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**WOMEN AND ENVIRONMENTAL CONSERVATION IN  
YATTA DIVISION, MACHIAKOS DISTRICT:**

**A STUDY OF SOCIO-ECONOMIC STATUS OF WOMEN  
AS A FACTOR IN PARTICIPATION**

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A Thesis submitted to the Department of Sociology, University of Nairobi, in partial fulfillment  
of the requirement for the award of a Masters of Arts degree in sociology



## DECLARATION

UNIVERSITY OF NAIROBI

This Thesis is my original work and has not been presented for a degree in any other university.

  
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KIOKO, M.M

This Thesis has been submitted for examination with my approval as University supervisor

 6/2/98  
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DR. E.H.N NJERU

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## DEDICATION

This work is dedicated to all those women of the world that suffer in their endeavor and silently carry their burdens and at long last emerge victorious. Top of the list is my dear Mother.

## ACKNOWLEDGEMENTS

It is with a lot of gratitude that I acknowledge Dr. Njeru of Sociology department, Nairobi University for his guidance, criticisms and comments on this work, without his assistance this work would not have been completed. I am grateful to Mr. Fred Ndege for his invaluable guidance and willingness to accept to read the work during his holidays. Not forgetting Prof. Mbula Bahemuka for the words of wisdom and encouragement at the most critical times of this work. May God truly reward you all abundantly.

I thank Egerton University for granting the resources that enabled me to go through my studies, without their financial support this work would not have been possible.

Special thanks go to all those who helped in carrying out the research, Alphonse Kisilu, Veronica Wambua, Charles Mbithi, Mary Wavinya and all the people whom we interviewed for availing their time and cooperation, they formed an integral part of this research and without them it would not have been successful.

I owe Philip K. Rono most sincere gratitude for the invaluable assistance he gave when everything looked completely grim. Special thanks go to you.

Finally, to my dear family without whose encouragement I would not have managed, my dear husband Kioko for his patience and all that he did in terms of physical and moral support, God bless you all in His own special ways.

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## ABSTRACT

The study highlights the relationship between women's socio-economic status and their participation in environmental conservation in Yatta division in the arid and semi-arid part of Kenya. The major objective was to examine women's status (education, income, autonomy, participation in women groups and family size) in relation to their perception and participation in environmental conservation.

Multi-stage sampling was done and 150 respondents interviewed. The variables levels of education, income, autonomy, group participation and family size were taken as independent variables while environmental conservation was a dependent variable, treated as an orderable discrete variable on a scale of 0 - 6. The measures of conservation taken into account were terracing, mulching, planting trees/conserving the indigenous trees, constructing water tanks, crop rotation/inter-cropping and use of energy conserving "jikos".

Levels of income and education were the most critical factors. Autonomy, location of respondent, number of children, group participation, income and education explained 69.2% of the change in environmental conservation.

The study recommends improved socio-economic status especially increased income and education, specifically, environmental education to facilitate higher levels of women participation in environmental conservation.

## CHAPTER ONE

### INTRODUCTION

#### 1.0 BACKGROUND

Widespread public awareness of environmental issues goes way back to early times. However, the beginnings of the modern Environmental Movement can be dated from the first Earth Day in April of 1970, which was prompted by the 1969 Santa Barbara oil spill. This awareness has intensified and spread to the Third World and it is now appreciated that massive over-exploitation of natural resources has resulted in the disruption of crucial ecological processes. In Kenya, resource conservation is an area of major concern for the government and receives considerable emphasis in the development plans.

Environment, according to the environmental science dictionary, is "the combination of external conditions that influence the life of individual organisms" (1992:pp 205). The external environment comprises the non-living, abiotic components (physical and chemical) and the inter-relationships with other living, biotic components.

Environmental degradation has been accelerated by increases in population, industrialization, agricultural mechanization and inappropriate land use policies. As the population increases the demands made on available resources also increase. There is extensive clearing of land for agriculture and settlement. Traditional land and resource

management systems are no longer able to adapt fast enough to prevent over-use of the available resources. Rapid population growth has led to more people moving from rural areas because of shortage of land, to the urban areas, swelling the urban population to record proportions and overwhelming the existing services and infrastructure. This also puts pressure on the available land in urban areas and this leads to a deterioration of the environment, (Waters & Odero, 1986:199). Apart from population spilling to urban areas there has also been spill-over to the ecologically fragile marginal areas.

There have been reports of growing global environment crises of the green-house effects, polluted lakes, rivers and seas all these leading to deterioration in the quality of life and threatening actual human health and existence. Increasing agricultural technology is causing water and soil pollution making it dangerous for human consumption, (World Report, 1992).

While all these forms of environmental degradation have been taking place, women have been placed at the centre of the controversy, whether they are to blame for environmental degradation or they are victims of environmental degradation, especially in the Third World, (see Dankelman & Davidson, 1988). Women have been accused of plundering the environment to meet individual and household needs without concern for the long-term environmental consequences of their daily activities. However this may not necessarily be the case since women as major users of the natural resources are well

aware of the need to limit exploitation to allow regeneration. Their close link with the environment helps explain their need to conserve it. Women in their responsibility for household subsistence spend much of their time collecting combustible materials for preparation of food and the loss of forest habitats that provided supplementary foods, medicinal plants and raw materials for handicrafts affect them adversely.

In some instances, when environmental conservation has been practiced it has meant additional workload for women. Women's efforts to conserve the environment is evident in the numerous environmental projects that they have started, for example India's Chipko movement started in 1973, Kenya's Green Belt movement and others in countries like Brazil, Nepal, Philippines, Zimbabwe (Shiva, 1987).

The World Development report, (1992) argued that continued and accelerated economic and human development is sustainable with improved environmental conditions. Sustainable development is a form of environmental management that uses natural resources to ensure continued productivity. Warren (1992) adds that such development meets the needs of the present without compromising the ability of future generations to meet their own needs. It is the maximization of the net benefits of economic development, subject to maintaining the services and quality of natural resources overtime. In summary it involves bringing people into harmony with the environmental systems that support them. The World Development report also cites



female education and participation as major policies required for achieving sustainable development. For long-term improvement in living conditions, natural resources like soil, water, vegetation, animals and the atmosphere have to be managed for sustainable development. The report cites women as among the most important actors in bringing about that sustainability since they have considerable knowledge on the use of natural resources in an environmentally safe way. Such knowledge would be used by development agencies to improve project effectiveness. Evidence indicates that better extension advice for women farmers in the use of chemicals can both raise productivity and reduce environmental damage (see op.cit, 1988). Unfortunately most policies continue to overlook or ignore this diversity of knowledge.

The problems of environmental degradation in Kenya are intertwined with the problems of women (Shanyisa, 1992). The first casualties of environmental degradation are women whose tasks involve them in continuous interaction with the natural resources. The main reason is that the nature of division of labour in many societies is largely based on sex, and women activities have brought them into direct contact with the environment. Therefore in order to bring environmental conservation which is sustainable there must be promotion and provision of environmentally sound technologies which have been designed and improved in consultation with women.

Women can be encouraged in environmental management because they are affected as farmers when they see the land eroding and hence yields decreasing, water-holes drying up and forcing them to move further away and spend much more time in search of fuel and water, (Sontheimer 1991).

## 1.1 PROBLEM STATEMENT

The principal victims of environmental degradation are the most underprivileged people and the majority of these are women (Senghor, 1985). Women are the first and hardest hit by environmental mismanagement, yet they are in most cases peripheral to the decisions on environmental policies.

Rural women actively interact and utilize the environment as they go about to meet the basic needs of the family. In the course of her duties as an agriculturist undertaking food production, home-economist undertaking such domestic chores, as cleaning and washing, socializing children and providing entertainment for the children and treating illnesses at the family level, the rural woman comes into constant interaction with the environment.

Rocheleau (1985:8) states that most rural women have the least formal power and are the poorest and in most cases the most illiterate. They are thus at times forced

by complex cycles of poverty into ways of living which induce further destruction of the environment. Women burn charcoal for commercial purposes to supplement meager incomes, especially in areas of low agricultural production, which is the main source of income for most rural population in developing countries. Furthermore because of the fast growing population women are forced to clear forests for planting to meet increased demand for food. As the soils become exhausted, and yields fall, women are pushed into clearing more forest area to grow food crops and get better yields. Thus as women try to solve one problem they create another.

Presently there is much pressure on governments to recognize the vital role played by women and advance the socio-economic status of women. Since there is evidence that women have very strong links with the environment and that they are managers and often preservers of natural resources, (see Agarwal, 1981, 1986), any programme aimed at bettering the environment should then involve women as participants. In order for women to undertake such an important role in sustaining environment there is need to assess some of the factors which influence women's actions in relation to environmental management.

Will an advancement in the socio-economic status of women have any significant impact on how they manage the environment?

- What is the relationship between socio-economic status of women and environmental management?

These socio-economic factors include, levels of income, education, influence in decision-making, family sizes and involvement in women group activities.

- How does addressing basic socio-economic status of women such as improved access to education, income, right to decision-making, reduced family size lead to environmental management to support sustainable development?

## 1.2 OBJECTIVES OF THE STUDY

The broad objective is to study the nature of women's involvement in environmental conservation with regard to their socio-economic and other personal characteristics which influences their perception of environmental issues as well as their participation in environmental conservation.

The specific objectives are:

- (i) To examine the impact of:
  - (a) income level
  - (b) education level

(c) autonomy

(d) family size and

(e) group participation

on the way women perceive and participate in environmental conservation.

(ii) To investigate whether the introduction of a furrow in one area led to differences in women's participation in environmental conservation.

### **1.3 JUSTIFICATION OF STUDY**

The study deals with women since they relate directly and are in constant interaction with the environment in their daily activities of food production, collection of firewood and in search for water. In their reproductive role rural women depend on the resources of wood, water, and soil for daily survival, and as such are often the primary users of the environment. This study therefore addressed more seriously the role played by socio-economic status of women in environmental conservation with a view to developing solutions to the pressing question of increased environmental degradation.

It has been postulated that women are a powerful force for change and have continually organized themselves in many regions of the world in order to initiate environmental activism for example the Chipko movement in India, this is also true for

Kenya as a country. Therefore it becomes crucial to understand how useful women collectively working in groups have been in bringing about environmental conservation. At the same time there have been many studies looking at women and environment, but considering women generally as an exclusive group with special relations to environment. However, many studies have tended to overlook differences amongst women themselves related to age, kinship and socio-economic status which may influence perceptions about environment. It is important to bring to light whether such differences impact differently on environmental conservation.

Kenya has been committed to environmental issues and was among those countries which attended the Earth Summit held in Rio de Janeiro, Brazil in June 1992 which in its declaration proclaimed that women have a vital role in environmental management and development and therefore their full participation is essential in the achievement of sustainable development. Therefore there is need for useful data based on these foundations so as to translate them into sound policies, this study attempts to provide such information.

Studies on how improvement of women status has been effective in many other fields have been extensively undertaken, relationships between socio-economic status of women and population, health of children, employment, education of children have been

widely studied, (see Blumberg, 1989, Brown, 1985, Le Vine, 1987, King, 1990). However studies on the relationship of women status and the environment have not been extensively undertaken. It is important to find out whether socio-economic status of women has impact on environmental conservation.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.0 OVERVIEW

Virtually all over the world human societies are structured along various lines. Among the most fundamental are the lines of gender. Harding (1983), Jaggar (1983) emphasize that gender structures and divides society more deeply and fundamentally than does race or class. One of gender's manifestations as an organizing principle in society is through the sexual division of labour, this form of differentiation is as a combined effort to meet human survival needs. Thus gender can be expected to be a powerful influence on cultural norms of every kind, and certainly those concerning environment also.

Dichotomization between male and female has been extended to Man and Environment. Prior to the sixteenth century, there had existed a reluctance to violate nature, the earth was seen as the generative "mother". Such symbolism was found in the African culture, among the kikuyu, (Kenyatta, 1953:21) says that the earth is considered the most sacred thing above all that live in or on it... The soil is especially honored and supplies people with their material needs of life through which spiritual and mental contentment is achieved. However Merchant (1980:170-189) argues that in recent times



this has failed and instead of earth being seen as a nurturing mother, the dominant imagery has become that of earth as a woman in need of being mastered. From these, there appears to be a masculine mode of aggression against nature and domination over women. And it has in recent years been suggested that important connections exist between the oppression of women by men on one hand and the way in which man dominates and misuses the environment on the other (Warren, 1987).

Muntemba (1989) explains that it was not until the processes of desertification were brought to the global attention and the most recent and dramatic food crises publicized that women's economic activities began to be appreciated within the context of ecological and environmental sustainability. The broad framework in which questions of women and environment can be appreciated include mechanisms for exploiting and modifying the environment on the one hand and the control and access of natural resources on the other. The natural resources include the key life support systems of land, water, flora and fauna.

It is important that women become involved in the interaction between mankind and nature. Held (1988) suggests that if the patriarchal structure that divides society into masculine and feminine could be transferred into a cooperative arrangement, then conditions would not only be far more sustainable for all human beings, but it can

further be expected that the relation between humankind and its environment would bring with it an understanding of how to "nurture" the environment rather than "rape" it.

## **2.1 WOMEN, POVERTY AND ENVIRONMENTAL DEGRADATION**

Degradation of natural resources by deforestation, desertification, erosion, salination and other harmful processes contribute to low productivity, poverty and rural emigration and aggravates the serious problems typical of underdevelopment. These environmental problems affect particularly the poorest groups, who reside in the rural areas and majority of these are women. Warren (1992) argues that it seems that the least powerful elements of society suffer first from loss of access to natural resources. Buvinic and Lycette (1988) also support that poverty has a gender bias. In their study they concluded that the number of poor households headed by women have expanded rapidly in rural Africa and in the urban slums of Latin America. These households were found on average to be poorer than other poor households.

When confronted with environmental degradation that reduces the availability of fuelwood, water and the productivity of the land which produces their food, poor women often have no other recourse but to work harder in an effort just to stay even. Thus in many countries where deforestation has led to shortages of firewood, women

have been forced to go further afield and to expend more time in collecting fuelwood.

The problems of women being expected to provide food for the entire family without help from the man, are exacerbated by the scarcity of fuel which means that women have also to find money to buy firewood. A study by Palmer (1980) in the Mwea irrigation scheme confirms the problems of women having no money to buy sufficient fuel. Tinker (1980) noted that insufficient fuel means eating uncooked food, getting cold and living in the dark. As the fuel costs rise or traditional fuel sources disappear most households will seek wood, animal waste, leaves or any other energy sources wherever they can, ignoring property rights as well as national concerns for forest reserves on erosion control. Jacobson (1992) says that for those poor women, healthy forests are a savings bank from which they draw the interest, in the form of fuel, food, fodder and countless other goods that their families depend on for survival. As these lands become debased, the principal in the "account" declines and women are forced to "borrow" against the future. For example, they compensate for the scarcity of fuel by, among other things cutting down live trees instead of dead or dry ones and cooking fewer meals. Since women are responsible for feeding their families they are forced to work longer hours to make ends meet, a situation that further compromises their health and well-being and that of their children as well.

Khumar and Hotchkiss (1988) have shown that because of the roles played by women, serious adverse social and economic consequences such as peak-season shortages of labour or decline in child nutrition maybe a direct result of deforestation. Shortages of labour are due to the much time spent in search of fuelwood. The decline in child nutrition comes about because of shortages of fuelwood, which force mothers to serve half-cooked meals.

Poverty and environment destruction are becoming inseparable because the poorest people who have the least access to investment capital and technology (largely women) occupy the lands that need the most infrastructure, management and external inputs if their utilization is not to result in land degradation and environmental destruction. In many arid and semi-arid areas, the pressures of wood gathering, inappropriate farming techniques, population growth and over-grazing contribute to the spread of desert-like conditions that further decrease the productivity of marginal lands and make the rural poor even more susceptible to drought and other natural disasters. Leonard (1989) points out three major demographic factors that interact to place long-term environmental protection concerns in conflict with the short-term survival strategies of the poor. The first is rapid population growth, secondly agriculture modernization in fertile areas and lastly land consolidation and prevailing inequalities in

land tenure. These factors have forced many people to migrate and this process causes environmental degradation and intractable poverty to become more and more closely intertwined in particular geographic areas with fragile environmental conditions.

Hardships and periodic famines beset the role of women in the arid and semi-arid regions. Stryker (1989:90) states that the survival of women in these areas depends on the allocation of food within the household, and this responsibility falls upon women. Therefore women who have external sources of income are better off and need not destroy the environment for their survival. Having independent income also allows women to contribute to the household budget and enhances their decision making power and this affects their status within the family.

The world's poorest are thus increasingly clustered in remote and ecologically poor rural areas. Therefore if social conditions are generally on the decline, then environment will also face a gradual deterioration. Mabogunje and Filani (1975) in their study concluded that poverty of rural areas is underlined by the lack of diversity in their economy, inadequacy of their infrastructural facilities and the insufficient amenities, all of which have been as a result of the process of development, which also affects the environment. They cite provision of essential facilities like education, health centres, piped water and other amenities as one way of ensuring improvement of environmental

quality. The environmental challenge facing Africa can be summed up in three words: "Pollution of Poverty." (Otieno as in IDS occasional paper No.15).

## **2.2 EDUCATION OF WOMEN AND ENVIRONMENT**

Education is basic for development and societies' investment in education, at every level, pay off in higher productivity and greater wealth. One of the prime functions of education is to prepare people for opportunities, responsibilities and experiences they will face through their lives and some of the most important responsibilities relate to the way they interact with the environment. Therefore for education to fulfil its complete social role, it must prepare the people, in this case women, as environmental managers. It has been articulated that ensuring women's access to quality education and training is necessary as the best single investment in achieving women's participation in environmental management (Mongella, 1995).

Illiteracy rates are disproportionately high among women in almost all regions of the world - with the highest being in sub-sahara Africa and parts of Asia, where over 70% of women aged over 25 years are illiterate (Blumberg, 1989). Overall women who are less educated have less access to education, economic and political power than men. In this instance they may not be able to respond to the ravages of changing economic

and environmental conditions.

Anderson (1986) states that because women and girls are active producers in the economies of many countries, an investment in their education may result in significant returns in areas otherwise exerting a negative effect on overall economic growth. Recent findings leave little doubt that women's education does have powerful social and economic impact. These studies have largely focused on correlations between women education and employment, autonomy, decreased fertility, increased child health, decreased child mortality and improved children's education (see Blumberg, 1989, Brown & Curlin, 1985, Irizarry, 1980, Radwan & Wangwe, 1986).

Although the quality of education is not uniform across or within countries, it can be appreciated that basic education instills literacy, numeracy, skills to perform standard tasks, enhances the ability to perceive and process new information, evaluate and adjust to changes and also reduces subjective uncertainty. Floro and Wolf (1990) emphasize that besides literacy and numeracy being critical in having "informed" members of society, education also leads to access to information and hence may have threshold effects in unlocking innovative skills in women which could largely contribute to environmental management. Women's education is vital for the survival of the families, communities and indeed the environment which needs to be valued, protected and

developed in parallel with the acquisition of new knowledge and skills from which women are largely excluded (Dankelman & Davidson, 1988).

Education of women is a major determinant of women's status: It enhances their decision-making power and thus affects their status within the family and plays a major role in advancing the socio-economic status of women.

The 1992 Earth Summit resolved, in Chapter 36 of Agenda 21: "Both formal and non-formal education are indispensable to changing people's attitudes so that they have the capacity to assess and address their sustainable development concerns. It is also critical for achieving environmental and ethical awareness, values and attitudes, skills and behaviour.....". (Our Planet, Vol. 6, No.5). These discussions on the importance of education also apply to women, the important role that education of women plays in the participation of women in environmental management.

### **2.3 WOMEN, AUTONOMY AND ENVIRONMENT**

According to a recent World Bank report (1992) development is about improving the well being of people. It cites raising living standards and improving education, health and equality of opportunity as essential components of development. This implies that with development women's opportunity to participate in decision-making about the



environment improves. However the relationship between environment and development has been under discussion since the beginning of the 1970's whether the two are complementing or conflicting concepts. Development with its advance of science and technology has had profound effect on the environment. Technological choices have been directed only towards maximization of profits and man has had a purely utilitarian concept of the environment geared towards exploitation to achieve his immediate needs. Therefore the environment has been sacrificed to the short-term advantages of production.

Although women have been identified as important resource managers, lack of property rights and political clout have made them to be traditionally bypassed when training, technology and access to technical assistance are being passed around (Bellamy, 1995). There have been numerous calls for the decision-making process to include women at all levels and the emphasis on ensuring the full involvement of women in decision-making and in implementing environmental management activities has been outlined in many policies by governments, international and national organizations.

Inequalities existing between men and women in power sharing and decision-making have been highlighted even in the earlier societies. However the decomposition

of many traditional communities often entails a loss of status for women. Kanogo (1992) clearly explains how the pre-colonial situation was like in Kenya. There was a system of rational fallow shifting cultivation that allowed old farmlands to lie fallow every four to five seasons. The farmers, who were mainly women, had mastered a seasonal calendar obtained from years of trial and error. The traditional shifting cultivation allowed for the land left fallow to regain minerals and therefore allow for better harvests. The nomadic pastoralism also constantly burned the fields and therefore eliminated pests and the ashes added minerals into the soil. The kind of farming previously practiced was mainly intercropping which allowed for different crops to extract from the soils different nutrients. The women had reached a considerable understanding of the total ecology of the soils, climate, animals, plants and their interrelationships. This simple form of agriculture that the European initially considered primitive was based on correct evaluations of the land's potential. The colonialists upset this structure and ignored this aspect of women's right to decision-making and women's knowledge that played a crucial role in environmental management.

The entire basis of property ownership, that is, women's access to and control - or the right to use- over resources has been seen as a contributing factor to environmental degradation. Unless women are able to use their knowledge about the

environment, by having the chance to make decisions about the resources, they can not be able to improve or change their perspectives on the environment (op.cit, 1995). Throughout history the burden of environmental degradation has fallen more heavily on women, they provide essential connections between natural systems and homes, however they have not been allowed to have responsible roles in power structures, their knowledge and experience are conspicuously absent from environmental decision-making.

Autonomy of women and their ability to actualize their desires has been seen as a contributing factor to the persistence of unequal power relations. Evidence suggests that women lack sufficient decision making power to act according to their own priorities. Curlin and Brown (1985) pointed out how difficult fertility control is for women even when sources of contraception are available. Blumberg (1985) suggested that when rural women have more decision making control over their lives, then they are in a position to decide to control their own destiny. If women do not have the power to enact their decisions then they are unable to change their attitudes, and this includes attitudes about the environment too.

The empowerment of women in decision-making will help realize sustainable livelihood in terms of usage of the women's knowledge of the environment in their

reproductive role and, their application of this knowledge in conserving the environment. Women's empowerment will also realize sustainable livelihood on the basis of their entitlement to livelihood resources in the environment. Therefore the empowerment of women becomes a crucial element in trying to achieve sustainable environmental conservation.

#### **2.4 WOMEN, FAMILY SIZE AND ENVIRONMENT**

The world population is growing at a rate of three people per second - or a quarter million people per day (Sadik 1990:10). This is faster than at any time in history. The most rapid of this growth is in the developing countries. At the same time the increasing poverty in these countries has been attributed to this rapid growth leading to population explosion. Population growth is increasingly being seen as the major cause of environmental degradation on a global scale (Shiva, 1987).

Brown et al, (1987) Holdgate et al, (1982) say that the major natural resources are now being utilized faster than the rate of replenishment although the human species continues to be dependent for its well-being and very survival on a continuing exploitation of natural resources of the earth.

The forestry department of Food and Agriculture Organization (FAO, 1984)

found that 69 out of 95 developing countries studied faced fuelwood shortages. The research concluded that, "there is a disturbing degree of correspondence between the areas at risk of desertification and deficient in fuelwood and those areas having inadequate land resources to feed their population." Population in this instance is as contributing to a large extent to environmental degradation.

Many reasons have been cited for the persistent high population growth in developing. In rural Africa, children have high economic value. Rural women spend long hours farming and performing other household duties. Therefore children contribute to labour in cropping, livestock herding, fetching water and fuel and child rearing. As the environment is degraded and the frontier for fuel wood recedes and water and soil resources are depleted, the need for children to share the increased work burden intensifies (Mwaka, 1991). This seems to explain, in part, the situation why women continue to desire many children in the family.

If the number of people in the family or household level increases, this means more mouths to feed and cater for. If the increase is as a result of high fertility, then the problem is made worse because children will be consumers but not producers in the short run. When women are the sole producers and providers of food in the home, they have to spend more hours in the field and this strains them physically. And as the

environment becomes degraded and resources become scarcer the balance between what people need and what they can obtain shift, especially with high fertility, large families and high rates of population increase. This becomes clear from a section of UNFPA's 1990 report, which targets women as in need of family planning techniques, and as mainly responsible for degrading the environment. They are accused of destroying the forests in search of fuel, polluting and exhausting water sources in search of drinking water and exhausting the land resource by producing too many additional mouths to feed. Countries with higher population growth rates experience faster conversion of land to agricultural uses, putting additional pressure on land and natural habitat. Cones (1992) studying sub-Saharan Africa, argues that where population pressure was intense environmental degradation exacerbated and vast area vulnerable to ecological deterioration also had high populations. Previously shifting cultivation and grazing had been appropriate traditional responses to abundant land, scarce capital and limited technology. But with rapid population growth such traditional land management has been unable to adapt to prevent degradation of environment. Population growth has led people to cultivate land not previously used for farming which include the fragile semi-arid lands. The results have been overgrazing, deforestation, depletion of water resources and loss of natural habitat. High population growth rates in rural areas have

led to pressure on the land and forced many people, especially males, to migrate to the urban areas causing rapid urbanization which has led to problems linked to failure by authorities to provide effective planning frameworks and therefore degrading the urban environment (Ominde, 1979).

Women have been at the centre of the discussion on growth of population. Sharma (1994) states that often in the past women have been seen as statistics, if there are too few people then women had to be made to "contribute" by producing more; if there were too many people then women had to be instructed to stop. Women have become the focus of the debate on population which is intertwined with environment, therefore women should actually also be the focus of environmental conservation. However, there have been controversies on whether population growth is the core of environmental problems or the contribution of population is greatly exaggerated and the real culprits are new patterns of technology as perpetuated by capitalism. That industrialization, technological progress and the affluent lifestyle of the developed nations have precipitated the acceleration of environmental degradation can no longer be ignored. But instead, today, almost universally it is attributed to a single cause: population growth (Mies & Shiva, 1993). According to Callicott (1982), Passmore (1980) and Toynbee (1972), it has long been widely accepted - and essentially without

question- that humans have supreme authority over earth and all of it's other living things, both plants and animals. Thus the earth with it's flora and fauna are simply treated by society as human property, the state in turn establishes the extent of individual and corporate property rights regarding the natural resources under it's control. It has now become imperative that the human instinct for self preservation be aroused into action against the ever growing threat to the human species of environmental exhaustion.

## **2.5 WOMEN IN GROUP PARTICIPATION AND ENVIRONMENT**

Women in most parts of the developing world have organized themselves into groups in an attempt to open new avenues and overcome the constraints they face through collective actions. Most of these groups are based on self-help projects. For African women collective action is not new, women have always worked within the framework of mutual aid groups. Among the Akamba people these groups are referred to as "mwethya" and have been encouraged by the government as part of the "harambee" movement. Masinde (1991) argues that in fact the history of "harambee" is the history of how women initiatives and labour have made the movement such a great success. Studies by Mbithi and Rasmusson (1977), Ng'ethe (1978) and Mutiso (1975)



show that over 50% of the registered self-help projects in Kenya are initiated by women.

These women groups participate in projects to generate income, general development activities, financial, labour and social matters. These groups have become for many women a source of identity, pride, moral support and motivation in their endeavor to improve the quality of their lives and that of their families. Masinde (1987) argues that women groups could be seen as a clear manifestation of their determination to break from the inferiority complex traditionally associated with women.

The groups are most important for women during the peak agricultural periods when there are shortages of labour to carry out farm work especially in the arid and semi-arid areas. In these areas there is scarce rainfall and proper timing of agricultural activities is crucial because planting even a week late may result in a 30 - 40 per cent loss of potential harvest (Porter 1976:131), while a further delay would result in complete crop failure. Majority of these women groups engages in agricultural related activities.

Women have been active, creative, concerned and committed in movements for the conservation and protection of nature. Women activists have struggled against ecological destruction and deterioration, for example, Chipko movement against the

Himalayas chalk mining (Shiva, 1987), Whyl movement against atomic plants in Germany (Gladitz, 1976), Japanese women against food pollution by chemically stimulated, commercial agriculture and for self-reliant producer-consumer networks (Etkins, 1992) and activities of the Greenbelt movement in Kenya (Dankelman & Davidson, 1988). All these groups are examples of women showing their collective concern worldwide for the conservation of the environment.

In Kenya groups involved directly with environmental conservation are few, one of the most outstanding being the Greenbelt movement initiated in 1977. It may have not expanded to many rural areas where there is actual need for combating deforestation but it is a good example of women's initiatives to defend their environment. There have been clear guiding principles for policy: women are to be incorporated fully into development programme activities. This is to ensure that women benefit directly from environmental projects, and that projects are not undermined by the exclusion of women, who are the primary environmental resource management agents. Women's groups are thus often proposed as the appropriate vehicle for "community" environmental action, (Leach, 1995).

Besides environmental conservation orientated groups being few, the already existing women groups are faced by many internal and external constraints. The internal

constraints include heavy domestic and agricultural responsibilities resulting to poor attendance at group activities. Poor organization and weak leadership accompanied with leadership wrangles; failure to identify viable projects and charging of admission fee and fines. Studies by Masinde (1978) in Bungoma district show that every group charged an admission fee and that most of them expected members to make periodic cash contributions towards the group's welfare or other collective causes. This means that women who are already cash-poor may not meet the groups' demands and therefore drop out. The external constraints include lack of capital and politicization. Despite the many constraints faced by women groups it is clear that women groups act as a means for development of rural areas. Their achievements are evident in agriculture, trade and home management. Since women are overloaded with their tasks and duties, environmental degradation only aggravate their existing burdens, and therefore they need to come together to share the burdens.

## **2.6 SUMMARY OF LITERATURE REVIEW**

From the foregoing literature it is clear that women are in constant interaction with the environment, yet they are peripheral to the decisions undertaken concerning the environment. The broad framework in which questions of women and environment can

be appreciated includes mechanisms for exploiting and modifying the environment on the one hand, and the control and access of natural resources on the other. Studies have shown that unlike education, health, nutrition and life expectancy environment is sometimes damaged by development. A strong relationship between environmental quality and people's income levels exists. The studies also show that improvement in socio-economic status of women have led to lowered fertility, reduced child mortality, increased wage employment and improved education of children. It is also clear that environment is affected by

- (i) economic development
- (ii) population
- (iii) poverty

Data shows that as female education, health and employment improve, the status of women also improves, could such an improvement also lead to improved participation in environmental conservation?

## **2.7 THEORETICAL FRAMEWORK**

The study can be viewed from a broad perspective of the theory of social change

using the structural functionalist model and the conflict model. The inability of earlier structural functionalist, who viewed society as a system that persists by maintaining "equilibrium", was heavily criticized by many during the sixties. This prompted functional theorists to be more concerned with the problem of understanding social change. The Neo-functionalists understand social change as the maintenance of a dynamic rather than a static equilibrium between the components of the social system. The systems are "open" in varying degrees to strains from surrounding environments, both natural and social. There may be new ideas, values, technologies or changes in the physical environment, for example drought, pollution and depletion.

Change in the society can be caused by technology, ideas, values and ideologies. Values are assumptions about what is desirable and undesirable and ideology means a more or less organized combination of beliefs and values that serves to justify or legitimize forms of human action.

Technology can cause change in three different ways. First, innovation increases the alternatives available in society. It may bring previously unattainable ideals within the realm of possibility and it may alter the relative difficulty or ease of realizing differing values. Secondly technology alters interaction patterns among people and finally it creates new "problems" to be dealt with,(Lauer,1977:162).

Improved technology brings in better nutritional methods and hence improved health. It lowers child mortality, increases life expectancy and rises fertility levels. These have a major influence on family size and lead to population explosion and therefore increased pressure on the existing resources. The environment is continually degraded and in order to survive measures of control have to be undertaken. Improvement in technology allows man not to passively accept geographic factors but to increasingly try to gain control over his environment to meet his needs. New and improved farming methods also establish a new basis for stratification. A new class system based on industrial wealth and income emerges. In many cases women end up being lower in this class system with lower incomes. The rapid advance of technology develops a degree of complexity sufficient to have a division of essential tasks into a system of specialization. Positions within this specialization led to the rural women being much lower in terms of real income, education, power and access to more modern technology.

However, technology brings along with it environmental despoliation, pollution, depersonalization and a great deal of moral ambiguity. Existing roles which were clearly defined and set change and new roles have to be created. Such roles are ambiguous and put the society in disequilibrium. Environmental management as the resources become

scarce may become one such role. When it is realized that remedial environment measures are required in order to maintain the society's equilibrium, frantic efforts to mobilize rural populations toward this ultimately focus on women. While the decisions are being made however, women are not consulted. The issue of involving women in the decision-making is often overlooked since the women have lost their autonomy due to technological advancement and the social change that has taken place in society. They take up such roles because of their close interaction with the environment in their daily activities to sustain their families. Such a role did not exist previously because there was harmonious ecological balance. This kind of reaction is in line with Parsons (1966) structural differentiation model which typically produces "integrative problems", that may require the development of new mechanisms of integration, coordination and control. As such the social system becomes more effective in generating and distributing resources and enhancing it's survival. Cuber (1968:535) concludes that the crux of the problem lies in the inability to distinguish between so-called breakdown of a traditional role and appearance of a new role.

Social change caused by ideas and values may promote change in one place and time or act as a barrier to change at other. Ideas and values can cause change in at least three different ways. First it can legitimize a desired direction of change. Secondly it can

provide the basis for social solidarity necessary to promote change. A third way is ideas can promote change by highlighting contradictions and problems. Values can highlight areas of discrepancies between the ideal and actual, and create source of tension which often generates change. Education has been cited as a strong agent of social change that has lead to shifts in values and attitudes in the society.

From a Marxian perspective, capitalism destroys not savage disorder but a communist social order. Neo-Marxists, Wallerstein (1974) further extend that conflict does not arise only from the "relations of production" but another possible source is the contradictions between the small market system of local trade with the vast expansion of markets that attended the colonial expansion into the non-European world. The advent of colonialism brought along with it transformation through capitalism. Colonialism split the family economy into subsistence and monetary sub-sectors and completely transformed the role of women in that economy. This is in accordance with Hegels (1891) argument that the development of capitalism through private property first caused the subjugation of women through unequal or monogamous marriage, and then of the unpropertied to the propertied. With such division women lost their effective control of family economy, while at the same time continuing to supply the labour necessary for both sub-sectors. The effect was a general increase in the economic



burdens of women, a factor that tended to slow down rate of agricultural expansion. Cash crops were introduced, which were mainly tree crops, and took up land and therefore reduced the land available for the food crops. At the same time fast growing but less nutritious and more labour consuming crops were introduced. The men who sometimes had participated in traditional production process were forced to migrate from their homes in search of labour so as to enable them to pay the taxes imposed by the colonialists. This expanded the women labour hours and burden. At the same time there was a creation of two spheres that were now clearly defined. There was the male dominated sphere that was outside the home and men were now seen as sole "bread-winners", and the private sphere inside the home with women now being seen as "house-wives".

The colonial system also redefined the land tenure system. Individualization of land led to overgrazing because the people had to keep livestock that was an important aspect of their lives. They kept large herds of livestock for dowry payments, circumcision fees, religious rites or were accepted as a means of payments for fines. Restricted pasturing meant confining livestock on given area and this led to massive soil erosion. All these changes placed heavy strains on the land and therefore led to an ecological imbalance. The argument is that social change has brought along different

uses, perceptions and management of the environment. Women have been caught up in the centre of all these issues.

## 2.8 HYPOTHESES

The study attempts to test five hypotheses. In this section independent and dependent variables per hypothesis will be specified.

III: *There is a positive correlation between amount of income (Kshs. per month) of women and the efforts put into conservation of environment.*

The independent variable is "amount of income (kshs. per month) of women". In the study this is taken to mean the amount of income the woman earns per month measured in Kenya shillings. It can be in terms of regular employment, or casual employment or from the sale of farm produce.

The dependent variable is "conservation of environment" which will be taken as an orderable discrete variable on a scale in order of efforts put in the conservation of environment. The parameters to indicate environmental conservation include terracing of farms, crop rotation, mulching, building water tanks, kind of fuel used and type of "Jiko" used, plating of trees or conserving of the existing indigenous trees, methods of

cultivation and form of cultivation either by machinery, animals, or human labour.

H2: *There is a positive correlation between education level of women and the efforts put into conservation of environment.*

The independent variable is "education level" which refers to the number of years of schooling. In the study the hypothesis is tested to find out the influence of education on the awareness of conserving the environment. This variable is measured directly by referring to the level of education, whether it is up to primary level and beyond or below. It is by no means true that any kind of education is better than none, so education includes formal education, that is, school attendance; participation in seminars or workshops on agricultural practices or family health care programmes and other development related programmes. The dependent variable is the same as for H1.

H3: *There is a positive correlation between autonomy of women and the efforts put into conservation of environment.*

"Level of autonomy of women" is the independent variable while the dependent variable remains the same as for the other hypotheses. The independent variable is the

ability of the women to make decisions and implement what they consider as necessary for environmental conservation. This information is got through questions concerning who owns the land, or how the land was acquired, whether the land is registered because the idea behind registration of land in names of individuals enables the owner to use it as collateral and can therefore seek loans from financiers. Such questions also seek to know the economic independence of women whether as household heads or as wives.

H4: *There is a positive correlation between family size and environmental conservation.*

The dependent variable is same as for the hypotheses. The independent variable is "family size". This is quite direct because it requires the number of children that the woman respondent has.

H5: *There is a positive correlation between group participation of women and efforts put into environmental conservation.'*

The dependent variable is the same as for other hypotheses. The independent

variable is "group participation". Since women have been known to achieve more through organized group work, it is assumed that those who have membership to such groups are more advantaged, and therefore get assistance from groups to conserve environment, in form of labour or farm inputs.

## **2.9 DEFINITION AND SPECIFICATION OF VARIABLES**

### **1.0 FORMAL EDUCATION LEVEL:**

The number of years of schooling a respondent has attended if they attended school at all. This is classified as per the Kenyan education system, that is, primary, secondary and university. It also incorporates adult education and attendance of training workshops or seminars.

### **2.0 INCOME:**

This will refer to the average amount of money earned per month in Kenya shillings; this refers to the regular income and also includes remittances that are regularly sent to the respondent. Regular implies steady flow of income from farm proceeds, casual workers, professionals and business.

### **3.0 AUTONOMY:**

This refers to the ability to make one's own decisions and actualize desires. Such decisions include how to plan one's time, how to spend one's income, where to go and what they can do on their own in the absence or presence of their husbands.

### **4.0 FAMILY SIZE:**

Refers to the total number of children and adults who are born and are alive per women respondent. It includes those who are born to the women but may not be staying with her at the time of study. It also includes children acquired through adoption and all those blood members who claim a share of that woman's responsibility.

### **5.0 MEMBERSHIP INTO "MWETHIYA":**

Literally "mwethiya" means a group of people who have come together with a common purpose. In the study it refers to affiliation to a women group. The groups may traverse from clan-based groups to those groups with a national

outlook.

## **6.0 ENVIRONMENTAL CONSERVATION:**

In this particular study it is limited to conservation of soil and water. It includes six measures of conservation and these are terracing, mulching, crop rotation, building water tanks, planting trees or conserving the existing indigenous trees and the usage of energy conserving "jikos".

## **7.0 MAJOR DECISION MAKER IN THE FAMILY:**

This refers to the person who undertakes the major decisions in the family. These include decisions concerning desired family sizes, disposing of land, how and when to cultivate, where the family will settle and inheritance of family property. It also refers to the person who if decisions are undertaken in their absence he or she has to approve their implementation.

## **8.0 SOURCE OF DOMESTIC WATER:**

It has been used to refer to the major source of water for the large part of the

year. In this study it has ignored sources of water which last only during the rainy season. The major sources of water could range from natural springs, piped water, dam water to manual wells and boreholes.

#### **9.0 LAND OWNERSHIP:**

The term land ownership refers to the owner as the person in whose name the title deed appears. The owner of the land is the one who has the final word on issues such as the disposing of the land, how the land is sub-divided or who cultivates which part of the land.



## **CHAPTER THREE**

### **3.0 METHODOLOGY**

This chapter outlines the methodology used in carrying out this study.

#### **3.1 SITE SELECTION AND DESCRIPTION**

##### **3.1.1 LOCATION AND BOUNDARIES**

The study was carried out in Yatta Division of Machakos District, Kenya. Yatta Division has 6 locations namely:- Masinga, Kinyatta, Ndalani, Matuu, Kithyoko and Ndithini. These are further divided into 18 sub-locations. Yatta Division lies in the arid and semi-arid zone of Kenya.

##### **3.1.2 CLIMATE**

Yatta lies in a low agricultural potential area and receives unreliable rainfall. Average annual rainfall is 600 to 800 mm with potential evaporation at 2000 mm to 2200 mm. The rain comes in two periods, short rains, November to December and the long rains come in Mid March to end of May (Atkins, 1984). There are big tracts of open grassland and when it rains soil erosion is a major threat to agricultural potential.

region has high soil erosion hazard especially in the more intensively cultivated. In addition the semi-arid climate adds urgency to the need to conserve rainfall as well as reducing the soil losses which deplete soil moisture holding capacity. The area has a fragile ecology that could deteriorate seriously unless action is taken.

Yatta Division has very few perennial water sources. Most of them are seasonal streams usually with subsurface flows in sandy rivers. Since surface water is scarce, the subsurface water resources found in sandy riverbeds form an important source of domestic and livestock water. The overall drainage pattern is from West to East. As the dry season progresses, livestock need to range further afield for grazing, but they still need to be within range of water points. Due to scarcity of water, concentration of people around few water points leads to severe soil erosion.

### 3.1.3 RESOURCES

The small portions exempted from these conditions of unreliable rainfall are Matuu and in particular areas along the Yatta Furrow where irrigation is possible. The furrow was constructed to support grazing and in 1967 a 50-ha small holder irrigation scheme was constructed at Matuu, (Bottrall, 1969). The other parts which have water throughout the year are those near the recently constructed Masinga dam. Due to

unreliable rainfall, agricultural produce as a main source of income may not be very dependable, as such the people in this area have tended to keep livestock of traditional breed which are more drought resistant. Owners are reluctant to sell their livestock which increase beyond land carrying capacity and hence contribute to soil erosion and thus control measures are essential if further soil erosion induced by livestock is to be avoided. Besides this region is not supplied with electricity adequately and majority of the people depend on wood fuel mainly firewood and charcoal for domestic use and as a source of income.

In their recommendation on soil conservation study in Masinga, Atkins (1984) suggested one institutional option as "accept that progress in on-farm conservation will depend on integrating conservation work with subsistence activity. Because of the importance of women in the subsistence cropping, this will mean expanding the work of the home economics extension service which caters for women cultivators and women groups".

### **3.1.4 POPULATION**

By 1989 the population density was 85 persons per square kilometers (MDP 1989).

This is an area where population is gradually increasing due to land pressure being

experienced in the high potential areas like Kangundo and Mbooni. At the same time the region has a very high out-migrant population, although the trend is similar also for the whole of Machakos District. The out-migration affects mostly males of working age of 20-65 years old. Most of them migrate in search of job opportunities in urban areas. Therefore, it's the women who are left behind in the rural areas. Population projections by sex (1979-1989) had projected that by 1989 there would be more females than males, that is males=337,836 while females = 377,470 in the Machakos District Development Plan (1989-1993). Because of migration of males and their absenteeism from rural areas women are increasingly carrying out traditional male tasks.

From the above, it is clear that this is an appropriate area for study because being in the arid and semi-arid zone it is marginal from an agricultural point of view. There is a big problem of adjustment to land use patterns so as to maintain the delicate environmental balance. Failure to maintain such a balance may lead to environmental degradation. Hence this region gives us a real typical situation of where people are struggling to maintain ecological balance since their livelihood depends on the scarce resources available.

### 3.2 SAMPLING

In the study, it was not possible to encompass the whole population and therefore sampling was undertaken because of the limited amount of time and resources. A representative random sample produces results that can be used to generalize for whole population. Another important reason for sampling as explained by Singleton et al (1988; 138) is that, paradoxically, the attempt to observe all cases may actually describe a population less accurately than a carefully selected sample of observations, especially in survey studies of large populations. The reason is that the planning and logistics of observation are more manageable with a sample.

In order to have a representative sample, the population was stratified into two categories: those areas that lie along the Yatta Furrow or border water bodies e.g. dam and those that rely entirely on rainfall. The belief is that the people from these two categories have different ideas on conservation of environment and land use patterns.

Under this stratification there were:

Matuu        )   Have access to water throughout the year

Masinga     )

- Ndalani )
- Kinyatta ) Rely entirely on rainfall
- Ndithini )
- Kithyoko )

When sampling was done, Matuu location was sampled from the first stratum that has water throughout the year while Kithyoko location was randomly sampled from the second stratum. Matuu location has five sub-locations namely Kithimani, Kauthulini, Kondo, Kimangu and Iviani. From the five sub-locations two sub-locations were sampled, these were Kauthulini and Kondo. These sub-locations are further sub-divided into "Utui" or villages. This being a densely populated area two villages were sampled from each sub-location, to give a total of four villages from which the final sample was drawn. With the help of the local headman of each village a list of all the households in each village was drawn and twenty households were randomly sampled from each village. *80 households*

From the second strata, Kithyoko location was sampled which has four sub-locations namely: Kithyoko, Thatha, Kivaa, and liani. Further random sampling of the sub-locations drew two <sup>sub-locations</sup> villages: Kithyoko and Thatha. Because this is a sparsely populated area, three villages were sampled from each sub-location and this gave a total

of six villages. From each village fifteen households were drawn using the same procedure used for the other strata. 95

The sampling frames for the villages were possible to get. This was facilitated by the fact that droughts and famines frequent this area, and it's necessary for the headman to know names and number of his village household to enable him to supply relief food or services.

A total of 150 cases were sampled and studied and five case illustrations carried out. The case illustrations were sampled using non-probability sampling, namely convenient sampling. Having known some of the eldest people from the headman, the sample was drawn according to what was most convenient in terms of time, money, energy and age.

### **3.3 METHODS OF DATA COLLECTION**

#### **3.3.1 PRE-SURVEY**

For purposes of gauging peoples' attitudes and beliefs about environmental conservation, a pre-test of unstructured interviews was carried out. This helped reveal respondents' logic or thought processes and enabled the researcher to know the options

to be included in the structured questions.

### **3.3.2 DIRECT OBSERVATION**

The questionnaire had three parts. In the first part there were general questions to be answered through observation. This included observing and recording the type of house in the compound, whether it is made of bricks, stone or mud, efforts that have been done to conserve the environment, for example whether farms are terraced. Also the sizes of farm were estimated and counterchecked whether they corresponded with answers given verbally. It was possible also to note whether trees had been planted. Through direct observation areas which have experienced soil erosion were noted. Direct observation helped reduce the biases of exaggeration and prestige effects, and helped to provide an authentic/original picture of the situation.

### **3.3.3 DIRECT INTERVIEWING**

The main method of data collection was direct interviewing and the tool used was questionnaire. The questions asked were the same for all respondents and the same order of questioning was maintained for all the respondents. Through interviews the objective was to assess tendencies in women-farmers behaviour and their socio<sup>2</sup>



economic status. Data was collected on education levels, income, number of children per woman, group participation, employment, cropping, farm income, attitudes of women towards soil and water conservation practices and environmental conservation practices undertaken. There were specifically separate questions for the male household head if he is present, this enabled the researcher to ascertain the male perspective and find out if it is different from the women's perspective. Then there was a main part for the "Mother-figure". Interviewing of each was done separately.

### **3.3.4 INFORMAL INTERVIEWS**

Direct interviewing (face-to-face) was also used and this encouraged respondent to talk freely about the topics and where necessary the interviewer probed for clarification on contradicting responses. Also the interviewer was in a better position to ask respondent follow-up questions to elaborate particular points. Interviewing also helped one to get the feel of the respondent and also understand the respondent. This kind of interview was preferred because it can also be applied to the illiterate population. The questions were mainly closed-ended questions, with a few open-ended questions for elaboration.

However, bias can not be ruled out completely which could have been introduced

by the interviewer for example failing to follow the interview in scheduled manner; or reactions to gender, manner of dress or personality and wittingly or unwittingly the interviewer may affect interviewees' responses.

### **3.3.5 CASE ILLUSTRATIONS**

Alongside there was a historical approach undertaken by citing a few case illustrations. This was done by conveniently selecting an aged member of the community to explain to the interviewer the past practices in the field of environmental conservation. This brought to light how environmental problems were solved, or how the people used to cope with them.

## **3.4 TECHNIQUES OF DATA ANALYSIS**

### **3.4.1 Percentages and means**

These techniques have been used to estimate averages of variables where necessary. The percentages have been calculated in order to give the distribution of frequencies of variables across different categories of respondents.

### 3.4.2 Regression analysis

This technique has been used to ascertain how much of the variation in dependent variable is explained by the independent variables and was used to establish how much environmental conservation is influenced by levels of education, income, autonomy, group participation, number of children and location. In this research regression has been used on the assumptions that the regression equation is linear in nature and there are no incidence of multi-collinearity or heteroscedasticity.

Regression was possible since environmental conservation was treated as an orderable discrete variable on a scale. The scale had a value of 0 - 6, and the values were as ranked in Table 3.1. If a person undertakes any of the following conservation measures, she is ranked as per the number of measures she has undertaken. The measures taken into account were terracing farms, mulching, planting trees or conserving indigenous trees, building water tanks, practicing crop rotation and use of energy conserving "jikos".

The results were analyzed at an alpha level of 0.05 significance level.

**TABLE 3.1**

**Ranking of Environmental Conservation**

VALUE	RANKING
0	No Effort
1	Very Little Effort
2	Little Effort
3	Some Effort
4	Average Effort
5	Much Effort
6	A Lot of Effort

## **CHAPTER FOUR**

### **DATA ANALYSIS**

This chapter covers data presentation of grouped frequencies and gives data explanations.

#### **SOCIO-ECONOMIC CHARACTERISTICS**

##### **4.1 INCOME**

###### **4.1.1 Source of Income**

The research findings showed the majority of the respondents having farming as their major source of income. From Table 4.1, 36.0% of the women mentioned the sale of farming produce as what they depended on for their income although for many this income is not regular due to the unpredictability of the rains. 28.0% indicated remittance and farming as their source of income. In this case remittance included income remitted by their husbands, children or relatives. And this could be in terms of cash or assistance

in form of food.

**Table 4.1 Percentage Distribution of Respondents According to Main Source of Income**

Source of income	Frequency	Percent
Full-time employed	8	5.3
Business woman	29	19.4
Casual Labourer only	13	8.6
Farming only	54	36.0
Remittance only	4	2.7
Remittance and farming	42	28.0
Total	150	100

However the majority admitted to having the remittance in form of cash mainly. Some women have engaged in business to earn income and they constituted 19.4%. The businesses are largely on small-scale and the women run them concurrently with their

household chores. These businesses included the sale of sisal products like baskets and ropes. Some of the women also earn income as casual laborers in the farms of those who are able to pay for extra help. But this was mainly in Kithimani where work on the farms alongside the furrow is available throughout the year. Those who depend on casual laboring formed 8.6%. The lowest percentage was found in those relying on only one source of income, for example, full-time employed constituted 5.3%, and remittance 2.7%. The full-time employed were mainly teachers and community workers. These findings reflect that the people in this region rely mainly on farming.

#### **4.1.2 Amount of Income per month**

Levels of income in this area are quite low with a total of 74% earning only Kshs 1,000 per month, as Table 4.2 shows. Those with over Kshs 3,000 per month constitute a mere 12.7%. This confirms the many studies that have revealed that rural women in many parts of the world are cash poor (for example Sen & Grown, 1987 and Khumar & Hotchkiss, 1988).

**Table 4.2: Percentage Distribution of Respondents According to Amount of Income per Month**

Level of income	Frequency	Percent
Less than Kshs 500	62	41.3
Kshs 500 - Kshs 1000	49	32.7
Kshs 1000 -- Kshs 2000	20	13.3
Kshs 3000 & over	19	12.7
<b>TOTAL</b>	<b>150</b>	<b>100.0</b>

#### 4.1.3 Regularity of income

**Table 4.3 Percentage Distribution of Respondents According to Regularity of Income.**

Regularity	Frequency	Percent
Regular	21	14.0
Irregular	129	86.0
<b>TOTAL</b>	<b>150</b>	<b>100.00</b>



From Table 4.3 it is clear that more than three-quarters of women have irregular incomes. This is largely due to the fact that they rely on farming as their main source of income, and since this area is frequented by droughts many are the times that there is crop failure and therefore no income for these women. The 41% who have regular incomes are composed of mainly those who are full time employed and those for whom remittances are regular.

## **4.2 EDUCATION**

### **4.2.1 Education levels of women**

The formal education standard attained by the respondents was noted as in Table 4.4. The table shows that quite a large proportion, 28.0% have not had formal education. This agrees with other studies done which have shown that women literacy levels are still very low, for example UNESCO, 1982 showed that over 64% of Kenya's non-literate population are women mainly in rural areas. From the table those who have attended adult literacy classes formed 8.0% which is an indication that not many of the

women have taken up the adult education programme which was set up by government to try and improve the literacy levels in the rural areas.

**Table 4.4: Percentage Distribution of Respondents According to Education Level.**

Education level	Frequency	Percentage
No Education	62	28.0
Up to Primary	61	40.6
Up to Secondary	30	20.0
University level	1	0.7
Adult literacy classes	12	8.0
Total	150	100.0

There was only one woman who had attained university education. Low levels of education of women have reduced the understanding and performance of women in many spheres of development

#### **4.2.2 Participation in other educational programmes**

As far as participation in other educational programmes is concerned, as Table

4.5 reflects, the majority of women, 61.3% have not been involved in any form of training.

**Table 4:5 Percentage Distribution of Respondents According to Participation in Other Educational Programmes.**

Programmes	Frequency	Percent
None	92	61.3
Agricultural training	22	14.7
Family life/Nutrition	30	20.0
Leadership course & Community	6	4.0
	150	100.0

The highest number were those who have received training in agriculture which had 20%. Most of those who had attended the training claimed that it was either because the husband was absent at the time of training or they are from female headed households. When the husband is present, he is usually the one to attend such training. The reason given by the women is that they are too busy with domestic chores they would prefer their husbands, who may have more free time, to go. These findings agree

with those of the study done by Staudt (1976) which found out there are great disparities between male and female likelihood of training with males having a fourfold greater likelihood of training. Family life & Nutrition training had 14.7% trainees. These programmes, the women said, are offered by the church through the maternal child health programme. There were very few women who have ever attended leadership courses and they comprised a mere 4%.

## **4.3 AUTONOMY**

### **4.3.1 Major Decision Maker**

To establish the variable on major decision-maker, the respondents were asked to state who undertook the major decisions in the family. Such decisions would include sale of land, number of children to have or the kind of crops to be grown. As the responses reflect in Table 4.6, 73.9% admitted that males were solely responsible for major decisions taken in the family. However 22.7% claimed that both wife and husband undertake decisions. When asked whether the men go with their wives to sign the loan agreements in banks or for the sale of land, the claim was that wives are, usually

very busy and so the men undertake such decisions alone.

**Table 4.6 Percentage Distribution of Responses According to who is Major Decision-maker**

Value Label	Frequency	Percent
Husband	111	73.9
Wife	3	2.0
Both	34	22.7
Relative	2	1.4
Total	150	100.0

At the same time most insisted that they usually have not been "informed" about such decisions. 1.4% said that major decisions are undertaken by relatives. Relatives here include the eldest members of the husband's family. This is the group that is strongly tied by kinship links and claims they have fewer problems because your own people can never "wish you bad" and many minds are better than one. When the men were asked

whether their wives were involved in making decisions in regard to land, they admitted to not seeking their opinion. However, if it is a marital problem being solved or the issue at hand involves the women directly then they are consulted. The 2.0% women who make decisions on their own largely consist of the single or the widowed. Those who make decisions jointly made up 22.7%. This is quite an impressive figure although many of these are women whose husbands have migrated to the towns. These figures are comparable with a Kenya-wide study, Mbula Bahemuka (1986) which reported that husbands made the major household decisions in 65% of the cases, 6% wife only and 20% jointly, while women tended to make the day-to-day decisions.

#### **4.3.2 Land ownership**

When carrying out the study it was found out that 52.0% of the males resided away from home. These figures agree with the FAO (op.cit) study that found out that in many developing countries men migrate to the cities in search of jobs, leaving women in charge of the households. As many as one third (33.3%) of rural households are headed by women. The majority of the male household heads had left and migrated to the urban areas. A total of 46 household heads had left for urban towns, while 25 were not alive

and only seven of the households are female headed, that is single parents. From the Table 4.7 we can deduce that 88.8% of the available respondents argued that the land belonged to the husband.

**Table 4.7 Percentage Distribution of Respondents According to Land Ownership**

Mode of land ownership	Frequency	Percent
Husband not present	78	52.0
Husband	64	42.7
Wife	0	0
Both	8	5.3
Total	150	100.0

Out of all the available responses, none indicated that the land belonged to the wife. There were eight cases (5.3%) that argued that the land belonged to both husband and wife.

### 4.3.3 Permission to carry out activities

In order to establish the levels of autonomy, women were asked whether they do seek permission from their husbands to carry out certain activities. 78.7% of the women agreed that they have to ask their husbands for permission to go to attend meetings, market, visit friends etc. However most of the women would rather say that they do ask permission from their husbands for fear of being looked upon as stubborn. Obbo (1980) concluded that women who struggle to maintain some independence from men might be accused of making their husbands impotent or of prostitution. The majority of the 21.3% who do not ask for permission are largely single parents and widows.

**Table 4.8: Percentage Distribution of Respondents According to Permission to Attend meetings, market, visit friends.**

	Frequency	Percentage
Request for Permission	118	78.7
Do not request for permission	32	21.3
Total	150	100.0



#### 4.3.4 Intentions of Spending income

**Table 4.9: Percentage Distribution of Respondents According to informing husbands on intentions of spending income.**

	Frequency	Percentage
Informs husband	106	70.7
Do not inform	44	29.3
TOTAL	150	100.0

At the same time most women have to inform their husbands on how they intend to spend their income. However, unlike asking for permission to go to markets, fewer women inform their husbands on their spending patterns; 70.7% compared to 78.7%. These figures highlight how in many African societies women have remained under the

authority of some man, usually her father first and then her husband, (Perlman, 1970). This has meant that the husband typically has a dominant position over his wife and may even limit her ability to earn an independent income.

#### 4.4 GROUP PARTICIPATION

##### 4.4.1 Group Membership

**Table 4.10: Percentage Distribution of Respondents According to Group Membership.**

Membership into group	Frequency	Percent
Belonging to group	140	93.3
Not belonging to group	10	6.7
	150	100.0

The results in Table 4.10 confirm that majority of rural women belong to a

women's group. Women have always worked within the framework of mutual aid group, and this area is no different from other regions, (see Masinde 1991, Mbithi & Rasmusson 1977, Mutiso 1975). Membership into a group is beneficial to women in terms of sharing work, problems, diffusion of agricultural information and valuable services. This also explains why many women have remained members of groups even with no economic benefits. Almost all women belong to one group or another.

#### **4.4.2 Group activities**

Women groups are particularly important for carrying out agricultural work that places a heavy burden on women. From Table 4.11 more than half the groups, 58.6% are engaged in agricultural activities. This also agrees with studies by Masinde (op cit) and Muzaale and Leonard (1982) which indicate that the majority of women groups are engaged in agricultural related activities. These agricultural activities include mainly planting, weeding and harvesting. Groups engaged in cultural activities formed 6.4%, which included groups, formed to cater for functions like marriages and births. Merry-go-round groups were 18.6% and in many cases the women contributed money to their members on monthly basis to enable them to carry

out other social activities. Groups involved in business formed 16.4%. This indicates that women have also been participated in rural trade. Were (1983) shows that the pressure of family needs has forced women to engage in local trade which includes sell of handicrafts & clothes.

**Table 4.11: Percentage Distribution of Respondents According to Group Activities.**

Group activities	Frequency	Percent
Agricultural activities	82	58.6
Cultural activities	9	6.4
Business/entrepreneurship	23	16.4
Merry-go-round	26	18.6
TOTAL	140	100.0

## 4.5 FAMILY SIZE

### 4.5.1 Number of children

The variable number of children was grouped into four groups. From Table 4.12 those that had less than three children constituted 18.7%. While the largest percentage was in the group with three to seven children which formed 61.3%.

**Table 4.12 Percentage Distribution of Respondents According to Number of Children**

No. of Children	Frequency	Percent	Cumulative Per.
Less than 3 Children	28	18.7	18.7
3-7 Children	92	61.3	80.0
8 Children and over	28	18.7	98.7
No Children	2	1.3	100.0
Total	150	100.0	

Those respondents who had eight children and over were equivalent to those with less

than three children, with a percentage of 18.7%. Those who had no children constituted a very small percentage of 1.3%. A cumulative percentage taken to include those with up to seven children adds to 80.0%. This indicates that this area has a very high fertility rate. It is therefore expected that this region has a high population growth rate.

## **4.6 ENVIRONMENTAL CONCERNS**

### **4.6.1 Environmental Conservation Compared to other Needs**

Environmental conservation included stating what kind of spending and for what exactly. The respondents were asked to arrange the following in order of priority as they budget for their income: School fees, food, clothing, entertainment, Harambee/Helping relatives, Medicines and environmental conservation. The results are reflected in Table 4.13. Those who ranked environmental conservation as top priority were 3.3% followed by 2.7% who ranked it as a second priority.

**Table 4.13 Percentage Distribution of Respondents According to Priority given to Environmental Conservation**

Priority Ranking	Frequency	Percent
First Priority	5	3.3
Second Priority	4	2.7
Third Priority	10	6.7
Fourth Priority	23	15.3
Fifth Priority	56	37.3
Sixth Priority	29	19.3
Seventh Priority	22	14.7
Difficult of Prioritize	1	0.7
<b>Total</b>	<b>150</b>	<b>100.0</b>

The majority ranked environmental conservation as fourth and fifth priorities out of a list of seven items. Those who ranked it as fourth priority were 15.3% while those who ranked it as fifth priority were 37.3%. Both combined have more than half, that is

52.6%. A further 19.3% ranked it as sixth priority while 14.7% gave environmental conservation last priority.

Most of the respondents gave food, school fees and medicine higher priority than environmental conservation. The value difficult to prioritize represents the respondents those who found the question as extremely difficulty and could not prioritize the given items. These findings show that women have other immediate needs rather environmental conservation. These women responses confirm that women prioritize the "domestic sphere" more than the "out-of-home" activities.

#### **4.6.2 Tree-planting**

The respondents were asked whether there were any traditions that govern who should plant trees or cut down trees. One community, the akamba largely dominates the area, with a dispensable number of outsiders, so the traditions are largely similar. From Table 4.14 the highest percentage of 82.7% said they were not aware of any such traditions.



**Table 4.14 Percentage Distribution of Respondents According to Traditions governing Tree planting**

Authorized Person	Frequency	Percent
Anybody	124	82.7
Men only	22	14.7
Women only	3	2.0
Elder/Community	1	0.7
Total	150	100.0

A total of 14.7 % said that there were traditions which allowed only men, this was linked to the fact that since the land belongs to men, the trees also belong to them and so they can choose whether to cut down or plant trees. Other women felt that their husbands must know before they cut down trees because the husbands were the major decision-makers. A percentage of 2.0% said that women do have a word in the felling of trees. Only 0.7% claimed that the elder/community governs tree planting or tree cutting. Therefore this community does not have traditions restricting growing or cutting

down trees by either men or women.

### Reason for planting or not planting tree

From Table 4.15 the respondents who had already planted trees and therefore the issue of reason for not planting trees did not arise formed 84%.

**Table 4.15 Percentage Distribution of Respondents According to Reason for not Planting Trees**

Reason for not planting trees	Frequency	Percent
Already planted trees	126	84.0
Presence of indigenous trees	8	5.3
Lack of seedlings	6	4.0
Land not their	2	1.3
Trees do not survive	6	4.0
Total	150	100.0

The 5.3% indicated as responding that there was no need for trees include those who felt that the existing indigenous trees were adequate. These respondents said that there was no need for planting trees since indigenous trees were already growing. 10.6% argued that the trees do not survive due to a variety of reasons. Some cited pests especially termites others cited poor soils and others just thought those exotic trees may not survive. This group coupled with those who cited lack of seedlings (4%) and lack of water (1.3%) make up 9.3%. These figures agree with the study by Mwenge (1988) which cited seedling survival rates being as low as 10% owing to moisture stress and damage from termites. They thought the trees might need a lot of care, which they might not be able to cope with. The 1.3% who cited lack of water as the major cause for not growing trees were mostly from the drier regions. They claimed that if they cannot get water for themselves, then water for trees is subsidiary. Another 1.3% said the land does not belong to them. These include those who have leased the land and the young people who have intentions of moving to other places. Their permanent homes are not build on this land and they feel there is no need to plant trees there.

## Reasons for planting trees

Table 4.16 shows that 17.3% of the respondents have not planted trees. The largest group was that which planted trees for commercial purposes, they formed 31.3%. They plant food trees especially fruit trees like mangoes, oranges and pawpaw trees. This is also confirmed in Tiffen et al (1992) study that in the drier parts of Yatta mango and pawpaw trees are very popular. They also plant trees to provide timber for sale. Although this is not on large scale and the trees mainly grown are of exotic nature. There were those who planted trees for firewood and they formed 12.0%. These are mainly trees that grow very fast and the majority of the respondents come from the densely populated area. 24.6% argued that they have planted the trees to prevent soil erosion in their farms. The majority of these also come from the densely populated areas. There were those who have planted the trees for home food consumption or beautify the compound and they formed 14.7% of the total respondents. Comparatively, although 12% said they planted the trees to prevent soil erosion, the type of trees they planted were those which have commercial value. And many of them have not planted the trees in their farms because of the belief that trees harden the soil.

**Table 4.16 Percentage Distribution According to Reason for Planting Trees**

Reason for planting trees	Frequency	Percent
Not planted trees	24	16.1
Prevent soil erosion	37	24.6
Firewood	20	13.3
Food consumption only	22	14.7
Commercial purposes	47	31.3
Total	150	100.0

These reasons given by the respondents are a very strong confirmation of how a community's own resolutions are more workable than external interventions. As early as 1930 the colonial Government had already embarked on compulsory afforestation which had very little success (Peberdy, 1958), unlike presently when people have engaged in the exercise out of their own felt needs.

#### **Factors limiting tree planting**

From the statistics on Table 4.17, most of the respondents who have either planted or not planted trees believe that ignorance is the major factor limiting tree

planting, that is 36%. 24.7% attribute the problem to pests and lack of water. There is also a relationship between percentage citing pests and lack of water to the location. The majority of these respondents are from the locations that have no access to water throughout the year. It also has a relationship to the variable involving visits by an agricultural officer. The majority of the respondents claimed that agricultural officer had not visited them during the last two seasons. Another factor cited was lack of seedlings, which formed 5.4%. Financial constraints had a percentage of 9.3%. The presence of indigenous trees was also seen as a factor limiting tree planting. Although the percentage was low there were respondents who have taken care of the indigenous trees for different reasons. Some trees are preserved for their medicinal value for various ailments, others for religious significance, for example, sacrifices are offered under particular species of trees. One respondent even said that under some trees clan meetings take place and therefore such trees have to be properly cared for. Of interest is that most of the respondents who have taken care of indigenous trees are those who settled in those areas earliest. Those who have settled recently have completely cleared the indigenous trees and replaced them with those of exotic nature.

**Table 4.17 Percentage Distribution of Responses According to Factors limiting Tree-planting**

Factor limiting tree planting	Frequency	Percent
None so far	2	1.3
Ignorance	54	36.0
Financial constraint	14	9.3
Lack of seedling	8	5.4
Ignorance & shortage of seeds	21	14.0
Presence of indigenous trees	7	4.7
Pests & lack of seeds	7	4.7
Pests & lack of water	37	24.7
Total	150	100.0

### 4.6.3 Water Conservation

The source of domestic water differed mainly on the basis of location. The frequencies of the respondents are in Table 4.18. 44% depend on the furrow or running water as their main source of water. This is of course mainly the respondents who live in Kithimani location where the Yatta furrow passes

**Table 4.18 Percentage Distribution of Respondents According to Water Source**

Source of Water	Frequency	Percent
Furrow/running water	66	44.0
Earthdams, Sandwells	14	9.3
Furrow, Stored water	7	4.7
Borehole, Wells Earthdams	63	42.0
Total	150	100.0

The Yatta furrow has really benefited the people living alongside it, in ensuring that they have water all the year round. 9.3% rely on earthdams and sandwells dug into dry riverbeds during rainy season. 4.7% depend on furrow and stored water under this category falls those who have constructed water tanks. The other major group of 42.0% relies on borehole, sandwells and earthdams. This indicates that the larger percentage relies on borehole water, these are the people from Kithyoko location where the people rely mainly on rainfall. There are however, only two boreholes in the whole location which the respondents claim do break down at the most unexpected times. Apart from



those people along the furrow the remaining 56% have unreliable sources of water throughout the year. Water remains a major concern in these drier regions of Yatta.

#### **Reason for not constructing water-tank**

In the Table 4.19 those who have constructed water-tanks constituted a mere 5.3% only. The major reason given for not constructing water tank was that the Yatta furrow provided sufficiently their water needs such that they do not need to construct a water-tank, 48% gave this response. The furrow therefore has managed to fulfil one of its main purposes, so far, which was to provide domestic water to Matuu and its environs. It has therefore earned its title as "lifeline" of Yatta plateau. (Tiffen et al, op.cit) The other major reason reflected in the statistics is the financial constraint. Most of the respondents felt that there were other immediate needs like food or school fees. Besides, most of them claim they do not have reliable regular income to undertake costly ventures like water-tank construction. Not having a permanent home or lack of family support was not a really major reason for not constructing water tank, and formed 0.7% each.

**Table 4.19 Percentage Distribution of Respondents According to Reason for not Constructing Water Tank**

Reason cited	Frequency	Percent
Already constructed	8	5.3
Presence of furrow	72	48.0
Financial constraint	57	38.0
Lack of iron sheet to harvest water	11	7.3
Lack of family support	1	0.7
Not permanent home	1	0.7
Total	150	100.0

#### 4.6.4 Energy Usage

##### Main Type of Fuel

From the statistics, on Table 4.20 there is no doubt what the major source of fuel in this area is. A total of 68.6% use mainly firewood. They depend on the firewood for their daily cooking. The firewood is got mainly by collecting, this means going out in

search of it in the forests. These figures agree with McDonald's study that revealed that in Kenya the dominant energy form used is wood fuel. The study found that 73% of fuel consumed is wood fuel. At the same time 4% of the respondents depend mainly on charcoal which is also wood fuel.

**Table 4.20 Percentage Distribution of Main types of Fuel**

Type of Fuel mainly used	Frequency	Percent
Firewood	103	68.6
Charcoal	6	4.0
Paraffin	38	25.3
Gas/Solar	2	1.4
Total	150	100.0

There were only 1.4% who used solar or gas mainly and this are precisely the well-to-do people in the area. Those who relied on paraffin were 25.3% and were composed mainly average income homes.

## How fuel is obtained

The figures in Table 4.21 show that the majority of the respondents obtain their fuel mainly by collecting or foraging for firewood. The results show 65.3%, which is a very high percentage. These findings are comparable to those found by Mung'ala and Openshaw (1977) who found that 74% of the households they surveyed relied entirely on collected firewood while only 6% relied exclusively on the market, that is, buying. In the study those who get their fuel through buying and collecting form 32.0%. The minority are those who depend entirely on buying and these form 2.0% while those who burn charcoal for their own domestic usage constitute 0.7%. However, these results on those who burn charcoal were specifically limited to those who go out and burn the charcoal not for sale but domestic use only. Majority of the respondents admitted that they do burn charcoal but for purely commercial purpose. At the same time the number of respondents who depend on buying fuel only was very limited because the majority said although they do buy fuel they do not depend on buying due to financial constraints, so they combine buying and collecting. But it is quite clear that the majority are those who rely entirely on collecting.

**Table 4.21 Percentage Distribution of how Fuel is Obtained**

Source of Fuel	Frequency	Percent
Buying only	3	2.0
Collecting only	98	65.3
Buying and collecting	48	32.0
Burning charcoal	1	0.7
Total	150	100.0

#### **Type of "Jiko" used**

To assess whether the respondents have knowledge about conserving firewood by use of energy conserving jiko, they had to answer to a question on the type of "jiko" they use. Table 4.22 shows the distribution of responses to the question. The highest percentage of 68.0% uses the 3 stone fire, which of course uses much firewood. A

further 20.0% use the 3-stone fire and the ordinary "jiko".

**Table 4.22 Percentage Distribution of Responses According to Type of "jiko" mainly used**

Type of "jiko"	Frequency	Percent
3 -stone fire	102	68.0
Ordinary charcoal "jiko"	1	0.7
3 -stone fire, ordinary jiko	30	20.0
3 -stone fire, ordinary jiko Paraffin		
Gas, paraffin stove	15	10.0
	2	1.3
Total	150	100.0

The lowest percentage, which is 0.7% use only, the ordinary jiko while 1.3% use gas or paraffin stove. However, it is fully evident that none of the respondents uses the energy conserving "jiko". It follows that they have to use more firewood and as such spend

more time in search of it, they also have to fell more trees to sustain their demand. This area of study contradicts Tiffen's (1991) argument that at the household level fuel-efficient stoves are believed to be in widespread use.

### Problems faced in obtaining sufficient fuel

The responses to the problems of obtaining sufficient fuel are in Table 4.23.

**Table 4.23 Percentage Distribution of Responses According to Problems faced in Obtaining Sufficient Fuel**

Problem Faced	Frequency	Percent
Lack of wood resource	43	28.6
Finance constraint	4	2.7
Shortage of labour	48	32.0
Shortage of labour and financial constraint	13	9.6
No problem	42	28.0
Total	150	100.0

The shortage of labour to go and collect firewood constituted 32.0% which was reflected as the major problem facing the women in obtaining sufficient fuel. 28.6% cited lack of wood resources as their major problem. These were mainly from Kithūnani location that is densely populated. Those who depend mainly on buying fuel saw financial constraints as a problem and made up 2.7% those who combined financial constraints and shortage of labour made up 9.6%. While 28.0% claimed they had no problem at all of obtaining their fuel. This trend is in support of the expressed fear that wood resources in this district are being heavily exploited. This is because Hayes (1986) had found a larger percentage as being self-sufficient, 56%. Gielen (1982) had found 47%, now the number has decreased to 28% in this study.

#### **4.6.5 Farming Practices**

##### **Work done to preserve soil**

The variable "work done to preserve the soil" was among the most important variables to establish how keen the respondents are on environmental matters. The largest proportion as reflected in Table 4.24 have their farms terraced, about 40%. The



high percentage maybe attributed to the compulsory terracing programme imposed on the Akamba people during the colonial times. Throup (1987) noted that the Kikuyu chiefs were rewarded depending on how well they had supervised soil conservation.

**Table 4.24 Percentage Distribution of Responses According to Work Done to Preserve the Soil**

Work undertaken	Frequency	Percent
Nothing done	11	7.3
Terracing	60	40.0
Mulching	2	1.4
Crop rotation	1	0.7
Terracing, planting trees crop rotation	57	38.0
Terracing planting trees	8	5.3
Terracing planting trees mulching crops rotation	11	7.3
Total	150	100.0

Presumably the same may have applied to the Akamba people. Besides there are those who have undertaken terracing, planting trees and crop rotation, they form 38%. Those who have done nothing to prevent their farms from soil erosion were a total of eleven,

which formed 7.3%. Among these majority were those who have settled in the area recently or have leased the land. From the statistics mulching is not a very established method preserving soil only 1.4% undertake mulching. All the respondents practice inter-cropping, single cropping is not popular. However, some of those who have dug terraces do not maintain them well. The move for terracing was made at a time when the government had insisted on the people terracing their farms. The majority claimed that the land is flat and there was no need for terracing but they agreed since there are different types of terraces, the government should not insist on those which do not suit them. They felt that the very deep terraces which are dug so as to preserve water, and the water may seep slowly into the farms were suitable, but the government insists on someone digging terraces the whole farm, and does not give finance or implements to carry out the work. The responses planting trees were few and were mainly from Kithimani where water is available throughout the year most of the people do not plant trees because of the presence of indigenous trees and they claim that due to lack of water their survival is not certain.

#### 4.6.6 Constraints to environment conservation

When the respondents were asked what they felt were the major constraints to environmental conservation 36.5% answered ignorance as reflected in the Table 4.25.

**Table 4.25 Percentage Distribution of Responses According to Constraints to Environmental Conservation**

Constraint	Frequency	Percent
Ignorance	54	36.5
Financial constraints	16	10.8
Do not know	15	10.1
Lack of proper care	35	23.6
Proper infrastructure	3	2.0
Lack of cooperation	12	8.0
Laziness and ignorance	15	10.0
Total	150	100.0

The respondents admitted to not knowing much about environmental conservation. 23.6% cited lack of proper care of the land while 10.8% cited finance as the major constraint. Those who felt that lack of cooperation among the people themselves and

government was the major constraint constituted 8.0%. A further 10.0% responded that ignorance and laziness were the major constraint, the respondents felt that people were lazy and did not want to do much work to preserve the environment. Laziness was also one of the factors Peberdy (1958) attributed to the failure of the afforestation programmes started earlier by the colonial administrators to provide an answer to the question.

#### 4.1.19 How the environment can be conserved

**Table 4.26 Percentage Distribution of Responses on How Environmental Conservation can be undertaken**

What can be done	Frequency	Percent
Cooperation	48	32.0
Do not know	15	10.0
Creating awareness	87	58.0
Total	150	100.0

As Table 4.26 reflects the majority of the respondents, 58.0%, giving their own opinion thought that creating awareness on the dangers of environmental destruction is the best

way environmental conservation awareness can be created. 32.0% argued that cooperation among the people themselves and also the government would be the best way while 8.0% did not know how the environment can be conserved. The idea on cooperation coming from the community itself is an important aspect and a lesson for future interventions to fully incorporate the people themselves

#### 4.7 CASE ILLUSTRATIONS

There were five case illustrations which were carried out among the elderly in order to establish some historical perspective and give insight to the extent of indigenous knowledge the elderly people may have on environmental conservation.

The first interview was conducted in Kithimani location, Kauthulini sub-location. The interviewee was an elderly widow by the name of Nthunya wa Mwatu. She was born during "vita ya Mathyaka" (First World War), around 1922. She highlighted the problem of overpopulation that forced her to move with her family from Kangundo to her present day home. Her revelation agrees with the findings of the study done by Matingu (1974), which found out that people had moved from Kangundo, Masii and Mwala to Yatta and Makueni because of a felt land shortage.

The second interview involved an old man, Nthenge wa Ndunda wa Ngalatu born around 1910. His major reason for moving from his original home was in search of pasture for his livestock, which he referred to as "syengo" (far from home grazing lands). Unlike his women counterparts whose motive for moving was concern for food supply for the family. Nthenge also elaborated on the issue of prices of the horticultural crops that the people along the Yatta furrow grow. He argued that the people concentrated more on the cash crops, which bring in "hard" cash although when compared to the inputs they have spent, the returns are quite low, and therefore they cannot afford the food that they have foregone to grow cash crops. His argument of seemingly attractive prices was also confirmed by the study carried out by Tiffen et al (1994), which found out that the marketing of these crops is fragmented, diversified, uncontrolled and is dominated by Asians who exploit the farmers.

The third interview involved an old lady Kamene Mutheu who was born after "Nyua ya Muvunga" (Around 1920). She moved with her family from Kangundo due to increased land pressure in search of pasture for the remaining few livestock. Before settling here she had first come to visit her relative and was impressed by the harvest from this area, compared to Kangundo where the harvests were falling. Although

moving to this area meant extra work for her including larger areas to cultivate and more cattle to milk.

She compared women in the olden days to "Ndugata" or slaves, while husbands had a very smooth time. She appreciates the changes that have taken place and now men can communicate openly with their wives and also help them with some home activities like fetching water firewood using the bicycle. She believes that there should be an understanding between men and women, and women should also not become lazy but instead "less talk, more work".

The fourth interview was with Nduku Kavenge from Kithyoko location. She is from the "Atangwa" clan and was born during "Nyua ya Mavoi". She recalls the good old days when the harvests were good and they used to grow more useful crops. She cited cassava, pumpkins, sweet potatoes, maize, millet, sorghum, and cowpeas. The staple food was made from millet and sorghum that she believes were more economical foods because you needed only a handful to feed many people. Although she, as a woman, owned no land and livestock she feels that she led a comfortable life although men had too much powers, even the power to beat their wives very hard.

She expressed her views of the present generation and says that women are now

more advantaged than before. Women are now involved in decision making in the nuclear family. As far as girl education is concerned, she is pleased that girls are now going to school in large numbers. She remembers that she experienced many problems trying to take her only daughter to school. One thing she regrets however is that the fathers of the educated girls may reap very little benefit from their children and yet they may end up poor due to payment of high school fees.

The fifth interview was with Mbuvi Mtwota wa Ndavi nicknamed "Bendera" during his youth days. He is from Kithyoko location and his identity card reads his birth date as 1909. He originally came from Kangundo with his livestock looking for pasture and water. He believes that land belongs to the man because it is the man who plays the role of "Kwatusya", that is the first clearing of the land. Women are usually scared of such heavy manual work. He attributes the low yields to soil exhaustion due to population pressure and food trade. Another major reason is shortage of labour because children now go to school for long periods and after school they go to urban areas in search of employment and business. He however, appreciates that children should be sent to school, both boys and girls because some girls have even proven to be better than boys are.



Previously, he had admired large stocks of cattle but presently he would not advise people to keep large herds. The reason is that with frequent droughts the cattle will die unlike people who he argued can be saved by relief food or food bought from the shops, what do you do with the cows?

He asserted that the local people following cultures that are not beneficial have brought about all these environmental problems. He said not everything that is brought forward is good so people should learn how to choose between what is good and bad.

#### **4.8 ANALYSIS OF CASE ILLUSTRATIONS**

##### **4.8.1 INCOME AND PROPERTY OWNERSHIP**

From the case illustrations done, it was clear that women owned no land or livestock. But as long as they remained married they had rights to continue farming on their husbands' land and milking his cows. The men justified their ownership of land as stemming from the fact that it was the men who explored and found where it is suitable to settle, then women came along. The men were also responsible for clearing the land for settlement and for this reason the land belongs to the man. Women were not given

land at their parents' home nor could they erect houses at their parent's home. As concerns inheritance, property was distributed to women, not for their ownership but so that they can sub-divide it among their sons. Daughters did not inherit property. However, the elderly women interviewed did not feel they had been denied anything because if it was a matter of farming, you had a farm. If they needed cows for milking, they had the right to the cows' products. They just pondered over "what is there in owning a cow?" Among this community wealth was measured in terms of the livestock a man owned. Those interviewed especially women expounded on their husband's wealth in terms of how many animals they were willing to slaughter for social functions, for example, in the process of acquiring a wife. All the wealth belonged to men but women were actively involved in protecting and caring for it. There was some form of barter trade especially with the neighbouring Kikuyu.

The elderly interviewees felt that introduction of a cash economy has brought in the major problems that their children and grandchildren are facing. Women who are earning their own money have become "bigheaded" and refuse to remain subordinate to their husbands. On the other hand, the men still want to dominate over their wives just like their fathers did, and this has led to quarrels in family and much cannot be achieved

in such a family. Because of money also the people have become mean, they do not want share because they want to accumulate and be seen as wealthy. They cite money as the source of all these evil. However, they do acknowledge that livestock as a source of wealth has one great disadvantage especially in times of drought, because they may all die and as a result, you end up losing all your wealth. However, according to them there is no threat of livestock causing any environmental problem. This is because the colonialists had imposed destocking on the Akamba people while frequent droughts have helped regulate the remaining numbers.

#### 4.8.2 EDUCATION OF WOMEN

The interviewees agreed that education of women is now very important. Previously only men were considered for education. Citing from their own experiences girls who had gone to school are now better off than their counterparts. For those who struggled against the society and took their girls to school, they are now happy that their girls can use their education to help themselves. The only problem with educating girls is that after they are married off they may not be able to help their parents while their parents have been impoverished in the process of educating them.

The interviewees agreed that those women with education were more exposed and could understand and adopt new methods of agriculture and implement them and become very successful farmers, better than some men. They also argued that women with education might understand the environment better and therefore the need to conserve it.

#### **4.8.3 WOMEN AUTONOMY**

Interviewing the elderly respondents it was found out that traditionally the position of women among this community's set-up was clearly defined. Women had no say in the choice of marriage partners, parents arranged marriages and the woman was not involved in anyway. Women after marriage were never to question the authority of their husband which was kindly bestowed by parents to husband. Any kind of opposition would call for beating. The clan would also discipline radical wives if they became too stubborn for their husbands to manage them. Even the decision for postpartum abstinence was a man's prerogative, or the decision to have children. If a woman met with her husband on the road, she was not allowed to start a conversation, it was the husband prerogative to start a conversation. In clan meetings women were

never contributors, they served porridge and food or came when punishment was being meted out to them.

However, the elderly men saw this as a proper way of functioning because there is no ambiguity. At the same time they argued that a woman would acquire status when she got daughters-in-law then she could make decisions concerning the daughters-in-law. A newly married woman always farmed with her mother-in-law until such a time when her children were grown up. Her mother-in-law who was also in charge of harvest made the decisions to plant.

The elderly men complained that although they appreciate that women can be involved in decision making, it brings in ambiguity with regard to who will be responsible for the consequences of certain decisions.

#### **4.3.4 FAMILY SIZE**

Many children were a source of pride and wealth to their parents. Children also provided labour for the many duties in the household. If you had many girls you were assured of wealth when they got married, if you had many sons you were assured of labour when they married. However, interviewees now felt that having many children

has led to deterioration of environment, because they need land to settle on and also farm. Previously a person would own large tracts of land but if they have many sons the land is subdivided and further subdivided for grandsons. This has led to land fragmentation and soil exhaustion. The interviewees pointed out that what is happening now in Yatta is what had happened in Kangundo many years ago before they moved out. Although one of the interviewees did not agree with contraceptive use she saw the need to have fewer children maybe through natural family planning. Another interviewee felt that with the frequent droughts, many children are a heavy burden especially when you have to buy food at exorbitant prices. He said if people had fewer children then maybe, even with low yields one maybe in a position to feed them. At the same time, nowadays children do not die as they used to due to modern medicine, so there was a pointed need to limit family size.

#### **4.8.5 GROUP PARTICIPATION**

All the interviewees pointed out that they had always worked in groups. They said there were different types of group and "Mwethya" was one of them, which was directly involved in helping one another with work on the farm. There were other

special groups involved in different cultural functions for the maintenance of the society. They believed that a person could not survive on his own and had to cooperate with neighbours, this cooperation allowed for harmonious existence of the people.

The interviewees felt that although the groups today still played a major role, they are faced by many problems. Firstly the groups have become monetized and therefore there are always leadership wrangles as everyone wants to control the money or have a chance of embezzling the funds. Secondly these groups have become politicized and are always being used and misused by the politicians. Finally, many cultural functions are not taken seriously nowadays and therefore some of the groups that carried out such functions have ceased to exist.

#### **4.3.6 ENVIRONMENTAL CONCERNS**

Information from the interviewees revealed that in the past, the community had undertaken farming and keeping of livestock. They would move in search of pasture for their livestock and establish "syengo" (far from home graze lands). Later on, many of them would move onto the "syengo" and establish their homes there. They kept mainly cows, goats and sheep which provided them with milk, meat, blood, hides and dung.

They were also used for paying dowry, fines and sacrificial purposes.

The harvests then, according to the interviewees were very good although they never used any fertilizers or pesticides. They planted maize, cowpeas, millet, pigeon peas, and sorghum all for home consumption. They never planted food for commercial purposes. The interviewees also cited laziness as a cause of food shortage. According to them farming with tractors is because one is lazy. The tractors waste much space in between since one tractor furrow is equivalent to almost three furrows of hand planting. Also the tractors harden the land they drive on and so the soil is not well aerated. Traditionally the people concentrated on food crops but now the "young generation" concentrates on cash crops. This is not a bad idea if only the cash in flow was high. The elderly said that the people are paid very little for a lot of work they have done. The prices of the cash crops are very low as compared to the prices of food that are very high, and yet they have foregone food crops in favour of the cash crops. These cash crops are also leading to soil exhaustion; the crops need pesticides and due to intensive farming techniques.

The worst that has happened is the introduction of food trade. People hardly store any food due to the expanded food market. Traditionally they had specially designed



food storage containers that could store food for very long periods. The elderly justify this on the basis of how they managed to survive the droughts yet there was no famine relief food.

Traditionally the firewood that women collected were the dry fallen twigs, they never fell trees. Felling trees is a recent idea that has come with introduction of charcoal usage. Trees are now cut down on large scale for commercial purposes including carvings and furniture previously unknown. Trees considered sacred and medicinal trees which were previously available for treatment of certain maladies have become extinct, as the people clear forests for settlement and farming.

One of the major points from the case illustrations is that, decision-making has for many years been a man's domain. This is also confirmed in recent times as Table 4.6 shows that the trend has not changed much. The same case applies to property ownership. Women do not own property and therefore it becomes very difficult for them to make any major decisions regarding such property. As Table 4.7 reflects, women do not own land, although they are involved in many activities concerning the land. These case illustrations bring out the cultural and historical position that men and

women have had as far as autonomy (decision-making) and property ownership. The elderly women interviewees accept that position and see no need for change as long as they have access to the property. In recent times property is equated to income and the idea that men are in charge is further accentuated and a general observation is that the modern men use such evidence to continue controlling household income.

As far as environmental issues are concerned the case illustrations cite major developments as a cause for environmental degradation. The introduction of a cash economy and the mechanization of farming have gone a long way in degrading the environment. Another factor cited is the breakdown of the cultural way of life, which has disrupted the ecosystem, for example, introduction of food trade and commercial uses of trees which means that more land is brought under cultivation and more trees felled. This is unlike the researcher's point of view before undertaking the research, that environmental degradation may be as a result of lack of knowledge on how to conserve the environment.

## QUANTITATIVE DATA ANALYSIS

### 4.9 HYPOTHESES TESTING

This section deals with hypotheses testing. Environmental conservation was treated as an orderable discrete value with a values ranging from 0 - 6. The values 0 - 2 were termed as less effort, 3 - 4 were average efforts and 5 - 6 much effort.

The hypotheses were tested using multiple regression. The results of the multiple regression are as in Appendix B.

#### 4.9.1 ENVIRONMENTAL CONSERVATION AND INCOME LEVELS

The first hypothesis was testing the influence of levels of income on environmental conservation. The null hypothesis of no relationship is tested against the research hypothesis as follows. The dependent variable is environmental conservation (V63) while the independent variable is income per month in Kenya shillings (V26).

*H<sub>1</sub>: There is a positive correlation between amount of income of women and efforts put into environmental conservation.*

*H<sub>0</sub>: There is no correlation between amount of income and efforts put into environmental conservation.*

When multiple regression analysis is carried out (see Appendix B) income has a very significant and positive relationship with environmental conservation, with a significance of 0.00 which means it is fully significant at any alpha level. This is indicative that the null hypothesis fails to be accepted and therefore the research hypothesis of significant and direct relationship between income and environmental conservation is accepted. When income alone is regressed against environmental conservation using stepwise method, income has a R-square of 0.60 which means that income explains 60% of the variation in environmental conservation, controlling for all other variables in the equation. For every one standard deviation increase in amount of income there is a 0.73 increase in efforts put into conservation of environment. Income therefore has much influence on the efforts to conserve the environment. The women or people with higher incomes will be in a position to conserve the environment more. This shows that the higher the income the higher the incentive/motivation not only to retain what one has but also to increase the current income so as to ensure security in future. The reverse also applies, those with little income are concerned with immediate needs

and have less to lose and therefore engage in conservation less. This conforms to the findings of Mabogunya and Filani (1975) who found out that low-income levels of the rural areas in essence create low quality environments. They emphasized that there is a strong relationship between facets of environmental quality and people's income levels. They argue that one can almost assert that the higher the income levels of a society, the better the quality of its environment.

#### 4.9.2 ENVIRONMENTAL CONSERVATION AND EDUCATION

The second hypothesis and it's null are stated as follows:

*H<sub>2</sub>: There is a positive correlation between education level of women and efforts put into conservation of environment.*

*H<sub>0</sub>: There is no correlation between education level of women and efforts put into conservation of environment.*

The dependent variable was ranking of environmental conservation (V63) when regressed against education level (V14) has a significance of 0.01 was obtained. When education alone is regressed against environmental conservation, 66.2% of the variation in environmental conservation is explained by education level of the woman respondent.

The significance obtained from the multiple regression is 0.00, which indicates that there is a 0.00% probability that the null hypothesis is true; therefore we fail to accept the null hypothesis which states that there is no relationship between education and environmental conservation. The regression analysis show that for every one standard deviation increase in education level there is a 0.09 standard deviation increase in efforts put into environmental conservation. Education level therefore is a factor that is important in the conservation of environment.

#### 4.9.3 ENVIRONMENTAL CONSERVATION AND AUTONOMY

The third hypothesis was stated as follows:

*H<sub>3</sub>: There is a positive correlation between levels of autonomy of women and the efforts put in conservation of environment.*

*H<sub>0</sub>: There is no correlation between autonomy level of women and environment conservation.*

The dependent variable was the same as for the other hypotheses, ranking of environmental conservation (V63). From Appendix B when multiple regression was

carried out, autonomy level (V21) had a significance of 0.62, which is not significant at an alpha level of 0.05. The relationship between the two variables is also negative, for every one standard deviation increase in autonomy level there is a 0.03 decrease in environmental conservation. Due to the negative relationship between autonomy level and environment conservation we fail to reject the null hypothesis of no relationship. The negative relationship may be a result of difficulties involved in the measurement of autonomy. Autonomy being the ability to make decisions and implement them, most women feel that culturally this is the man's responsibility, and they would rather say that the decisions are made jointly, or they may not be able to clarify how far they can make decisions and implement them on their own. These results on autonomy maybe attributed to the difficult task in the study concerning measurement of autonomy level. Autonomy is more of a qualitative subject matter rather than quantitative. The possible indicators of autonomy had to be related to the sources of power, which were not very clear in the research. This is exemplified in the fact women may have access to certain resources but may not have control over the resources. Therefore in this case a question of levels of power comes in which the researcher had not been adequately prepared for.

#### 4.9.4 ENVIRONMENTAL CONSERVATION AND FAMILY SIZE

The hypothesis on family size in relation to environmental conservation was stated as:

*H<sub>1</sub>: There is a positive correlation between family size and environment conservation.*

*H<sub>0</sub>: There is no correlation between family size and conservation of environment.*

When the variable family size (V13) is regressed against the dependent variable environmental conservation a significance of 0.85 was obtained. This value is not significant at the given alpha level of 0.05. However the relationship between environmental conservation and family size is positive and for every one standard deviation increase in family size there is a 0.02 increase in environmental conservation. On such basis we find that we fail to reject our null hypothesis of no relationship and conclude that family size may not necessarily influence environmental conservation. Therefore we may conclude that there is no direct relationship between population and environment, since we would expect families to conserve environment more given that there maybe competition for scarce resources. These results maybe a reflection of the



current debate on "Northern Overconsumption" and "Southern Overpopulation"; the issue being which is the more influencing factor on environmental degradation; population or energy consumption. The results also totally confirm Tiffen et al (op.cit) study of Machakos district where the population has shown capacity to adjust to the changing environmental conditions.

#### 4.9.5 ENVIRONMENTAL CONSERVATION AND GROUP PARTICIPATION

The fifth hypothesis on group participation and the null hypothesis were tested using multiple regression analysis. The hypotheses are stated as:

*H<sub>5</sub>: There is a positive correlation between group participation of women and efforts put into conservation of environment.*

*H<sub>0</sub>: There is no correlation between group participation of women and efforts put into conservation of environment.*

As indicated in the Appendix B, group participation (V16) has a relatively weak relationship with significance of 0.55. The relationship is also negative, for every one-

standard deviation increase in group participation there is a 0.14 decrease in efforts put into environmental conservation controlling for other variables in the equation. This weak relationship is associated with the fact that most of these groups are based on social needs. At the same time many of them have been highly politicized and have deviated from their original objectives. Besides, for groups to engage in environmental conservation which is tedious, adds onto their already overburdened schedules and they may not live up to it in terms of physical strength. On the basis of these results we fail to reject the null hypothesis of no significance and positive relationship. It can be concluded that group participation need not lead to increased efforts in environmental conservation. This kind of relationship can be attributed to the fact that most of the women's groups are formed on the basis of meeting social needs and exclude viable projects. This has also been identified by Mwaniki (1986), the problem of women about viable projects. Another explanation could be that women groups have been politicized and now women engage in projects that have financial promises from either government or donor agencies. This has led to what had been foreseen by Musyoki and Gatara (1985), Masinde (1987) when in their studies they found that women groups response to outside support was very positive. As such the groups may engage in particular

projects which may not bring direct benefits to them

## 4.10 CONCLUSIONS AND RECOMMENDATIONS

### 4.10.1 CONCLUSIONS

From the research findings it is clear that differences in levels of socio-economic status of women have an impact on the way they engage in environmental conservation. The most significant of these indicators being the levels of income which influence environmental conservation greatly. Income is a major determinant of women status, and an independent income for women gives them the opportunity to contribute to the household budget and enhances their decision-making power. Besides, income allows women to engage extra farm help to carry out the heavier manual work which they may not have time to perform. The study has confirmed Mabogunja and Filani (1975) who found that income does have influence on environmental conservation in the rural areas. Therefore we can agree that poverty and environmental degradation are closely linked in the rural areas of the developing countries.

From the findings education has significant effect on environmental conservation.

Educated women are more actively involved in decision-making and have access to information and therefore have threshold effect in unlocking innovative skills. Although formal education may have threshold effects, education aimed at issues concerning environment is still not widespread within the research area, and this may be true for many other rural areas. Therefore as we list down the benefits of education of women to infant mortality, fertility, population stability, entrepreneurship (as outlined in literature review) we can now add environmental conservation.

Autonomy as a variable had an unexpected relationship with environmental conservation in this study. It was expected that with higher levels of autonomy women would have engaged in environmental conservation activities more, which was not the case. However, this may have been largely due to the difficulties involved in the measurement of autonomy, which is more of qualitative, subject rather than quantitative. Besides there is a strong feeling that the responses of women to questions relating to autonomy may have been more emotive rather than objective. The women did not want to appear as "radicals" in the eyes of the society and want to maintain the image of a "proper" wife.

Women in group participation variable gave results implying that there is a

negative relationship between group participation and environmental conservation. This is in contrast with the existing ideas that women are able to achieve more in groups rather than individually. The major reason for this relationship is that women are not engaged in meaningful activities in their groups. Majority of the groups are not engaged in viable activities which are long-term and furthermore many of them have been "politicized" and are seen as stepping stones for political mobility.

Although "family size" as a variable had a weak relationship with environmental conservation, it need not be ignored. There seemed no valid reason for this kind of relationship.

One of the objectives of the research was to highlight whether development/progress has an impact on environmental conservation. This was confirmed when the results revealed that people from Kithimani location (where the Yatta furrow passes) have engaged more in conservation efforts than people from Kithyoko location who rely entirely on rainfall. The major reason for this relationship is that Kithimani is a densely populated area as compared to Kithyoko, because the furrow whereby they can undertake irrigation and hence earn higher incomes has attracted many people. The land has to be used intensively and therefore conservation of the

small portions available is necessary. This is in contrast with Kithyoko where the area is sparsely populated and large tracts of land are non-arable for the most part of the year. The males in this region have migrated to the urban areas in search of employment and have left behind women who are totally engrossed in their day-to-day survival. This depicts the impact of development, since these two regions were previously relatively homogenous.

In the research area women responses indicated that women have not organized themselves in groups to meet environmental challenges. However there was one group which had existed in Kithimani location although it "died" due to poor attendance by the members.

As it had been cited in the theory of social change, issues of environment have come up as a result of changes in the society. From this research it has become clear that women are agents of economic and environmental change and must be recognized for their role in managing resources and families. Women's contribution to environmental conservation is threatened by the lack of control to resources on one hand and the practice of discrimination on the other, which has been shown by the research to have deep cultural roots (from case illustrations).

From the research, it was found out that the community has indigenous knowledge about conservation of environment through the appropriate types of crops to be grown during specific seasons and ways of conserving energy. Whereas the researcher went to the field with the idea that the usage of energy conserving "jikos", as a way of conserving the environment, the local population had more knowledge on the types of trees which burns slowly and therefore lessens the amount of firewood used. At the same time, the usage of such "jikos" denies the people the advantage of warming their houses as they cook.

#### **4.10.2 RECOMMENDATIONS**

Since income and education of women are very significant factors in environmental conservation, there is need to improve the levels of income and education for women. Although the government has done much to improve educational status of women, continued educational expansion for women and girls remains an imperative need, coupled with environmental education.

Women also need to be more informed on their crucial role in environmental conservation. The extension services need to reach women. It is recommended that

extension services training incorporate a gender perspective in planning their programmes, and also women need to be involved in the decision-making process at higher levels.

Rural electrification should be accelerated and usage of other forms of fuel can be facilitated. Fuel switching from collected fuelwood to paraffin would decrease women's workload, consume less energy as well as reducing damages to the environment. This can be through improved transport and distribution system and controlled paraffin prices. Apart from paraffin, development of other forms of energy such as biogas (from residues and wastes) and solar would decrease over-reliance on wood.

#### **4.10.3 SUGGESTIONS FOR FURTHER RESEARCH**

Studies relating to women and environment should be widespread; it would be beneficial such studies to be carried out in different regions so as to establish whether environmental concerns are uniform across regions.

Given time and resources an in depth study should be carried out to ascertain the indigenous knowledge that different communities have on conservation of environment.



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## APPENDIX A

### A) WARS

1. *Vita ya Mathyaka* - First World War
2. *Vita ya Jerumani* - Second World War

### B) FAMINES

1. *Yua ya Kakuu* - 1922 Famine
2. *Yua ya Mwee* - 1919 Famine
3. *Yua ya Mavoi* - Famine before World War I
4. *Yua ya Mavunga* - 1920 Famine

### C) HARVEST

1. *Nzini sya Kivanga* - 1916 bumper harvest

### D) CLANS

1. *Aiwani*
2. *Aombe*
3. *Atangwa*

### E) OTHERS

1. *Kituto* - The village dancing arena
2. *Kwatsya* - Clearing of virgin land
3. *Syengo* - Far from home grazing lands
4. *Kinga* - Grass woven storage container for grains
5. *Ndugata* - Enslavement
6. *Kimaa* - Meal made from sorghum flour

## APPENDIX B

**Table 5.1 Multiple Regression Analysis of Environmental Conservation and Socio-Economic Variables**

Dependent variable V63: Ranking of Environmental Conservation

Multiple R = 0.83206

R square = 0.69232

F = 17.43876

Significance F = .0000

-----Variables in the equation-----

variable	B	SE B	Beta	T	Sig. T
V11	-0.03081	0.06126	-0.03849	-0.503	0.6168
V21	-0.28393	0.38539	-0.05534	-0.737	0.4641
V1	-0.31813	0.12508	-0.19120	-2.543	0.0135
V13	0.02034	0.10807	0.01412	0.188	0.8513
V16	-0.14411	0.23998	-0.04722	-0.601	0.5504
V26	0.53379	0.06638	0.62830	8.041	0.0000
V9	0.50534	0.20826	0.18825	2.426	0.0182
V14	0.15721	0.0574	0.22251	2.738	0.0081
(constant)	0.47936	0.80511	0.595	0.5538	

**KEY:**

- V1 Location of respondent
- V9 Land ownership
- V11 Major decision-maker
- V13 Number of children
- V14 Education level
- V16 Belonging to group
- V21 Ask permission to go for meetings, market
- V26 Amount of income per month
- V63 Ranking of environmental conservation

Therefore the regression equation which is linear in nature is written as follows:

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8 + E$$

Upon fixing the values from the research findings the regression equation is as follows:

$$Y = 0.48 - 0.19(\text{LOCT}) + 0.19(\text{LAND}) - 0.04(\text{MDECM}) + 0.01(\text{NUOC}) + 0.22(\text{EDUC}) - 0.05(\text{GROUP}) - 0.05(\text{PERM}) + 0.63(\text{INCM}) + 0.50.$$

Where:

Y = Environmental conservation

a = Constant value

b = beta coefficients

x<sub>1</sub> = location of respondent (LOCT)

x<sub>2</sub> = land ownership (LAND)

x<sub>3</sub> = major decision maker (MDECM)

x<sub>4</sub> = number of children (NUOC)

x<sub>5</sub> = education level (EDUC)

x<sub>6</sub> = belonging to group (GROUP)

x<sub>7</sub> = permission to go for meetings, market (PERM)

x<sub>8</sub> = amount of income per month (INCM)

E = error term

## APPENDIX C

### MULTIPLE REGRESSION OF ENVIRONMENTAL CONSERVATION AND SOCIO-ECONOMIC VARIABLES (simplified)

VARIABLE	B	SE B	Sig.
1. Major decision maker	-0.03	0.06	0.62
2. Permission to go to market, meetings	-0.28	0.38	0.46
3. Location of respondent	-0.32	0.12	0.01**
4. Number of children	0.02	0.11	0.85
5. Group participation	-0.14	0.24	0.55
6. Amount of income per month	0.53	0.07	0.00**
7. Land Ownership	0.50	0.21	0.02*
8. Education level	0.16	0.06	0.00**
constant	0.48	0.80	0.55

R = 69.2 %

p = 0.05\*

p = 0.01\*\*

## APPENDIX D

### QUESTIONNAIRE

NAME .....

HOUSEHOLD NO. ....

### PART ONE: OBSERVATION

1. What type of structure is seen in this household?
  1. Stone-house with tiles or iron-sheet
  2. Grass thatched mud house
  3. Brick house grass thatched
  4. Other:Specify
2. Are there any noticeable measures of environmental conservation undertaken?
  1. Terracing
  2. Water tanks built
  3. Exotic trees planted
  4. Mulching
  5. Cover crops planted
  6. Other:Specify
3. What can you say about the distribution of the population in this area?
  1. Sparsely populated
  2. Densely populated

### PART TWO: MALE HOUSEHOLD HEAD IF PRESENT

4. How was this land acquired?
  1. Inheritance
  2. Purchase
  3. Just settled in from another place
  4. Land is on lease
  5. Other Specify
5. Has this piece of land you are using been formally subdivided and title deeds issued?
  1. Yes, title deeds issued
  2. Yes, title deeds not issued
  3. Not yet formally subdivided
6. If title deeds have been issued, does having a title deed make any difference to land patterns as far as you are concerned?
  1. No
  2. Yes, what difference.....
7. What is the approximate size of your farm?
  1. Less than one acre
  2. 1 acre - Less than 2 acres
  3. 2 acres - 4 acres
  4. Over 4 acres

- 7b. How many acres belong to husband? ..... Wife? .....
8. Who makes the major decisions in this household e.g. selling or buying of land, allocation of money e.t.c. ?
- |                  |               |             |
|------------------|---------------|-------------|
| 1. Husband alone | 2. Wife alone |             |
| 3. Both          | 4. Relatives  | 5. Not sure |

**PART THREE: ELDEST WOMAN IN THE HOUSEHOLD**

9. What is the type of marriage in this homestead?
- |                   |                  |
|-------------------|------------------|
| 1. Polygamous     | 2. Monogamous    |
| 3. Woman to woman | 4. Single mother |
10. How many children have been born to you and are still alive?  
Sons ..... Daughters .....
11. Have you had any formal education? What is the highest level you attained?
- |                        |                    |                        |
|------------------------|--------------------|------------------------|
| 1. None                | 2. Primary         | 3. Secondary "O" level |
| 4. Secondary "A" level | 5. Adult education |                        |
12. With or without any formal education, have you participated in any other training activities or seminars?
1. Seminars on agricultural practices.
  2. Workshops on family health (nutrition, family planning)
  3. Courses on community development (small businesses, sewing)
  4. Leadership courses.
  5. Other: Specify
13. Do you belong to a "mwethya" (women group)?
- |        |       |
|--------|-------|
| 1. Yes | 2. No |
|--------|-------|
14. If Yes, for how long have you been a member of the group?
- |                     |                     |
|---------------------|---------------------|
| 1. Less than 1 year | 2. 1 year - 2 years |
| 3. 3 years          | 4. 5 years and over |
15. What kind of activities does your group engage in?
1. Cultural activities e.g. organizing certain ceremonies
  2. Agricultural activities
  3. Business/entrepreneurship activities
  4. Other: Specify
16. What is your position in the group?
- |                        |              |
|------------------------|--------------|
| 1. Chairperson or vice | 2. Secretary |
|------------------------|--------------|





28. How do you mainly get your fuel?  
 1. Buying                    2. Collecting                    3. Other: Specify
29. If you collect, how far do you have to go and how long does it take you?  
 Distance: ..... Time:.....
30. Why do you use this type of fuel?  
 1. Readily available                    2. Cheapest to buy  
 3. No other option                    4. Other reasons: Specify
31. Which type of "jiko" do you mainly use?  
 1. 3-stone open fire                    2. Ordinary charcoal "jiko"  
 3. Paraffin stove                    4. Gas/electric cooker  
 5. Energy conserving "jiko"                    6. Other: Specify
32. How many meals do you cook per day?  
 1. One                    2. Two                    3. Three                    4. More than three
33. What do you normally consider while deciding on the number of meals to be cooked per day?  
 1. Fuel consumption                    2. Food costs  
 3. Number of people to eat the meal                    4. Other: Specify
34. What would you say the major kinds of foods that you usually cook?  
 State:.....
35. Do you face any problems in obtaining sufficient quantities of fuel that you normally require?  
 1. Yes                    2. No                    3. Sometimes
36. If yes, what problems?  
 1. Unavailability of wood resources                    2. Financial constraints  
 3. Shortage of labour to collect firewood                    4. Other: Specify
37. When you settled in this area how many trees have you planted?  
 1. None                    2. Less than 10 trees                    3. 10 - 50 trees  
 4. 50 - 100 trees                    5. Over 100 trees
38. If none, why?  
 1. No need for trees (indigenous trees present)  
 2. Lack of seedlings  
 3. The land does not belong to us  
 4. The trees will not survive  
 5. Other: Specify

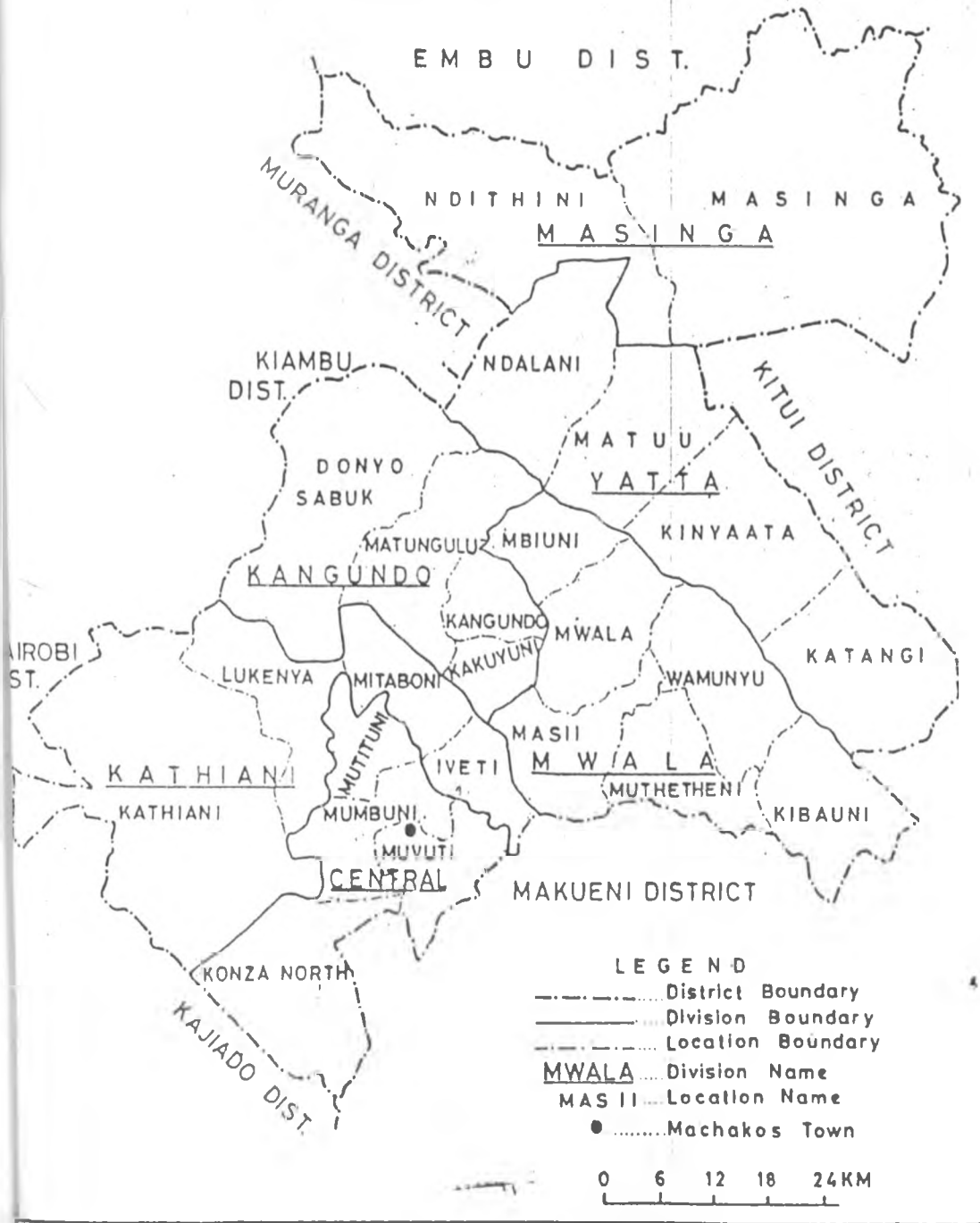
39. If you have planted, why did you decide to plant the trees?  
 1. Prevent soil erosion, wind breakers, beautify the environs  
 2. For firewood/fuel precisely (domestic)  
 3. For commercial purposes      4. Advised by the government  
 5. No particular reason      6. Food: Own consumption  
 7. Other: Specify
40. Do you consider tree growing as important?  
 1. Yes      2. No
41. Are there any specific traditions that govern who should plant or fell trees?  
 1. Men only   2. Women only   3. Both      4. Elders in community
42. What are the factors that you think limit people from trees in this area?  
 State reason .....
43. From where does your household get most of its water for domestic use for the most part of the year?  
 1. Borehole      2. Earthdam      3. Furrow/running river water  
 4. Wells      5. Piped water      6. Stored rainwater  
 7. Other: Specify
44. How long does it usually take to the place you get water?  
 1. .... hours      2. .... minutes
45. How many times per day do you fetch the water?.....
46. Is there anyone to help you? Who .....
47. Have you constructed a water tank to conserve rainwater?  
 1. Yes      2. No
48. If No, why .....
49. Do you consider construction of water tanks to conserve rainwater as an important measure? Give reasons for your answer.  
 .....
50. Which of the following farm implements do you mainly use for farming?  
 1. hoe("jembe")   2. panga      3. oxen-plough  
 4. tractor      5. other: specify
51. What crops do you mainly grow?  
 Food crops:.....  
 Cash crops: .....
52. How are the crops planted?





# MACHAKOS DISTRICT

## ADMINISTRATION BOUNDARIES



Source: Machakos district Development Plan 1994 - 1996. Rural Planning Department, Office of the Vice President and Ministry of Planning and National Development.