaptations to changing environmental and demographic conditions. The majority of the farmers reported not less than ten types of crops. The existing small holdings seem not to allow the average farmer to produce all crop species. However, in order to economize the limited space the local farmers have created and/or adopted traditional agroforestry practices in which annual and root crops are intentionally intercropped with farm trees and fruit crops. In general, high degree of crop diversification under the existing traditional agroforestry land use systems has served to smooth out the flow of food and cash income during the year (Section 5.1.3.3).

(3) Intensive cultivation of the land per cropping season through greater application of labour inputs per unit area of land. In contrast with other rural areas (for instance, Shashemene and Dale Weredas, Yibeltal, 1994), it was found out that agricultural production was constrained by seasonal labour shortages as a significant number of the farmers (on average 56-7 percent) have perceived family labour shortage to undertake the various farm operations. With increasing intensity of cropping induced by demographic and land pressure more labour inputs have been employed for land preparation, intensive weeding, harvesting and threshing per cropping season so that the level of land productivity would remain at least constant. In general, the level of labour utilization in the area has kept pace with the increase in the supply of labour (section 5.1.3.2.). This corroborates the discussion present in Dejene (1996:44) which argued that "... peasant agriculture has the capacity to absorb a substantial proportion of additional labour supplies. In other words, it can be hypothesized that peasant agriculture sustains itself, among other things, by generating additional employment opportunities given conducive physical, economic and social environment."

It was also argued that the availability of household land, family labour and capital significantly influence the capacity of peasants to produce food grains and cash crops required for the sustenance of the household farming economy. Nevertheless, not all households in the area have had a fair balance between the key factors of production. The discussions under section 5.1.4 displayed that local land transaction arrangements were devised as coping strategies against the problem of the mismatch between production factors. The ever-increasing population pressure in the area has resulted in the commercialization of the major productive factors which, in turn, allowed those farmers with insufficient PA allocated crop fields to supplement and ease pressure on their own land. It was empirically observed that farm oxen ownership and availability of active male worker significantly determine the propensity of farmers either to give or to take land on the basis of land-leasing and/or share cropping tenancy. This substantiates the conclusion of Ege (1994:174) which states farmer-to-farmer land transfer arrangements "... can be understood basically as practices to overcome the dislocation of the production factors."

The thesis has also asserted that the peasant model which views peasants' livelihoods as being entirely contingent upon access to land is no longer adequate to describe the real picture of the rural farming economy. In order to enhance the understanding of how peasants struggle to bridge food supply-demand gap, the thesis has discussed the effects of growing population pressure and land shortage on patterns and levels of peasant participation in rural non-farming activities as well as temporary and permanent out-migratory processes. Rural non-farm activities in the area have provided seasonal and part-time employment opportunities for about 65 percent of the sampled households. They have also provided a substantial amount of cash income for the practitioners. The mean annual cash income derived from non-farm activities amounted to about Birr 617.65 per household. The large majority of the farmers (about 80 percent) have utilized the non-farm income for purchase of food grains, suggesting the vitality of local markets for the proper functioning of the domestic food economy. The major reasons for engagement in non-farm activities were observed to be, in order of importance, food insecurity due to family size increment, household land shortage, increasing demand for cash due to large family size, inheritance from family, and learning the skill from friends and neighbors. The most important conclusion that can be drawn from these findings is that while high agricultural population density and land shortage necessitate intensification of agricultural systems, they also stimulate the expansion and development of non-farm activities in rural areas for they limit the number of households which are able to sustain from agricultural output alone (section 5.2.1).

It was also discussed (under section 5.2.2) that a little over 11 percent of the randomly selected household heads have involved in temporary out-migration. Amongst the total working age population, nearly 17 percent were away from their permanent residence for less than six months during the 1997 production year. Moreover, around 20 percent of the interviewed household heads have claimed to have at least one family member who has been permanently away from home. Of the total working age population, close to 9 percent were permanent out-migrants. The first and strongest reasons for temporary and permanent out-migration were indicated to be land shortage (for 23.9 percent the respondents), food supply-demand gap (22.6 percent), marriage and family related factors (19.7 percent), lack of seasonal

and part-time labour markets within the residence home PA (18.3 percent), and fast population growth (15.5 percent). Thus for most of the respondents temporary and permanent labour out-migrations are responses to concerns about livelihood stress instigated partly by population pressure. The most important issue that arises out of the research is that labour out-migration from the study area appears to be a "safety value" and a rational means through which peasant households sustain their rural livelihoods, spread their risks and ensure some cash remittances, with which to purchase food, thereby making up the deficit between food produced and consumed in the family in times of harvest failure.

6.2. Policy Implication

The research findings discussed so far imply some useful insights into the formulation and implementation of rural development policies and strategies that tackle the real problems and constraints identified by the local farming community. The following sections pick up some of the general themes which call for government and NGOs intervention for promoting sustainable rural livelihoods, and suggest some specific steps which may be taken to encourage more effective pressure responses on the part of the local farmers.

The Need for Agricultural and Non-Agricultural Diversification and Intensification

A closer examination of the multiple responses of farmers to population pressure and land shortage in the study area directs our attention to a wider context for economic policy and rural livelihoods. What might be important for sustainable rural livelihoods under demographic and land pressure is not just agricultural or even rural policy, but a whole range of cross-sectoral and inter-sectoral policies that provide the framework within which rural people's sustenance are embedded.

As we have seen, making a living exclusively from the land in the face of growing population and scarcity of land is rare and a great challenge for farmers in southwest of Lake Chamo. Rural people in the study site are not only farmers, but they are also casual farm

laborers, crafts-people, traders and so on. In order to strengthen the positive farm-non-farm responses of farmers in the area, there is therefore a pressing need for government and NGOs support, particularly in the domains of agricultural and non-agricultural diversification and intensification through the following ways:

(1) Effective exploitation of the available surface water potential for small-and medium-scale irrigation development.

As has been discussed in Chapter Five, in their efforts to make agricultural intensification through double and multiple cropping under rainfed farming with supplementary irrigation from Sego and Wezeka rivers, farmers in the area have encountered a serious problem of frequent break of the locally-constructed diversion weirs. Thus, there is a need to provide technical, material and financial supports on the part of the central/regional government and concerned NGOs so as to construct long-lasting dams and reservoirs across Sego, Wezeka and other perennial rivers. The positive results that could arise out of this investment include increased double and multiple cropping thereby reducing the magnitude of household land shortage, increased potential for food and cash crop production thereby enhancing the food and cash security of farmers, and increased supply of agricultural by-products for livestock fodder thereby reducing the degree of overgrazing and over-browsing.

(2) Promotion of agricultural research and on-farm trial on improved seeds

It is shown in Chapter Five that the shortage of early-maturing maize and sorghum seeds is one of the constraints for increasing land use intensification in the study area. Because local variety seeds of maize and sorghum stay on the field for longer months which may not permit sufficient time for cultivating the second crop on the same field within the production year. It is thus necessary on the part of the Institute of Agricultural Research of the MOA to undertake crop research and on-farm trial to develop early maturing and high-yielding crop varieties which are adaptable and responsive to the local agro-ecosystem and increasing population.

(3) Promotion of peasant awareness about extension inputs and appropriate technologies

The cost-effectiveness and appropriateness of chemical fertilizers and other extension inputs were matters of some debate among farmers in the area, because they have neither deep experience of them nor any effective and affordable access to them. Farmers should therefore be oriented as to the pros and cons of industrial inputs, pesticides, insecticides and herbicides so that they would make their own production-decision through use or non-use of extension inputs. The roles of agricultural development agents (DAs) in this regard are of vitally significant.

(4) Provision of the required veterinary medicines and vaccines and introduction of improved livestock breeding herds.

The frequent outbreak of animal diseases (such as *Witsilie, Dombesa, Sombe*, etc.) in the study area has created a severe problem of farm oxen and other breeding animals and poor distribution of them locally. Since the livestock sub-sector plays a pivotal role in the people's livelihoods and sustenance of the cropping sub-system, timely provision of vaccines and veterinary medicines and introduction of cross-breed animals with superior performance and disease-tolerance should be given considerable attention.

(5) Construction of all-weather road networks, and promotion of vocational training centers, formal and informal credit institutions for diversification of non-farm activities and migration

Farmers in the study area are favorably disposed towards crop and livestock trade activities, and trade is found to be the most profitable non-farm activity in the area. However, the current lack of effective road transport networks in the study area , as discussed in Chapters Three and Five, has limited the opportunities for new entrants into crop and livestock

marketing and trade activities. Therefore, policies to support and strengthen flexible marketing should take not only the removal of movement restrictions, price controls and abandonment of a central marketing systems (as it is the case today), but also investments in such sectors as transport infrastructure, credit services and meaningful support for new market entrants,millers and traders. Provision of marketing education to promote awareness of cash saving culture and food storage for emergency cases and use during old-age is of equally necessary. This may, in the long-run, limit the number of households in the study area who want to bear large number of children and family size for old-age security consideration.

As we have seen, handicraft activities in the study area typically predominate the structure of non-farm activities in terms of employment generation, indicating the viable potential in reducing the existing heavy population pressure on land resources. In order to realize this full potential role of handicraft activities, a combination of appropriate training on skill-development, targeted credit and other institutional supports is highly needed, and this should be an integral part of rural development policy.

The significance of cash and non-cash remittances from migrant relatives to patterns of investment in the crop-livestock economy and, more particularly, in the livelihoods of the local people should not be underestimated. Rural villages in the study area and the neighboring small urban centers and rural areas are intimately linked through migrant workers and flow of people, money and resources back and forth. It should be realized that policies that affect off-farm employment in the towns and in the Selle and Aelgo commercial state farms also significantly affect livelihoods in the study villages. Therefore, economic diversification necessarily requires policies that traverse the rural-urban divide and encourage the expansion and development of formal and informal activities both in towns and rural areas.

The Need for Strengthening Tenure Security and Natural Resource Policy

Land and natural resources are basic necessities for sustainable rural livelihoods, yet policies in the past, or even recently, have limited people's access to and control over them. As

has been discussed in Chapter Three, highly inequitable land distribution , inadequate tenure security and inappropriate natural resource rules and regulations have combined to make farmers indifferent to invest the necessary labor and capital in land quality improvement and sustainable resource use and conservation. Thus, in order to encourage farmers to pursue sustainable natural resources use and management strategies and ameliorate their livelihoods, they should be left not only with the right of possession but also the right of ownership over their land resources on which they are making a living. Moreover, the cardinal roles local land contractual arrangements play in mitigating the mismatch between key factors of production and in improving rural people's livelihoods should be seriously taken into account in designing land and natural resource policies. Thus land policy that allows and encourages landless and near-landless peasant households to obtain access to agricultural land wherever, whenever and however possible should be designed and operated.

Fair fragmentation of agricultural land is something which farmers in the study area aspire to, because dispersed plots have served to avoid complete crop failure, to diversify crop production and smooth-out the flow of cash and food during the year. Therefore, land redistribution policies should allow farmers to have their crop fields dispersed over the existing agro-ecological niches.

It may now be high time to test other policy options for sustainable natural resource management. If natural resource policies are to be acted upon, they should be credible, and the local people should believe in them. If problems of natural resource depletion are to be resolved, policy solutions should emerge from the local -level institutions and leadership. The most viable policy option in this regard is perhaps to consult local -level institutions during the formulation, implementation, monitoring and evaluation phases of rules, regulations and policies over natural resource management. Such a decentralized approach to land and natural resource management encourages local responses to local problems and specificity, while at the same time provide guidelines on the process and indications as to appropriate limits and standards for resource use.

The Need for Family Planning Education and Implementation of the National Population Policy

In order to maintain the balance between population and the natural resource base in the study area, it may be necessary to systematically implement the national population policy. But one has to be very cautious not to overemphasize this since population growth is not necessarily a problem; it mainly becomes a problem when it interacts with environmental degradation, declining productivity of land and static land policy. However, population control in the study area could be one policy option, but success in this regard takes much longer time since a significant majority of farmers in the area generally consider large number of children and family size as a long-term security and survival strategy in the face of limited access to and control over productive and adequate land. Effective fertility regulation among the local people may be possible, in the long-run, through improvement of their awareness and quality of life by expansion of socio-economic services such as primary health care, education and training on family planning and birth control methods and promotion of cash and asset saving culture for old-age security.

The most plausible opportunities for balancing resources with population, in the short- and medium-term, may include afforestation and reforestation programs with community participation, development of family woodlot schemes and alternative fuel sources, provision of community education and training on environmental conservation and management to promote their awareness and ownership feeling, and strengthening the existing traditional agroforestry practices through meaningful government and NGOs support to farmers like seedlings of indigenous and exotic species.

In general, it is safe to argue that rural development policies and strategies should be formulated on account of a continuous process of learning from the past experiences, creative potentials, responses and aspirations of the rural people. For this reason, it is vital that planning and policy-making is viewed as a co-learning process (Scoones et. al., 1996) whereby different views and multiple livelihoods are heard and acknowledged. Therefore, participatory

approaches such as PRA/RRA offer some useful opportunities for exchange of ideas and learning from and with local people and to integrate indigenous knowledge and perspectives into the formulation, implementation, monitoring and evaluation of rural development policies.

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DECLARATION

I, the undersigned, declare that this thesis is my original work and that all sources of materials used for the thesis have been dully acknowledged.

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