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Understanding Change in the Traditional Vinyungu Farming System: A Case of the Little Ruaha River in Iringa Region, Tanzania

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Elizabeth Bernard Palela

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Gutachter

Prof. Dr. Gerhard Bahrenberg, Universität Bremen

Prof. Dr. Michael Flitner, Universität Bremen

DEDICATION

To God be the Glory
The source of my strength and confidence.

To Chenduta, Alvin, Mercy-Lydia and Danielle-Blessing Makawa
For their sacrificial and enduring love and support

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Abstract

The traditional vinyungu farming system in Iringa Region, Tanzania has undergone significant changes in magnitude, production methods and characteristics. Changes undergone in the traditional vinyungu farming system, as in the case of most traditional irrigation farming systems in Tanzania, are understood as being largely in response to exogenous factors the most common being population growth, physical environmental changes and economic policies (structural adjustment programs (SAPs) in particular). While the significant roles of these factors can not be ignored in explaining changes in traditional irrigation farming systems, understanding the transformations undergone by the agents responsible for bringing about these changes, in this case the individual farmers, is likewise of paramount importance.

This study adopts a qualitative approach through the application of combined in-depth interviewing techniques and overt observations to provide an in-depth understanding, from farmers' perspective, on the phenomenon of change in the traditional vinyungu farming system in six villages along the Little Ruaha River from the 1950s to 2005. Among other things, it examines the farmers' reasoning behind their engagement in vinyungu farming over time and across generations. Central to the study is the transformation of the vinyungu farming system from a purely traditional subsistence to a market oriented farming system. The study seeks to understand how farmers describe their decisions to engage in market production which has subsequently led to land use changes in the various valley bottoms and floodplains of Iringa region.

The study postulates that temporal changes in the vinyungu farming system are influenced by farmers' production goals in a three fold description: (1) Changes are a function of the individual farmers' attempts to solve problems (*problem-solving motivation*) arising within their production systems and in turn, threatening their existing goals. (2) The changes are a function of the farmers' changing goals and preferences over time. (3) The role of *new generation farmers* is a significant contributor to change, as younger farmers tend to be more ambitious in their production goals as well as techniques (*opportunity-motivation*).

The findings suggest that the farmers' transformations over time and across generations are a significant driver of the land use changes experienced within the valley bottoms in the study area. Apart from assisting in the diffusion of innovation, access to information enabled through both formal and informal channels play a significant role in the farmers' change in perception, goals and preferences. The farmers' changing goals, both induced and self realised needs, desires and preferences over time and across generations (although not the only components) have proved to be significant contributors in the farmers' decisions to engage in market production. This has subsequently led to the alteration and /or complete change in their agricultural land use practices in the valleys and floodplains within the study area. The findings also indicate that farmers are not static over time and across generations. They change in knowledge, experience, perceptions and world views relative to their own translation of the changing social and physical environment which, in turn, influences their agricultural land use decisions.

Zusammenfassung

In den letzten fünf Jahrzehnten haben in der traditionellen Vinyungu-Landwirtschaft in der tansanischen Region Iringa grundlegende Veränderungen in Bezug auf Merkmale des Anbaus wie z.B. Ertragshöhe und Produktionsmethoden stattgefunden. Dieser Wandel in der traditionellen Vinyungu-Landwirtschaft wird in der Literatur meistens - wie zum Beispiel bei Transformationen im traditionellen Bewässerungsfeldbau - durch den Einfluss exogener Faktoren erklärt. Am häufigsten werden in diesem Zusammenhang Faktoren wie Bevölkerungswachstum, Umweltveränderungen und Änderungen in der Wirtschaftspolitik (in Tansania insbesondere die sogenannten „Structural Adjustment Programs (SAP)“) genannt. Die bedeutende Rolle dieser exogenen Faktoren für die Veränderungen im traditionellen Bewässerungsanbau kann zwar nicht ignoriert werden, die Berücksichtigung der Perspektive der Akteure, die diese Änderungen faktisch in Gang setzten und durchführen (in diesem Fall die einzelnen Landwirte) ist jedoch ebenfalls sehr wichtig.

Die qualitative Untersuchung kombiniert Tiefeninterviews und ethnologische Beobachtungstechniken, um ein vertieftes Verständnis für die zwischen 1950 und 2005 stattgefundenen Veränderungen im traditionellen Vinyungu-Landwirtschaftssystem in sechs Dörfern entlang des Little Ruaha Flusses aus der Perspektive der Landwirte zu ermöglichen. Unter anderem wird die Argumentation der Bauern für die Begründung ihrer Tätigkeit in der Vinyungu-Landwirtschaft im Zeitverlauf und in verschiedenen Generationen analysiert. Im Zentrum der Untersuchung steht die Transformation der Vinyungu-Landwirtschaft von einer traditionellen Subsistenzwirtschaft zu einer marktorientierten Landwirtschaft. Das Ziel der Untersuchung ist zu rekonstruieren, wie Landwirte ihre Entscheidung für eine Marktproduktion begründen und welchen Einfluss der Übergang zu einer marktorientierten Landwirtschaft auf die Flächennutzung verschiedener Talauen und Böden in der Iringa Region hat.

Die Studie postuliert, dass die zeitlichen Veränderungen in der Vinyungu-Landwirtschaft von den Produktionszielen der Landwirte beeinflusst werden. Es gibt drei Haupterklärungen für die stattgefundenen Veränderungen: (1) Veränderungen ergeben sich aus den Versuchen einzelner Bauern Probleme zu lösen , die aus den älteren Produktionsweisen hervorgehen und ihren heutigen Zielen entgegenstehen (problemorientierte Motivation); (2) Veränderungen sind ein Ergebnis des Ziel- und Präferenzwandels der Landwirte im Zeitverlauf (*Zielorientierte Motivation*); (3) Landwirte der neuen Generation haben erheblich zu den stattgefundenen Veränderungen beigetragen - insbesondere junge Landwirte zeichneten sich durch einen ausgeprägten Ehrgeiz in Bezug auf Produktionsziele und -techniken aus (*Chancenorientierte Motivation*).

Die Ergebnisse der Studie zeigen, dass die Verhaltensänderungen der Landwirte im Zeitverlauf und zwischen den Generationen ein wichtiger Faktor für die Flächennutzungsänderungen in den untersuchten Talauen sind. Neben der Verbreitung von Innovationen hat insbesondere der Informationszugang, sowohl über formelle als auch informelle Kanäle, eine wichtige Rolle im Prozess des Vorstellungs-, Ziel- und Präferenzwandels bei den Landwirten gespielt. Der Wandel der Ziele, Bedürfnisse, Wünsche und Präferenzen der Landwirte im Zeitverlauf und zwischen den Generationen hat sich als wichtiger Einflussfaktor für ihre Entscheidung zugunsten der Marktproduktion erwiesen. Dies hat folglich zu Änderungen und/oder einem kompletten Wandel der Flächennutzungspraktiken in den Tälern und Talauen in der untersuchten Region geführt. Die Ergebnisse der Untersuchung deuten auch darauf hin, dass Landwirte nicht statisch sind. Sie verändern ihr Wissen, ihre Erfahrungen, Vorstellungen und Weltanschauungen in Abhängigkeit von ihrer eigenen Wahrnehmung der sich ändernden sozialen und physischen Umwelt, und dies wiederum hat einen Einfluss auf ihre Entscheidungen in Bezug auf die landwirtschaftliche Bodennutzung.

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CHAPTER ONE
INTRODUCTION

1.1 Introduction

Walking along the valley bottoms and floodplains of the Little Ruaha River in Iringa region in the 1950s or earlier, during the dry seasons (between the months of June and November), the scene that would meet one's eyes would be that of water or marsh and natural vegetation scientifically known as hydrophytes[1]. Crop production would be sited in very few areas along the river channel in form of small cultivated patches, with traditional subsistence crops, in the midst of the hydrophytes, known as *'vinyungu'*. This is a traditional subsistence irrigation farming system[2] found in Iringa region, Tanzania. However, if the same valley bottoms and floodplains were to be revisited between the mid 1990s and 2005, one would observe a scene unlike that of the 1950s or earlier. The differences would include expansion of the cultivated area in terms of individual plots and floodplains as a whole, at the expense of the natural vegetation. Others would include altered cropping patterns and increase in crop varieties, including newly introduced non-traditional crop types. The question would then be why did these changes occur and how did they occur?

The phenomenon of change in traditional agricultural production systems has attracted much attention from Tanzanian researchers. However, in most cases, the changes referred to are somewhat implicitly within two focus areas. On the one hand, research on traditional irrigation systems, including vinyungu, has focused on examining the role and potentials of these systems in alleviating poverty. This includes among other things, examining their implications on farmers' livelihoods of which food security and income earnings are central (see for example Mkavidanda and Kaswamila, 2001; Majule and Mwalyosi, 2003; Kaswamila and Masuruli, 2004; Sokoni and Shechambo, 2005; Tageeth, 2001; and Kyando, 2007). This focus is partly influenced by the nation's ongoing efforts on poverty alleviation (see for example URT, 2000b; URT, 2003) as it takes into account the fact that the agricultural sector employs over 75% of Tanzania's working population (URT, 2000), most of whom are smallholder farmers constituting the majority of the nation's poor[3] (URT; 2000b; URT;

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[1] Hydrophytes (water plants) are plants which are able to live either in water itself or in very moist soils.

[2] In Tanzania, traditional irrigation schemes are mainly gravity flow systems constructed by villagers who use local materials to divert water from a river into a system of canals. At the junctures between the main canal and secondary canals, mud division structures control the direction of the water flow (Koopman et.al. 2001). Although this is the general understanding each traditional system possesses unique characteristics differentiating it from the others.

[3] "According to the Household Budget Survey of 2000/01 the proportion of the population below the national food poverty line is 18.7 percent and that below the national basic needs poverty line is 35.7 percent … Poverty

2005). The focus is further influenced by the discouraging performance of rain-fed agricultural production (URT; 2001) coupled with the government's increased support for irrigation development (Mnzava and Kweka, 2005). On the other hand, equal emphasis has been placed on environmental management and sustainable resource utilization (being directly or indirectly, associated to poverty alleviation) by the Tanzanian government particularly from the 1990s (URT, 2005). This has in turn prompted researchers to examine the environmental implications or rather the environmental impacts of the increasing intensity in production within these traditional irrigation systems (partly as a result of market production) on the respective resource bases, water and soils in particular (Majule and Mwalyosi, 2003; 2004; SMUWC, 2001; Anthony, 1979; Sokoni and Shechambo, 2005; Ngatunga, 2008). The majority of the studies have more often dealt with the two focuses simultaneously.

Within these two focus areas, studies imply that changes in traditional production systems emanate from three main factors. Firstly, they explain population growth as having led to land fragmentation and land scarcity in rain-fed fields as well as having caused increased consumption levels leading to (among other farmer-responses) agricultural field expansion into valleys, floodplains and marshlands for irrigation production (Masija, 1993; SMWUC, 2001; Mtatifikolo and Comoro, 1999). Secondly, they suggested that farmers have increasingly engaged in traditional irrigation production for food security. This is claimed to be in response to changes in the physical environment particularly with regard to erratic rainfall patterns and loss of soil fertility in the rain-fed farms. Thirdly, the majority of the researches has associated change in traditional irrigation systems with economic policies, particularly those linked to the structural adjustment programmes adopted by the country in the mid 1980s most notably market liberalisation and removal of subsidies on agricultural inputs (Hammond, 1999; Majule and Mwalyosi, 2003). These studies argue on the one hand that farmers have increasingly encroached upon and cleared virgin lands (particularly wetland and forest areas), requiring limited input use, as a result of the removal of subsidies and high input prices arising from market liberalisation. On the other hand, market liberalisation has been cited as having influenced intensification of market production within these traditional irrigation systems. The few studies which have examined changes in some traditional systems more explicitly (Mpayo, 2005; Kurosaki, 2007) concur more or less with the above mentioned observations.

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remains overwhelmingly in rural areas where about 87 percent of the poor population live. It is highest among households who depend on agriculture" (URT, 2005:4).

Though the mentioned factors and their combined effects, as evidenced in the respective studies, provide useful and significant insights on changes in traditional irrigation systems, they altogether give the impression that farmers adjust their production decisions based primarily on these externally-induced factors. Explanations on such factors have been predominant and tend to overshadow the role of some explicit internal influences, emanating from the farmers. The changing characteristics of individual farmers', being the ultimate agents of change, over time and across generations have been somewhat overlooked by many of the Tanzanian scholars in explaining changes in general and the commercialisation of most of the traditional subsistence irrigation systems in particular. While changes in the physical and social environments, said to influence farmers' production decisions, are widely researched, farmers seem to have remained somewhat constant. There is limited piece of information on the role played by farmers' personal characteristics such as changing goals (or aspirations, needs, objectives), preferences, perceptions, attitudes, values and world views in shaping farmers' decisions with regard to land use change and/or engagement in market production. This study attempts to give a 'human face' to the phenomenon of change in vinyungu farming systems by giving a voice to the individual vinyungu farmers to contribute in filling this knowledge gap.

The importance of understanding the characteristics of individual farmers has been acknowledged among various scholars (Henrich, 2005; Gasson, 1988; Fairweather and Keating, 1994) for its instrumentality in assisting viable agricultural plans and policy formulation (Briggs; 1985), where improvements to the sector are sought after, as in the case of Tanzania. This would seem more the case for a country such as Tanzania whereby almost 80% of the working population is employed by the sector and especially considering that it contributes about 50 percent of the Gross Domestic Product (GDP) and 54 percent of the nation's foreign exchange earning (URT, 2003). Moreover, the recently (2009) launched national agricultural campaign "Kilimo kwanza" (Literally "agriculture first") aimed at revolutionising agriculture in Tanzania, will find that a better understanding of the agents of this revolution, is of much value.

This study aims to provide an in-depth understanding, from farmers' perspective, on the phenomenon of change in the traditional vinyungu farming system in six villages along the Little Ruaha River from the 1950s to 2005. It investigates the underlying reasons for farmers' engagement in the vinyungu farming system by examining whether and in what period(s) and under what conditions the farmers' reasons for engaging in the vinyungu farming system changed. Of particular interest and central to this study is the transformation of the vinyungu

farming system from a purely traditional subsistence to a market oriented farming system. The study seeks to understand how farmers describe their decisions to engage in market production. Among other things, the study examines farmers' personal production goals and preferences over time and their influence on vinyungu farming. Undergone changes in this farming system could not have evolved in isolation without producing any effects within its vicinity and beyond hence a further objective is to discover some of the socio-economic and environmental implications of changes in vinyungu farming within the study area.

1.2 Farmers' goals and agricultural change: A conceptualisation

As in the case of traditional irrigation farming in Tanzania, many studies generally indicate that environmental factors such as climate change and reduced levels of soil fertility have been responsible for agricultural change worldwide (Lambin, 2003; Ali, 1995; Ilbery, 1995; Grigg, 1982; Mbonile et al, 2003). Population growth is another factor that is said to lead to shorter or no fallow (leading to lower soil fertility) and land scarcity and fragmentation causing farmers to intensify production through the adoption of new production technologies (Boserup, 1965; 1975; Turner et al, 1993; Turner and Ali, 1996; Groote, 1999; Carswell, 2002). Technological changes or improvements are likewise widely appraised for their role in producing significant agricultural changes.

Explanations that associate agricultural change to exogenous factors such as economical, political, institutional and demographic factors (referred to here as the *social environment*), tend to implicitly or explicitly (depending on the factor) suggest that farmers are informed of or are aware of the existence of these factors. This would suggest (again implicitly or explicitly) the existence of mechanisms that provide information, signals and/or stimuli which farmers are able to recognise and accordingly incorporate into their production decisions (considered here as *information and learning experiences*) producing somewhat uniform production responses (a common assumption within such explanations). This is of course with the exception of the *physical environmental* factors, which affect the farmers rather directly.

The extent to which exogenous factors or the transmitted information is relevant in producing changes by the individual farmer, however, will depend on the type of stimuli it induces upon the individual farmer. Edwards (1992) points out that a variety of different stimuli induces the farmers' recognition that some change from the status quo of the present production system may be necessary. Giving examples, he categorizes these stimuli into three as follows:

1) *Problem-solving motivation:* The farmer may become aware, for example of some problem existing or arising in the production system which requires a solution.
2) *Goal-directional motivation:* The farmer may wish to change a system in order to achieve some newly perceived goal.
3) *Opportunity motivation:* The farmer may wish to take advantage of a newly perceived opportunity. (Edwards, 1992:140-142)

Edwards' categorization of stimuli motivating farmers to change their production systems helps to explain the role of exogenous factors in farmers' decision making. For example, one of the explanations for subsistence farmers' participation in market production is that internal population growth leads to reduced landholdings causing farmers to intensify production for survival (Godoy, 2005). Having conducted a study on market liberalisation and rural livelihoods in Songea and Morogoro districts in Tanzania, Ponte (1998) suggests increased commercialisation of rural life, being a product of market liberalisation, as being the major reason for farmers' engagement in market production and subsequent changes in their crop choice. Commodity demand is another reason cited for subsistence farmers' engagement in market production. Farmers are said to respond to market demand by changing cropping strategies and intensity to obtain best returns (Ali, 1995). Subjected to Edwards' categorisation, the first explanation (as is the case with explanation on the physical environment and population growth) indicates a *problem-solving motivation* that was responded to by the farmers. In the second explanation, farmers' reaction could be in response to any of the three stimuli. The third explanation on commodity demand, however, indicates farmers' response to an *opportunity-motivation* stimulus. In other words, it can be deduced that the exogenous factors influence farmers' decision to apply changes in their production systems by producing *constraints* to be overcome or *opportunities* to be gained through the changes.

However, the two stimuli (*problem-solving and opportunity motivations*) can be viewed as components of *goal-directional motivation* in farmers' production decisions. When we ask the questions, 'why does the farmer need to find a solution to a problem in the production system?' and 'what is the motivation behind taking advantage of the newly perceived opportunity?' the answers to the two questions can be found within the *goal-directional-motivation.* This will, however, require adding another aspect to Edwards' example (that of achieving some *newly perceived goal*) which is to *maintain an existing goal*. The farmers seek to solve production problems such as those resulting from climate change, loss or reduced soil fertility, reduced land size or low productivity in general to *maintain* the *goals* that had originally led to the existing practice. Barlett (1980) refers to farmers' responses toward such

problems, aiming to maintain production, as 'adaptive strategies'. Taking advantage of a newly perceived opportunity, let's say for example production for the market, can likewise be for maintenance or improvement of existing goals, for which money is required. Within this line of thought, we can infer that farmers' goals[4] have an overarching effect on farmers' production decisions.

Various research findings have provided evidence on the significant role of goals (often in conjunction with farmers' values, attitudes or preferences) in influencing farmers' production decisions and subsequent actions (see e.g. Gasson, 1973; Ilbery, 1983; Fairweather and Keating, 1994; Costa and Rehman, 1999; Brodt et al., 2006). For instance, having studied the goals and values of hop farmers in West Midlands, Ilbery (1983:340) concludes that "an examination of goals and values provides a better understanding of farmers' motivation and attitudes, and in turn a more realistic explanation of their economic behavior." Expressing shortcomings towards the tendency of the innovation adoption and diffusion tradition in using the barriers to adoption approach in explaining farmers' non –adoption of desired practices, Brodt et al. (2006) in there study on farmers goals and management styles express:

> …Shortcoming of the barriers to adoption approach is that it recognizes only the negative side of technology adoption, i.e. factors that prevent adoption, and misses the positive side, i.e. incentives to adoption. By doing so, this perspective promotes a view of farmers as passive recipients of various structural and environmental constraints that are mostly beyond their own control. *While such constraints are indeed often significant and must not be ignored, an alternative view of farmers might see them more as agents actively pursuing their varied goals,*[emphasis added] making proactive decisions and acting within their broader constraints, as opposed to simply reacting to them (Brodt et al., 2006: 103).

Some studies have examined the influence of goals on direct farm management with regard to production efficiency and farm management styles (Padilla-Fernandez and Nuthall, 2001; Berkhout, 2009; Brodt et al., 2006; Fairweather and Keating, 1994). Padilla- Fernandez and Nuthall (2001) conducted a study of goals and efficiency among sugarcane farmers in the Philippine, and found that among other things, that the farmers' efficiency or inefficiency in production was partly a function of the farmers' goals and values. In another study conducted

[4] Following Gasson (1973: 524) this study defines goals as ends or states in which the individual desires to be or things he/she wishes to accomplish. The goals can be self- sufficient ends or instrumental to gaining more desired ends. People are said to make choices in attempts to satisfy needs, often expressed in the form of goals, which direct the decision - making (Hogarth, 1980; Byrnes, 1998; Hill, 1980; Edwards, 1992). This would in turn suggest a purposive and goal oriented agent (Turner, 1991; 2003) contrary to popular postulates that seem to suggest a deterministic nature of external factors on farmers' production decisions. Farmers tend to make choices within the context of their households (Netting, 1993). They are influenced by the household's needs and goals as well as by the resources available to the household (Barlett, 1980).

on farmers in Canterbury, New Zealand, Fairweather and Keating (1994) identified three management styles. They observed that the relative importance of desired goals was one way in which the management styles differed from each other, with goal priorities ranked most highly by each type. Likewise, Brodt et al. (2006) examined differences in the management styles of almond and winegrape growers in California's Central Valley, and found that farmers held many unique combinations of goals and values that resulted in different management strategies even where farmers grew the same crops within the same geographical region. Much research has, on the other hand, laid emphasis on identifying farmers' goals and/or values, the objective being to establish general categories and rankings of goals most and least salient to farmers relative to their production systems, through selected quantitative functions (Gasson, 1973, Ilbery, 1983; Costa and Rehman, 1999; Patrick, 1980; Van Kooten et al., 1986).

Nonetheless, Patrick (1980) cautions that general goals may have little or no influence on a particular decision made by a farmer. This could explain the lack of direct links between actual production decisions and the categorized goals by some studies. Instead, Patrick puts emphasis on the importance of specifying goals relevant to specific types of decisions being studied. He adds, "The researcher must make this evaluation on the basis of specific situation being analyzed"(Ibid: 201).

This study further argues that reliance on broad generalizations would obscure the understanding of farmers' personal goals and their influence on farmers' production decisions in any given agricultural system. This is more the case given that research on farmers' goals and other behavioural characteristics (values, preferences, attitudes etc) for explaining agricultural production is limited in developing countries (Berkhout, 2009) and Tanzania in particular. However, the bulk of existing research has been conducted and is more related to the developed countries, hence making some generalisations unrealistic, when bearing in mind the social, economic and cultural differences (Ilbery, 1983). Advocating for the necessity of identifying farmers' personal goals through farmers themselves, Fairweather and Keating (1994) state:

> Yet if we are to understand the ways in which farmers run their businesses, it is necessary to understand the goals that underlie their approaches to farm management, and to base this understanding on research methods that see farmers as the experts (Fairweather and Keating, 1994: 182).

1. 2.1 Conceptual framework

The numerous studies provide evidence on the significance of farmers' goals on production decisions at various levels. It would be correct therefore to suggest that farmers' goals are significant in explaining land use changes. However, very few (e.g. Edwards, 1992) have explicitly examined the influence of farmers' goals on the farmers' decision to change their production system, as in the case of the *vinyungu* farming system.

Figure 1.1 provides an analytical framework illustrating interrelationships that combine to result in changes in the traditional *vinyungu* farming system along the Little Ruaha River in Iringa region. It postulates that temporal changes in the vinyungu farming system are influenced by farmers' production goals in a three fold description: First, changes are a function of the individual farmers' attempts to solve problems (*problem-solving motivation*) arising within their production systems and in turn, threatening their existing gaols. For example, the farmer may, with time, become aware of changes in weather conditions, loss or reduced soil fertility (*information and learning*[5] *experiences from the physical environment-constraints*) that reduce his/her yields, hence jeopardising food security and/or income (*farmer's production goal*). This would compel the farmer to seek solutions in order to *maintain his/her production goals*. Likewise, solutions will be sought in the case where the individual farmer realises that input prices are high beyond their purchasing power (*information and learning experiences* from the *social environment – resources as constraints*) resulting from policy change. Insufficient inputs or the complete inability to purchase inputs in order to *maintain production* goals may lead the farmers to make changes in their production systems. However, the sought solutions will depend on the individual *farmers' decision environment*[6] (refer Figure1.1).

The above postulation might explain why the removal of subsidies on agricultural inputs and market liberalisation measures imposed under structural adjustment programmes in the early 1990s, received much attention in explaining agricultural change among Tanzanian scholars (see e.g. Hammond, 1999, Mwakalobo, 2000).

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[5] Learning is according to Found (1971:139) the process whereby an individual or group develops a behaviour pattern in response to situations through time. This can be a conscious process or may occur unknown to the individual. Fond expresses that learning in land use occurs in response to two types of information: (1) knowledge gained by the individual him/herself and (2) knowledge obtained from exogenous sources [the physical and social environment] through communication with others (Ibid, 1971:163).

[6] This concept is borrowed from Found (1971). He defines the decision environment as "The information available to the decision maker". However, this definition has been expanded in the context of this study to include a broader range of factors perceived to influence the individual farmers production decisions therefore the decision environment includes the interaction between information available to the farmer, the resources available , farmers production goals and preferences, and the farmers perceived constraints and opportunities in decision making.

Second, the changes in vinyungu farming system are a function of the farmers' changing goals and preferences[7] over time. The individual farmers may desire to change their production systems in order to improve on existing goals or in order to achieve new perceived goals (*goal-directional motivation*). The desire to improve on existing goals or to achieve new goals are postulated to be a function of *information and learning experiences* acquired by the individual farmers from the social and physical environment over time (Bandura, 1986) and across generations. The individual farmers' may acquire new *goals* (also needs, desires or aspirations) and *preferences* complementary to or in addition to those already in place. The source of these new *goals* and *preferences* stem from farmers' interpersonal relationships and mobility within and outside their respective villages (*social environment*). As the farmers interact daily with other farmers, family, friends, neighbours or even strangers (formally or informally), there is an exchange of *ideas, experiences and information***.** This interactive process becomes a *medium of information* sharing enabling *learning* and acquisition of *new experiences*. Moreover, new comers or migrants introduce farmers to different production methods, experiences and/or attain production outcomes which are attractive or admirable to the inhabitants consequently leading to change in production. Likewise, farmers' observations of their changing surroundings, in this case their respective and neighbouring villages, townships, cities and /or other regions, also provide them with new *learning experiences and awareness* that trigger the development of *new goals* and *preferences* or improvement of existing ones (Bandura, 1986).

Other means, through which *information and learning experiences* are conveyed to the farmers, are more formal and purposive in nature. Government institutions, NGO's, foreign investors, academicians and/or researchers purposively inform, educate or raise farmers' awareness on a range of issues. Through various government and private initiatives, farmers are made aware of what they ought to consider as an appropriate way or standard way of life. For example, the present Tanzanian government efforts for poverty alleviation which began in the mid 1990s can have such an impact. Formulated policies and strategies are to effect poverty alleviation both at grassroots and national levels, educating the masses on how to alleviate poverty and strive for better living conditions (URT, 2005b; URT, 2000; URT, 2004; URT, 2001).

[7] Changes in farmers' preferences are in this context described as changes in farmers' attitudes towards a set of objects or conditions, reflected in their decision-making over time (E.g. crop choice, production methods, production objectives etc.). Whereby objects or conditions that were earlier preferred are either no longer preferred or less preferred to other new or already existing objects or conditions.

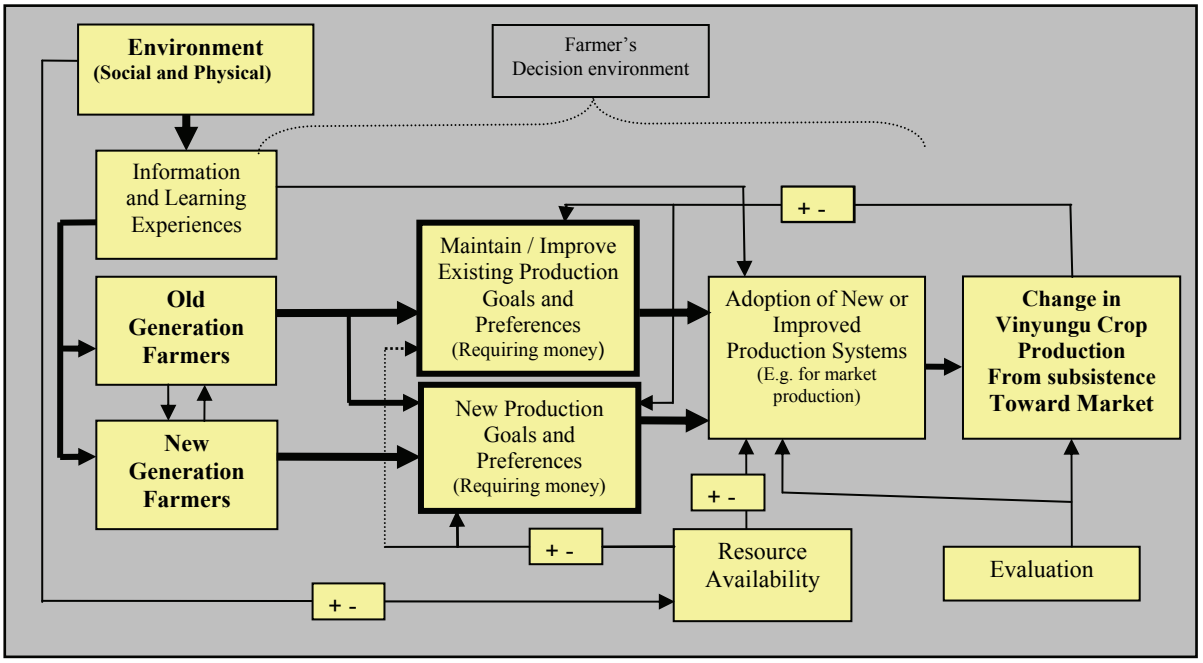
Conveyed to the farmers, such government initiatives may produce what one can refer to as *`induced goals and preferences´*. In the case where the newly developed goals and preferences are not attainable within the given production system, the farmers will consider alternative ways and means (Leonard, 2005; Henrich, 1997; Edwards, 1992). Nevertheless, this will be relative to the *information* that the farmers have on alternative production systems and the *resources* available to them (*farmers' decision environment* - see figure 1.1). This information is likewise attainable from the *environment*; it can be either through informal or formal channels or both.

Third and lastly, the role of *new generation farmers* (below 20 – 45 years old) over time is likewise postulated as a significant contributor to change in the vinyungu farming system. Several cases reveal that younger farmers tend to be more ambitious in their production goals as well as techniques (*opportunity-motivation*). In contrast to the *old generation farmers* (from 50 years old), *new generation farmers* are ready to take risks and to experiment with new and more profitable enterprises (Ilbery, 1983; Henrich, 1997). This could explain the introduction of new crop varieties and methods in vinyungu production system. Having been exposed to new forms of production technology, definitions and criteria of development, coupled with low to medium education levels and low or no employment opportunities, the younger farmers approach production with a different worldview compared to older farmers (*information and learning experiences – social environment*). Determined to change their future, they reject the setbacks experienced by their predecessors and strive to achieve a better standard of living (Henrich, 1997). Although the second postulation may be appropriated to both the *new* and the *old generation farmers*[8] (particularly the intermediate age group 40 to 55 years old), the *new generation farmers* are considered to engage in vinyungu farming having only new production goals. This is of course, relative to the initial goals (at time of engagement) of the *old generation* farmers, which may tend to change over time.

While the old generation farmers' were instrumental in providing their children with basic production knowledge as the children participated in family labour, the children having grown (*new generation farmers*) are now imparting knowledge to the *old generation*. As the new generation introduces new profitable production methods, having acquired knowledge from school and from peers (*social environment*), the old generation may be motivated to imitate (*incentive motivation* – Bandura, 1986).

[8] The study does not claim homogeneity of characteristics in regard to age groups. It only provides a majority perspective of the phenomenon. This means there are young and old farmers that do not necessarily fit into the description of the majority.

Figure 1.1 Changes in the vinyungu farming system



Key: + Providing opportunities **Source:** Author
- Constraining

The search for *alternative production methods* generally entails the search for information. The information on these alternative strategies will be through formal or informal sources or both (see figure 1.1). The formal sources may include agricultural extension officers, NGOs and other interested organisations. The informal sources may include asking friends, neighbours, family members and /or through observation and imitation of *successful-others* (Found, 1971; Bandura, 1986). The alternative production system to be adopted will then depend much on the nature of information received, how it is perceived by the farmer (this may have to do with farmers education), the farmers' ability to apply the information, the resources available to the farmer and the goal to be achieved (*decision environment*).

Whether the changes undergone in the farming system are a result of the farmer's attempt to accommodate new goals or to maintain existing goals due to changing environments, there is an evaluative process that the farmer adopts (directly or indirectly) that will result to a cyclic process leading to continuous alterations or changes in the production system. The system adopted will undergo evaluation in that, the outcome of the strategy will be considered against the goals set by the farmer. The extent to which the goal(s) has been met will determine whether the farmer will continue with the particular production system or seek yet another system hence, leading to further changes. However, the changes can be in form of minor adjustments or alterations (not adding significant change) until the preferred results are obtained (Found, 1971). Likewise, the farmer may opt to try out the system or method in

small portions first to ensure its feasibility in terms of costs and benefits as well as personal capability, before fully adopting (Found, 1971). In the case whereby the farmer perceives the system unsuccessful, a search for another alternative may be triggered.

The postulations above have attempted to provide an explicit conceptualisation of the role of farmers' goals and preferences in bringing about change in crop production systems. The study adopts this conceptualisation as an analytical framework in providing an understanding of the interrelationships that have combined to bring about changes in vinyungu crop production along the Little Ruaha River valley bottoms and /or floodplains.

1.3 Organisation of thesis

This thesis contains six chapters. Chapter one introduced the problem, objectives and the conceptual framework of the study. Chapter two provides a detailed description of Iringa region and the selected study area. It also presents the methodological approaches of data sampling, data collection and data analysis and presentation.

Chapter three introduces the reader to the traditional meaning of vinyungu and provides a description of the characteristics of traditional vinyungu production system between 1950 and 1980s. The traditional production techniques, seasonality and crop types are also described. The chapter further provides farmers' perspectives and reasons for their engagement in vinyungu crop production between 1950s and 1980s.

Chapter four provides a detailed account on the transformation of the traditional vinyungu farming system between 1990 and 2005. The first section of the chapter (4.2) presents the farmers' reasons for engaging in vinyungu crop production between 1990s and 2005. Changes in the system's production characteristics within this period are described in the second section (4.3). The third section (4.4) examines farmers' decision making characteristics under transition towards market production. The final section of the chapter (4.5) presents farmers' perspectives on the reasons for transformation in the vinyungu farming system. It attempts to show the role of farmers' goals in the transformation of the traditional vinyungu farming system from a purely subsistence towards a market oriented production system.

Chapter five discusses some of the socio-economic and environmental implications of changes in the vinyungu farming system. Chapter six contains the summary and conclusion.

CHAPTER TWO
STUDY AREA AND METHODOLOGY

2.1 Study area

2.1.1 General description

This study was conducted in the Southern Highlands of mainland Tanzania in Iringa[1] region. The region is located approximately between 6°50' and 10°30' south, and 33°45' and 37°00' east. It consists of seven administrative districts, namely: Mufindi, Iringa rural, Iringa urban (municipality) Kilolo, Njombe, Ludewa and Makete (see map 2.1). The region has an area of 58,936 km^2 of which 55,864 km^2 (88%) is land area and 2,072 km^2 (12%) is water (URT, 2007). 73% is arable land and the rest is grazing, game reserves, forest reserves and waste land (URT, 1997).

The region's altitudes ranges from below 500m to 2,700 m above sea level (a.s.l.). Dissected, hilly-to-rolling plateaus and valleys of tectonic origin partly characterise the topography of Iringa. The most common landform is a big plateau that covers a wide portion of the total area in the region (URT, 1997). Three other major landforms in Iringa region as described by the URT (1986) include:

- Hills with relief intensity ranging from 140 to 220 m/km², highest elevation of 2,020 m a.s.l. and the lowest position 1,580 m a.s.l. The slopes range from 5 to 55%.
- Peneplains with relief intensity ranging from 60 to 120 m/km², highest and lowest elevations are 2,040 and 1,580 m a.s.l. respectively. The slopes range from 1 to 30%.
- Alluvial valley bottoms with relief intensity of 5 m/km² and slope of between 0 and 2% (URT 1986; quoted in Majule and Mwalyosi, 2003:8).

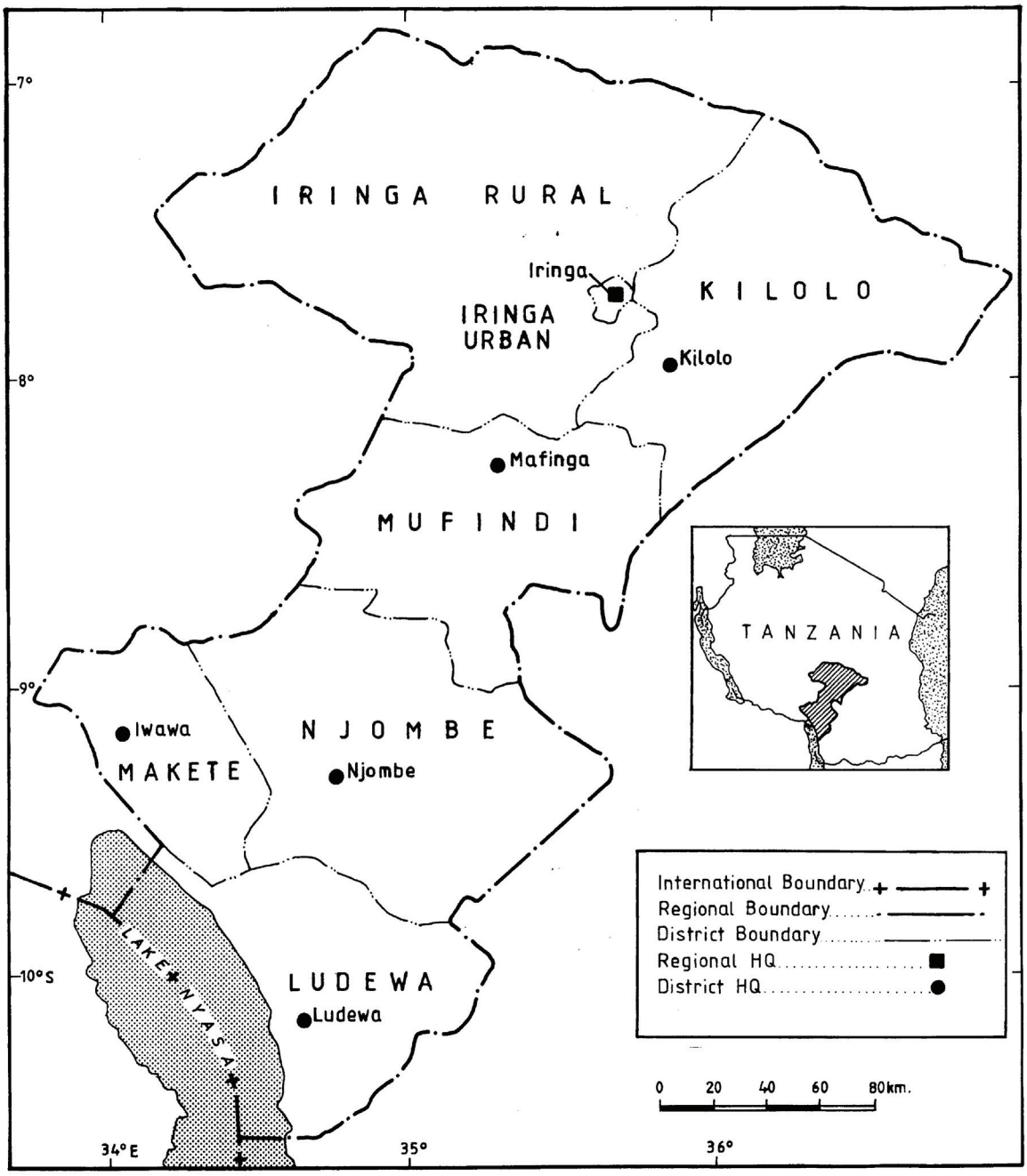
Moreover, Iringa region forms part of the Indian Ocean drainage zone. The Great Ruaha River with the Little Ruaha River, its major tributary, joins the Rufiji River outside the region forming part of the Rufiji River basin (URT, 1997; 2007) which is the largest in the country and of unquestionable national significance. Together with these major river systems, the region is endowed with a number of perennial streams which are potential for irrigation farming especially during the dry season (DANIDA, 1982; Mkavidanda and Kaswamila, 2001).

[1] The name 'Iringa' is a corrupt form, by the first Tanzanian colonial masters (the Germans), of the original Hehe word 'lilinga' meaning fortress. The Germans considered Iringa as a war zone or country in which the only way intruders could survive was behind a fortress. They therefore built their own 'lilinga' (or Iringa according to them) at the present day site of the now regional capital. Both the regional capital and the region have adopted the name 'Iringa' to date (URT, 2007:1).

The general rainfall pattern in Iringa region is mono-modal with one rainy season from November to May and dry conditions during the remaining part of the year (RADP 1986; Majule and Mwalyosi 2003). The mean annual rainfall is about 1000 mm whereby 900 mm falls during the rainy season (December - May), and 100 mm of rain falls between June and November (DANIDA, 1982; Mjule and Mwalyosi, 2003). However, altitude, topography and vegetation tend to influence climate considerably, causing micro climate in specific localities and macro climate in larger areas. Consequently, three distinctive climatic zones are identified in Iringa region. These are the highlands, midlands and lowlands zones. The highlands zone lies at an altitude of 1,600 to 2,700 m a.s.l. temperatures are normally below 15°C with rainfall ranging between 1,000 and 1,600 mm per annum, falling in a single season from November through May. The rain season is followed by a dry and cold season that lasts from June to September. The midlands zone lies at the altitude of 1,200 to 1,600 m a.s.l. with temperatures ranging from 15°C to 20°C. The average rainfall is between 600 and 1,000 mm per annum. The lowlands zone lies at the altitude of 900 to 1,200 m a.s.l. Temperatures vary between 20 °C and 25 °C with low rainfall ranging between 500 and 600 mm per annum (URT, 2007; URT, 1997).

The three climatic zones further translate into three distinctive agro- economic zones. URT (2007:28) defines an agro-economic zone as "an area in which agricultural conditions are sufficiently homogenous to warrant the adoption of a single agricultural policy". The distinctions are made on the basis of economic activities, topography, altitudes, climate and vegetation. The agro-economic zones are therefore indistinguishable from the three climatic zones being also classified as highlands, midlands and lowlands zones. Agricultural production, livestock rearing and fishing are the region's main economic activities with forestry, mining and trading as minor contributors. Identified among *'the big four'* regions[2] of surplus food production (chiefly maize), agriculture is the largest sector in the economy of Iringa region. It employs about 90 % of the region's working population of 767,669 according to the 2002 census (URT, 2007). The region's total population was 1,490,892 with a growth rate of 1.6 % per annum (URT, 2002). Agriculture dominated by peasantry farming contributes over 75 % of the region's economy. Rain-fed agriculture is the predominant form of production complimented by small scale irrigation systems and traditional irrigation systems such as vinyungu farming.

[2] Others include Mbeya, Ruvuma and Rukwa regions



Map 2.1: Administrative Districts in Iringa Region

Source: Cartographic unit - University of Dar es salaam.

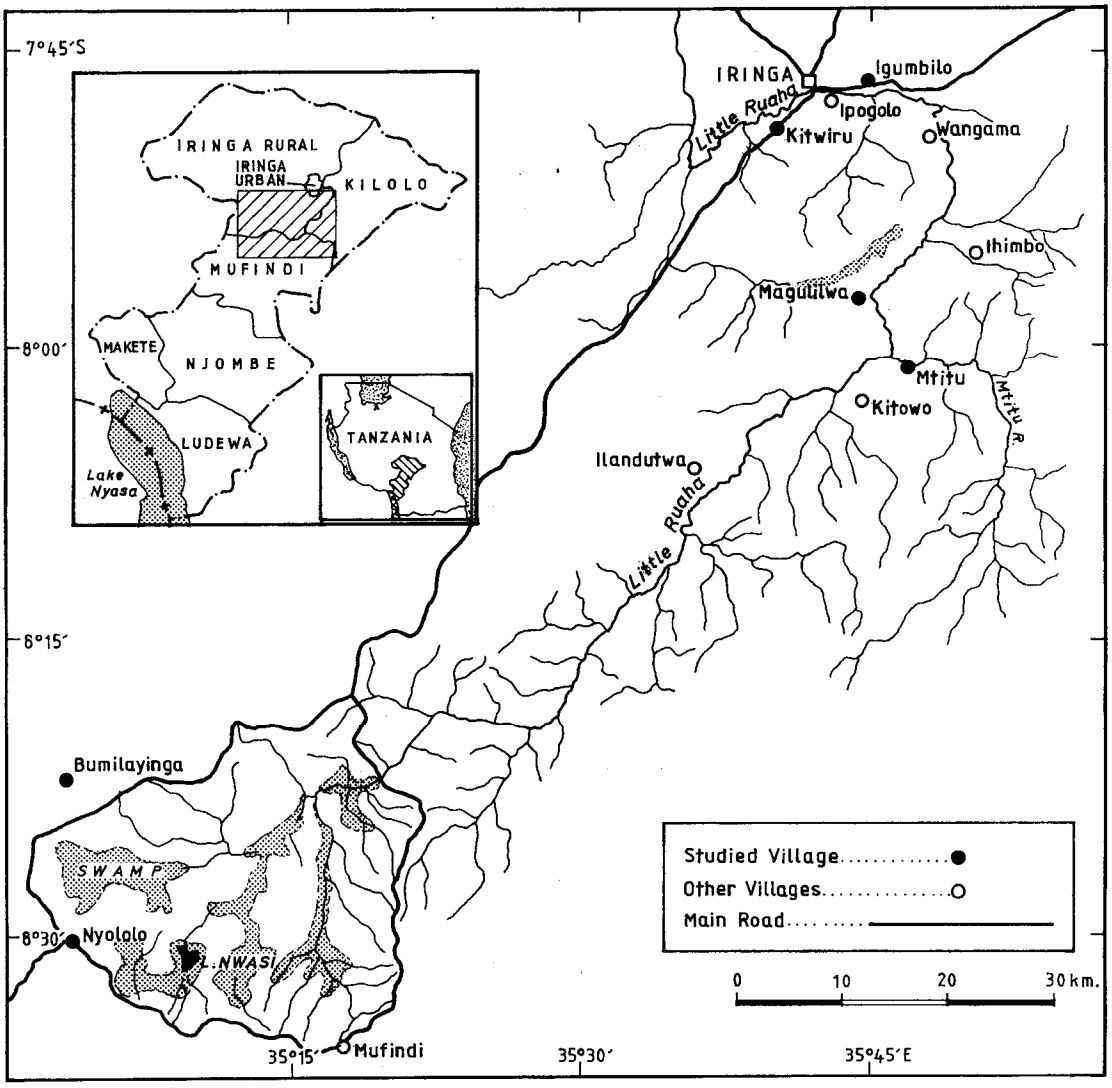
2.1.2 Selection of the study area

This research was conducted in villages located along the Little Ruaha River incorporating those valley bottoms and floodplains associated with the Little Ruaha River, from the head waters in Mufindi District, following it through Kilolo, Iringa Rural Districts, to Iringa Urban (see map 2.2). The little Ruaha River headwaters are found about 100km southwest of Iringa on the Mufindi plateau. The river flows generally towards the northwest of Iringa where it ultimately joins the Great Ruaha River outside the region. It drains the highland plateau to the east of the Tanzania –Zambia highway. At Iringa (urban), the catchment is about 3,100 km^2.

Prior to the preliminary research, the study's original focus was to cover the villages surrounding only the headwaters of the Little Ruaha River in Mufindi district. The area had attracted the researcher's interest after having been informed of its potential and the consequent agricultural developments that were taking place in the area but with negligible research coverage (IRA, 2003) on the factors influencing the development. Being a major tributary and hence contributor to the Great Ruaha River[3] (which had raised the nation's concerns due to significant reductions in its water levels) it was of the researchers opinion that the changes taking place at the source of its major tributaries be well understood. The researcher's interest was, however, also in line with on-going national research efforts which lay emphasis on obtaining a better understanding of the processes surrounding the nation's wetlands and their social, economic and environmental implications (Kamukala and Crafter, 1993; IRA, 2003).

However, after the researcher's personal visit to the site and after consultations with the regional agricultural office in Iringa, at the commencement of the preliminary field research, the original scope proved too small and hence insufficient to meet the research objectives. At this point, it was also brought to the researchers attention that the changes were not endemic to the Little Ruaha River headwaters only but had been concurrently taking place in many other locations along the Little Ruaha River as well as in other parts of the region. Given this fact, it seemed practical to the researcher to involve a larger segment of the river enabling the collection of more comprehensive data and hence better results, relative to the set objectives. Being among the important attributes sought after by the researcher, the expansion of the study's scope took into account the diverse characteristics possessed by villages located along the Little Ruaha River and its tributaries. The river flows alongside villages of varied characteristics. The village locations range from those in high altitudes, remote and rural areas, to middle altitudes mixed areas (possessing both rural and urban characteristics) situated along the highway. This diversity was to ensure the inclusion of a wide range of vinyungu farmers (and hence goals and preferences) as well as vinyungu farming practices. The case study therefore, involved six villages located, along the Little Ruaha River, in four districts of Iringa. These villages are namely: Nyololo and Bumilayinga villages in Mufindi district; Magulilwa village in Iringa Rural; Mtitu village in Kilolo district; Kitwiru and Igumbilo villages in Iringa municipality (see map 2.2).

[3] The Great Ruaha River supports one of the nation's main sources of hydro-electricity



Map 2.2: Sampled Villages

Source: Cartographic unit – University of Dar es Salaam

2.2 Methodology

Qualitative methods are best used for problems requiring depth of insight and understanding especially when dealing with explanatory concepts (Robinson, 1998). These techniques are essentially descriptions of people's presentations and constructions of what is occurring in their world (Eyles, 1988). Yates (2004) sums up all these aspects suggesting that qualitative work often attempts to do one or more of the following:

- Achieve an in-depth understanding and detailed description of a particular aspect of an individual, a case history or a group's experience(s);
- Explore how individuals or group members give meaning to and express their understanding of themselves, their experiences and / or their worlds;
- Find out and describe in detail social events and explore *why* they are happening, rather than how often;

- Explore the complexity, ambiguity and specific detailed processes taking place in a social context (Yates, 2004:138).

The main objective of this study has been to provide an *in-depth understanding* of *why* and how change in the vinyungu farming system has *happened* or is *happening*. With the farmers considered as the main actors, the study achieves this objective through analysis of *farmers' presentations* of the phenomenon with regard to *their experiences* within *their own world*. Therefore justifying the methodological approach adopted.

2.2.1 Sampling procedure

Village sampling

The researcher was not well acquainted with all the villages engaged in vinyungu farming found along the Little Ruaha River. For this reason, the village sampling was conducted during the preliminary research stage with the assistance of district agricultural officers and agricultural extension officers. A list of suitable villages was established. However, it would not have been possible to cover all the listed villages along the river's stretch. For this reason, the selection covered different parts of the river channel from the headwaters in Mufindi district to the flood plains of Iringa municipality, taking into consideration the variations in village characteristics, time, financial limitations and village accessibility. Another consideration was that the researcher tried as much as possible to avoid villages that had already been visited along the lines of vinyungu farming. This is with the exception of one village (Mtitu) which had already been researched (see for example Majule and Mwalyosi, 2003). This exception was made because the extent of vinyungu production in this village is relatively large compared to the other selected villages associated with the Little Ruaha River hence adding to the attribute of diversity. The reason for attempting to avoid already researched areas was in order to obtain originality in the farmers' responses in relation to vinyungu farming. Six villages namely: Kitwiru in Kitwiru ward, Igumbilo in Igumbilo ward, Magulilwa in Magulilwa ward, Mtitu in Kilolo ward, Nyololo in Nyololo ward, and Bumilayinga in Bumilayinga ward were ultimately selected (see table 2.1).

Table 2.1: The Total Population by Wards and Villages in the study area

	District	Ward	Type	Population	Village	Population
1	Iringa Urban	Kitwiru	Mixed*	7,211	Kitwiru	909
2	Iringa Urban	Igumbilo	Mixed	10, 829	Igumbilo	1,233
3	Iringa Rural	Magulilwa	Rural	26,327	Magulilwa	4,234
4	Kilolo	Mtitu	Rural	19,983	Mtitu	2,438
5	Mufindi	Nyololo	Mixed	10,385	Nyololo	1,697
6	Mufindi	Bumilayinga	Rural	5,557	Bumilayinga	1,349

* refers to areas possessing both urban and rural characteristics

Source: URT (2002)

Population sampling

Unlike quantitative sampling, qualitative research does not aim to be statistically representative. Therefore, importance is placed on the depth and richness of encounters rather than the number of people who participate in the study. The sampling therefore stopped after reaching a point of data saturation (a point at which the researcher is no longer hearing new information). A purposive sampling procedure to select participants was employed. The participants were chosen according to specific criteria put forward by the researcher, to meet the set objectives. Due to the fact that there was no data available on the specific characteristics of individual farmers and their farming activities in the villages, the village leaders and village agriculture extension officers were helpful in identifying the farmers that best fulfilled the set of criteria. A total of 84 individual vinyungu farmers were selected from the six villages.

The selected participants included firstly, those farmers who had been practicing vinyungu farming from the 1950s or earlier. Respondents under this category were those aged 60 years and above (that is the *old generation farmers*). This category of farmers provided historical information on the general developments in vinyungu farming from the 1950s or earlier to the time of the interview (2005). Moreover, being the *old generation* their narratives and/or life histories on the changes that they personally made in vinyungu farming throughout the years and their reasons for making the changes proved valuable in providing a deeper understanding of change in vinyungu farming system.

Secondly, the sample included participants who adopted vinyungu production in the subsequent decades (that is, after the 1950s) including the 1960s, 1970s, 1980s, 1990s and 2000 – 2005 (at the time of the research). The reason for this sampling approach was among others to enable the assessment of the reasons for farmers' engagement in vinyungu farming relative to their respective periods. Moreover, different age groups including the young, middle and old farmers were taken into consideration. This age differentiation was regarded useful in distinguishing the goals and preferences of different age groups across time and generations especially between the *old generation* and *new generation farmers*.

The majority of the respondents were males (see table 2.2). This is because, being the head of the home, customs and traditions in Iringa dictate that the male be the spokesman for the household (except in the case of their absence). However, it appears that some have begun to move away from these traditional boundaries. The researcher encountered two cases where men gave the privilege of spokesperson to their wives. In one case, the reason given that "she knows better". In the course of the interview though, it was discovered that the man was also involved in some non-farm activities hence the wife managed a greater part of the farm activities. In the second case, the man simply said, "We work together and decide together so she can as well explain, I have no problem". Other instances where the researcher was able to speak to women in their households were where the husbands were, for some reason, not at home. When the researcher specifically requested that women be among the identified interviewees, the majority of those identified (five in total) turned out to be widows who were now heading their households.

2.2.2 Data collection

The study employed a combination of qualitative data collecting techniques. Three types of in – depth interviewing strategies were applied. These included 1) an interview guide approach, 2) informal conversational interviews and 3) group discussions. The first two techniques were used for individual respondents. Group discussions were conducted during the preliminary research stage and the follow up stage. The preliminary research was, among other things, instrumental in identifying the appropriate data colleting methods for the main field research.

Individual interviews

Individual interviews were conducted during the main research between October and December 2005. An interview guide (in Kiswahili language) was prepared in advance, outlining the specific topics and issues to be covered. The themes among others included the respondents' personal information; crop production practices in vinyungu; reasons for

farmers' production decisions; changes in vinyungu practices. The wording of questions and the sequence in which they were asked varied from one interviewee to the other. This depended very much on the flow of the conversation with the interviewee. There are concerns that flexibility in wording and sequencing would lead to variations in the questions posed hence reducing the comparability of responses (Kitchen and Tate, 2000). The researcher tried to avoid this outcome by repeating questions that seemed to produce varying responses, by rephrasing them within the course of the discussion.

There were occasions where it was necessary to apply the interview guide approach and informal conversations simultaneously. This is because some respondents were very free and willing to take time in conversing on specific themes. This technique was mostly popular with the older respondents who were keen to narrate their life histories and those of their surroundings. Such discussions were encouraged. During such discussions, the researcher slotted in relevant and prompting questions whenever it was appropriate. This strategy enabled the acquisition of some useful information especially with regard to past practices in vinyungu and the farmers' past lifestyles. Interviews conducted in this fashion took up to two hours, while most interviews ranged between thirty minutes and one and a half hours. The former indicating most of those interviews conducted near to or at the point of data saturation. All the interviews were conducted in Kiswahili language. Although Kiswahili and English are both official languages in Tanzania, Kiswahili is the national language (that is spoken nation wide).

The majority of the interviews were conducted in the valley bottoms, at the farmers' place of work (at their vinyungu plots). This was done for two main reasons. One, it was a way to verify their responses in relation to vinyungu production and two, it was for observation's sake. The few interviews that were not carried out in the valleys were either conducted at the respondents place of residence or at the village office. The limited time in which the farmers worked in the vinyungu (usually from very early in the morning to around 12 noon or 1:00 pm in the afternoon, did not offer enough time to interview a large number of respondents at their vinyungu plots. At this time, it is normally too sunny and hot to work (dry season). Therefore, most farmers retired early and returned to their plots later in the evening. However, the evenings were not appropriate for interviewing, as the farmers tried to accomplish their tasks (mainly irrigating) before it became dark. Hence having to sit down for an interview for as little as half an hour would have inconvenienced the farmers and would have probably yielded negative results. Hence, other interviews were conducted at the farmers' residence during their time of rest.

Key informant interviews

Apart from the individual interviews with vinyungu farmers, 21 key-informant interviews were also conducted in order to shed light on more technical aspects. The information helped to shed more light on the farmers' responses in relation to some specific themes. The district agricultural officers for instance, provided information on the status of vinyungu production within their districts in general. They were also instrumental during the initial stage of village selection. Informal conversations were also held with five agricultural extension workers from the sample villages. These provided information on some technical aspects of vinyungu crop production in their areas. They also assisted in the selection and recommendation of farmers to be interviewed. Village executive officers (VEO) also were helpful in providing official information relating to their respective villages and farmers as well. The researcher also sought the audience of one district community development officer (in Mufindi district) to find out the role played by the district office in terms of education provided to farmers on developmental issues. This contact was made in the attempt to find out the channels through which the farmers acquire information influencing their perception on development. Others included district land and water officials whereby the objective was to obtain information on the various rules, regulations and policies that have a direct or indirect effect on the farmers' decisions. Financial resources determine to a great extent the farmers' production decisions as well as their ability to produce. It was therefore considered appropriate to visit some officials from institutions providing credit services which included Mufindi Community Bank Ltd. (MuCoBa) in Mufindi district, and the Savings and Credits Cooperative Societies (SACCOS) in Iringa Municipality.

Group discussions

Group discussions in five villages namely: Nyololo, Bumilayinga, Kitwiru, Igumbilo and Kalenga villages were conducted during a six weeks preliminary field research (carried out between February and March 2005). The group discussions were to achieve a number of objectives at that early stage. Firstly, the discussions were to help determine an appropriate study area for the main research. They were useful in providing information on the characteristics and importance of the vinyungu farming system in the areas. Such information later led to the exclusion of Kalenga village in the study. Secondly, the group discussions helped to disclose the extent and general nature of changes that had occurred within vinyungu farming system over time.

Four of the group discussions (in four different villages) took place in the village executive officer's office and one (in Bumilayinga village) was conducted in the midst of vinyungu

plots. The groups consisted of both male and female vinyungu farmers, of middle to old age. The total number of group discussion participants in four villages (excluding Kalenga village) was 36 with group sizes ranging between seven and thirteen farmers per group (see table 2.2). The village agricultural extension officers together with the village executive officers assisted in the identification of participants. The discussions lasted between 60 and 90 minutes.

Few individual interviews were also conducted in Igumbilo village in addition to the group discussion that was held in the village during the preliminary research stage. The intention was to compare the responses given by the farmers as a group, with the responses given by the same farmers as individuals. Kitchin and Tate (2000:215) point out that "a group discussion might produce different perspectives to one-to-one interviews concerning the same issues." Therefore, the approach was to assist in selecting the most informative method to be adopted during the main research.

Through this technique of tool testing, it was established that farmers provided more detailed information when interviewed alone than in groups. This was particularly the case for sensitive information concerning their personal survival strategies and welfare. Due to the cultural and traditional beliefs and superstitions that are still very much a part of rural life in most parts of Tanzania, most people would not feel comfortable exposing their personal affairs in public. This observation was once more confirmed during the main research. The researcher commenced the interviews being accompanied by the village executive officer and the village agricultural extension officer who functioned as guides. During the second interview, the researcher noticed the reluctance of the interviewee in conversing about such themes as the amount of produce, sales and his personal goals of production. After the interview, the two officials revealed to the researcher that the respondent had not been truthful and that he had considerably reduced the scales of his production as well as the amount of produce that he marketed. The researcher associated the farmer's behaviour to the presence of the two officers. This inference was made with respect to the researcher's experience during the preliminary field work. After this observation the researcher requested to be left alone with the respondents and was able to obtain very insightful information. For these reasons, the main research did not involve group discussions rather the information obtained in discussions conducted during the preliminary research are used to complement the individual interviews. Magulilwa and Mtitu villages were not part of the preliminary research but were earmarked for the main field research, hence no group discussions were conducted in the two villages.

The group discussion method was also applied during a brief follow-up in Kitwiru and Igumbilo villages conducted three years and seven months or 43 months (on the16th and 17th of July 2009) after the main field research. The group discussions comprised a total of seven (two males and five females) discussants. Six out of the seven discussants took part in the main field research, including two agricultural extension officers (making nine participants). The main objective was to follow up on the continuity of changes in the vinyungu farming system and the implications of the changes as of that period. Time and financial constraints[4] limited the follow-up field study to only two villages.

Table 2.2: The number of individual and group interviewees per village

Village	**Number of interviewees (individual famers)**		**Groups (Preliminary field research)**		**Total**
	Males	Females	Males	Females	
Bumilayinga	2	6	7	2	**17**
Igumbilo	7	2	6	1	**16**
Kitwiru	9	3	5	2	**19**
Magulilwa	17	3	Not conducted		**20**
Mtitu	15	1	Not conducted		**16**
Nyololo	14	5	11	2	**32**
Total	**64**	**20**	**29**	**7**	**120**

Source: Author's fieldwork (2005)

Recording of interviews

> Audio recording of an interview allows you to accurately record an interview word-for-word with a minimum amount of effort. Recording the interview does allow you to concentrate fully upon the discussion rather than trying to balance conversation and note taking (Kitchin and Tate, 2000: 218).

All interviews and group discussions (with the exception of some few expert interviews) were tape recorded (that is audio recording). Care was taken to ensure that the interviewees were aware of the fact that the discussions were being recorded. Therefore, their consent was

[4] The follow –up field study was a self sponsored initiative.

sought and they were assured of the discreetness of our conversations before beginning the interviews. All the interviewees granted their consent and appeared comfortable throughout the session. The session began with informal conversations in order to build rapport and to remove the respondents' attention from the tape recording, before slowly entering into specific themes. In order to avoid distractions, and the feeling (on the part of the interviewee) that the researcher's attention was more focused on the tape-recorder rather than the interviewee, the researcher avoided direct involvement in operating the tape recorder (that is, turning over the cassette or changing a cassette or batteries). Instead, an assistant was engaged for this purpose. This enabled the interviewer to concentrate fully upon the discussion, rather than trying to balance conversation and the technical aspects of the interview. Note taking was also minimised for the same reason. Only few aspects were jotted down while trying to maintain a casual and friendly mood rather than being formal. Two mini-tape recorders were operated concurrently during each interview session. The second tape recorder functioned as a back-up avoiding the risk of loosing data in case any technical problems arose with one of the tape recorders.

Observation

The research adopted a straight (overt) observation approach. There was no direct engagement in the farmers' activities (with few exceptions, where assistance was given to one or two farmers) rather the researcher visibly observed how the farmers went about their production activities in their vinyungu plots (with the full awareness of farmers). This approach also served as an on-the-spot guidance for some of the questions that the interviewees were asked. Questions associated with land acquisition, land size, crop types, choices combinations and crop-plant patterns together with other practical issues arose in the course of the observation. The observation also included assessing the physical appearance of the plots on which crop production took place. Photographs were taken as illustrations for better understanding.

Moreover, observations on the extent of changes were made relative to the narratives provided by the farmers. Descriptions on what used to be and what was currently existing, were made clearer through the farmers physical illustrations in the valleys. Such descriptions as "do you see that tree there or that hill… that is where we used to … in the 1950's or 1970s" proved helpful in drawing a more vivid picture of what had transpired in these areas over time. Apart from the physical and practical aspects connected to vinyungu production, some social issues such as the characteristics of those producing in the vinyungu plots in terms of gender and age, were among things that were observed. Social relations within the working environment such as division of labour were likewise observed. Moreover, some observations

were also made at the farmers' places of residence to verify changes that farmers claimed to have made resulting from goals that were set and met through vinyungu farming. Some of the aspects observed included the farmers' new house structures, shops and livestock.

Secondary data sources

Secondary data were collected through published and unpublished materials, including regional, district and village reports and documents used to substantiate information acquired through primary data sources and to contribute relevant information such as statistical information pertaining to the study area. Newspaper articles on themes relevant to the research were also utilised.

2.2.3 Data processing, analysis and presentation

The tape recorded individual and group interviews were all transcribed. Each interview session and group discussion was typed as a single script to ease handling of data. The transcribed data were studied and annotated (manually). The data were categorised first into master categories based on general themes relative to research objectives, followed by sub-categories (more specific issues under each theme). The master themes included: 1) Production decisions and methods 2) Resources (availability and accessibility) 3) Information sources 4) Production Goals 5) Changes in vinyungu production (past and present) 6) Others (incorporating implications). Thereafter the data was broken up (relative to themes) and coded (that is assigned to specific categories) in order to identify similarities and differences between data.

The data analysis involved linking and connecting the sorted and reorganised data (from the various categories) in order to identify the nature of relationships between data that is, how things associate and how they interact (Kitchin and Tate, 2000: 247). The associations and interactions sought after included firstly, the things that were associated with the engagement of farmers in vinyungu crop production over time and across generations (chapters three and four). Secondly, the associations and interactions that resulted to changes in the traditional vinyungu farming system including its transformation from subsistence towards a market production system and the resultant implications of the transformation (chapters four and five). The associations and interactions were established based on the farmers' introspective detailing from interviews and group discussions and from relevant supporting literature.

The analysis is textually presented. Text boxes are used for narratives and life histories that provide important insights. Visual illustrations such as tables, photographs and maps have also been used where applicable, to aid understanding.

CHAPTER THREE
THE TRADITIONAL VINYUNGU FARMING SYSTEM IN IRINGA REGION

3.1 Introduction

Vinyungu, a traditional irrigation farming system, is not a new phenomenon in Iringa region. It has existed for over a century. It is suggested that the origin of this practice traces back to the Bena tribe in Njombe district dating from the1890s (Culwick and Culwick, 1935) from whence it erratically spread to other districts within the region. However, having studied *vinyungu* farming in Njombe district, Lema (1996) informs that none of his informants could precisely recall when or where *vinyungu* cultivation began within the district. He suggests that the informants' failure to recall the origin of this practice is an indication that "The practice is as old as the tribe itself." Unfortunately, he does not provide us with the age of the tribe. Culwick and Culwick (1935) however provide us with a hint as they note that the tribe migrated to the area (Njombe) between 1860s and 1870s. Notwithstanding, the spread of this farming system has not been uniform. Giving an account of Kalenga division in Iringa district, Majule and Mwalyosi's (2003) study reveals that the system existed earlier than 1939. Most of the interviewed farmers who have been practising *vinyungu* farming since the 1950s also confirmed that the *vinyungu* production system had existed in several parts of Iringa region, including some parts along the Little Ruaha River (though very patchy) before the 1950s.

This chapter provides a description of the traditional *vinyungu* farming system. The chapter aims at creating an understanding of the constituents of the original traditional *vinyungu* farming system before its various transformations. Additionally, the chapter reveals the reasons and influences behind the farmers' engagement in vinyungu farming from the 1950s to the 1980s. It further examines how farmers acquired and/or accessed land, and participated in the market within this time frame. Much of this description relies on farmers' narratives and life histories backed up by secondary data.

3.2 Defining traditional vinyungu

Different scholars have defined the *vinyungu* farming system focusing on various (and at times overlapping) characteristics of the system. Box 3.1 provides an outline of some of the definitions which collectively summarise the basic characteristics of the vinyungu farming system by answering the questions: where, by whom, how, when, what, and for what purpose it is practised. This study adopts these definitions collectively, embracing the mentioned

characteristics. It therefore defines *vinyungu* as '*a traditional irrigation farming system in Iringa Region practised by smallholder farmers on camber-beds or raised beds in valley bottoms or floodplains utilising natural moisture or water, undertaken during the dry season for subsistence production of maize, beans and an assortment of vegetables.'* The dry season aspect and that of subsistence production are nevertheless only applicable in defining the *traditional vinyungu farming system* and not the c*ontemporary form* of the system (discussed in chapters four and five).

Box 3.1: Variations in defining the vinyungu farming system

Small areas of raised beds…in valley bottoms and along stream beds (Lema, 1996:141).

An ingenuous camber-bed type of cultivation… practised by smallholder farmers in...districts of Iringa administrative region to grow maize, beans, peas, and vegetables during the dry (June-November) season. (Kayombo et al., 1999:91-92)

Is a valley bottom dry period farming practice in which farmers harness water from rivers and or springs to produce both food and cash crops at subsistence level using traditional irrigation techniques. (Mkavidanda and Kaswamila, 2001: 1)

Vinyungu farming is a traditional farming system in Iringa Region practiced by smallholder farmers usually in valley bottoms or floodplains…undertaken…during the dry season in order to maximise the available moisture or water (Majule and Mwalyosi, 2004: 2 and 2005:116)

Although definitions of what constitute *vinyungu* include some commonly agreed features there are varying explanations on the origin and verbalization of the term itself. For instance, some studies suggest that the term *vinyungu* is a Swahili version of the Bena word *kinyunga* (singular) or *fiyungu* (plural) (Lema, 1996). Mkavidanda and Kaswamila (2001) agree that *vinyungu* is a Swahili version of the Hehe / Bena word but opine that its plural form is *fyungu*. Others argue that *vinyungu* is a 'local' collective term for *kinyungu* (singular) (Majule and Mwalyosi, 2004:2). 'Local' in this context appears to suggest that this is the actual term used by the indigenous people, the Bena tribe, hence opposing the suggestion that it is a Swahili version of the indigenous term. On the other hand, Mbwambo (2006) in a newspaper article on *vinyungu* narrates that the name came about during the dry spells in Iringa, when farmers decided to grow pumpkin seeds in valley bottoms. He explains that the local name for the seeds is *kinyungu,* hence the name which was later associated with vegetable farming in valley bottoms. On his part, Ngatunga (2008: 90) contends that the word *vinyungu* means, "numerous crop fields located in valley bottoms."

Based on these mixed views regarding the term *vinyungu*, an inquiry was conducted among the indigenous people of the Bena tribe. This was borne out of the fact that this farming practice was said to have originated from Njombe District (Lema, 1996). These people provided the correct orthography and pronunciation of the terms expressed above. They corrected Mbwambo (2006) pointing out that the name for the pumpkin-seeds is in fact *nyungu* (coinciding with researchers personal knowledge) and not *kinyungu*. They expressed however that there was a possibility that the name *kinyungu* might have originated from the earlier practice of growing pumpkins on these plots of land since the word partly carries the name of the pumpkin seeds (*nyungu)*. They also replaced the terms *fyungu* (plural) and *kiyunga* (singular) with *fiyungu* (plural) (as was suggested by Lema) and *hiyungu* (singular) respectively. However, this study adopts the said Swahili version *kinyungu* (singular) and *vinyungu* (plural) due to their regular usage in available literature and among the majority of people. Moreover, the farmers in the study area consisting predominantly of the Hehe tribe seem to have adopted the said Swahili version[1].

3.3 Characteristics of the traditional vinyungu

Traditionally the *vinyungu* farming system is a small-scale irrigation farming system commonly practised in valley bottoms and flood plains. It utilises natural soil moisture resulting from a high water table characteristic of most valleys and floodplains of Iringa region (Ravenborg, 1993; Majule and Mwalyosi, 2005) or water from springs, streams and rivers. The system was commonly practised during the dry season when production in the dry land (rain-fed production) was not possible. The main implements used included: machetes, sticks and hand hoes. The machetes were used for clearing the plots while the sticks were for gathering and pilling the cleared vegetation (for burning). The hand hoes were for tilling the ground and creating soil-mounds (while simultaneously creating trenches) during the construction of camber-beds (see photos 3.1 and 3.2 for illustration). Lema and Kayombo et al., describe how the *vinyungu* plots were prepared:

> In preparing vinyungu in the valley bottom land, ditches or furrows are prepared to separate the ridges from one another. The orientation of these ditches or furrows and the ridges themselves can differ from one place to another. Moreover, ditches can be oriented in different ways within one side. They may lie in a parallel series along the river channel or be perpendicular to the river channel. The main determinant of their orientation

[1] Given the widespread and long time usage of the said Swahili version by the Hehe tribe in predominantly Hehe districts, it is possible that the said Swahili versions of kinyungu (singular) and vinyungu (plural) could in fact be the Hehe version of the Bena tribe's original terms hiyungu and fiyungu respectively. However this is the researcher's personal observation.

> is the nature of the slope and the hydrological (drainage) conditions. Where there is a lot of water in the soil (as is the case where there are several springs), the ditches and ridges are constructed perpendicular to the channel essentially for the purpose of draining the soil. Where the slope is not quite so flat, the ditches and ridges are generally laid across the contour. (Lema, 1996:142)
>
> This practice is commonly used on heavy soils (clays) found in wet valley bottoms and other low-lying areas. The ridges are built up higher (up to 0.6m) and wider (up to 5-20m); with a cambered surface sloping down to the open drain on either side. (Kayombo et al., 1999: 92)

Moreover, the traditional vinyungu farming was practised without the use of inputs such as fertilisers and pesticides (Majule and Mwalyosi 2003; 2004; 2005) as one respondent explains:

> *We used to produce without using fertilisers. We just sowed the seeds and harvested just a small amount and that was it ...It was just for vegetables, beans, and maize for food* (54 year old female in Mtitu village, speaking of the 1970s).

Most of the respondents who engaged in vinyungu farming between the 1950s and early1980s revealed that the valleys and floodplains on which vinyungu farming was practiced during this period possessed natural soil wetness throughout the year. Therefore, irrigation was seldom applied. The following respondents from Magulilwa, Bumilayinga and Mtitu villages recount:

> *In the past when I was assisting my parents, we did not irrigate. It was just a matter of sowing and then weeding. Moisture was present at that time ... you would not see people carrying water buckets for irrigation. After sowing one would just add some drops of water to assist the seeds to sprout, but no irrigation followed afterwards* (54 year old female in Magulilwa village, speaking of the 1950s -60s).
>
> *In the past, the area was wet that is why we divided the land in small camber-beds in order to reduce moisture. It was only after doing this that one could grow something successfully* (Group discussion - Bumilayinga village, speaking of the 1960s).

Photo 3.1: A kinyungu (on the right hand) after preparation

Source: Author's fieldwork 2005

Photo 3.2: An example of camber-beds (vinyungu plots) with heavy clay soils, separated by open drain on their sides (with maize crops)

Source: Author's fieldwork 2005

> *This area was naturally very wet. I had to drain it in order to create vinyungu. At that time one could not discern the stream*[2]*, it all looked the same. Therefore, we dug a channel to drain the water so that we could create the vinyungu plots* (55 year old male in Mtitu village, speaking of the 1970s).

Another feature typical of the traditional *vinyungu* farming system was that the *vinyungu* plots were very small in size (Lema, 1996; Majule and Mwalyosi, 2005; 2003). One farmer pointed out that the *vinyungu* plots in those early days could range from as small as 3 x 3 strides[3] to approximately 10 x 10 strides (local measurement). The plot size was determined by the needs of an individual and one's strength in preparing the camber beds, a task said to be very difficult. One would commonly create a small *kinyungu* in the midst of trees and reeds (see photo 3.3a and 3.3b) which in turn suggests the smallness of the area covered by the practice, as illustrated by the following farmers:

> *You know in the beginning these areas were not cultivated, only a small portion was being cultivated for vegetables…In the past, one produced in less than 0.25 of an acre*[4] *…* (Group discussion – Bumilayinga village).

> *In the 1970s for example, this whole area had a lot of trees. The area occupied by trees exceeded that of vinyungu plots* (51 year old male – Mtitu village).

> *Water reeds were present in abundance back then, because we did not use the whole area for production…* (54 year old female – Kitwiru village).

The *vinyungu* plots were commonly used for producing vegetables, green maize, beans and potatoes. There were combinations of traditional leafy vegetables such as pumpkin leaves, traditional radish leaves (*figili*), wild amaranth, a handful of green maize and beans all in one small plot (mixed cropping). The arrangements of crops on these small plots were somewhat chaotic (see photo 3.3a). It was not unusual to find five small stocks of maize or beans growing together from the same point, perhaps suggesting some level of ignorance or uncertainty pertaining to the quality of seeds used as illustrated by these farmers:

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[2] Referring to Ihambili stream which connects with Mtitu river in Mtitu village before ultimately connecting to the Little Ruaha river.

[3] One stride approximates one meter but is not consistent; it can differ from person to person depending on a person's height and/or on how wide one stretches one's legs.

[4] The farmer is referring to the total area under vinyungu farming owned by the farmer (>17.5 m x 17.5 m) rather than to the size of an individual camber -bed (or kinyungu). The area can contain a number of *vinyungus* (camber beds).

When I was still a child, I used to see my parents produce in the valley bottom in very small plots just for vegetables (31 year old male – Igumbilo village).

There were some few people producing in valley bottoms back then but it was very local. One could probably grow an area of 10 x 10 strides and would see it as a big thing. At the same time, one would throw four to five seeds in one hole … (60 year old male – Igumbilo Village).

Although the plots on which production took place were very small, this was not a reflection of land scarcity. Rather, it was a reflection of the perceived insignificance placed on *vinyungu* farming. At the time, most of the farmers were engaged in rain-fed production for subsistence, very few produced in the valley bottoms. The majority of the farmers associated their lack of interest in valley bottoms with the availability and reliability of rain during that period. The two farmers below express:

I began valley bottom farming in 1959 because there was hunger…When I began production, there were already people producing in the valley…However, they used to produce very little. The valley was not important because at that time there was plenty of rain. They produced in the dry land and got enough maize for food. Therefore, this Little Ruaha head water - valley was not very important at that time (81 year old male in Nyololo village).

To say the truth, valley bottom cultivation was never perceived as being important to the people of Magulilwa. I was also among those with that perception. Truthfully speaking, for the 25 years that I was in this village, that is from 1971-1996, these valleys were redundant. I could not see the importance of valley bottom farming (Magulilwa village, 60 year old male).

Photo 3.3a: A typical example of what traditional vinyungu plots looked like[5]**.** The arrow shows a plot(s) in the midst of the vegetation.

Source: Author's fieldwork 2005

Photo 3.3b: An example of traditional vinyungu plots surrounded by vegetation.

Source: Author's fieldwork 2005

[5] No actual photograph of the past was found hence, an environment approximating the past condition has been used for illustration. This in turn, suggests the continual existence of the traditional vinyungu farming system in some parts of the region. On the fore-ground is a partial view of three vinyungu plots in form of raised earth beds (to reduce excessive moisture from the plants) on which a mixture of maize, beans and traditional radish are planted together on the same plot. Between the plots are ditches that drain away water, suggesting a waterlogged or high water table environment. The plots are surrounded by some vegetation (in the middle and background) that commonly thrive in waterlogged or high water table environments (hydrophytes), with another small patch of maize stocks in the midst (see arrow).

Furthermore, the traditional *vinyungu* farming was largely practiced by women (Lema, 1996). A woman, married into a family practicing *vinyungu* farming, received land in the valley bottom (belonging to the husband's family or clan). She was to engage in *vinyungu* farming for her newly acquired family. This she did under the guidance of her mother-in-law (if she was not already familiar with the practice). A female respondent reminisces about her experience:

> *I got my vinyungu plots when I was 23 after I got married… so I began producing in the valley. Since that time, I am still producing on the same portion of land. This is because at the time, every woman was given her own small plot(s) of vinyungu, and was expected to take good care of it, because one did not expect to receive any more land afterwards…It was my father-in-law who gave me this portion of land in the valley* (54 year old female in Kitwiru village).

The fact that it was the father in law who gave land to the respondent and not the mother in law, is an interesting observation. While women were considered the main producers in vinyungu, the men owned the land. This would suggest that the women were only entitled to accessing the land but had no claim over it. In some parts of the region, it was considered a disgrace or shame for a man to produce in the valley bottoms. The few men that attempted to produce in those early years were usually mocked and ridiculed by fellow men. A male farmer who began *vinyungu* farming as late as 1984 recounted his experience with fellow men in Magulilwa village.

> *When I first came to this area and began production, I found there was a tendency to laugh at men who produced in vinyungu. In the past, it was not an honourable thing for a man to engage in vinyungu farming especially with regard to the Hehe customs (47 years old male – Magulilwa village).*

The most plausible explanation for such an attitude is that the practice was mainly for producing vegetables and green maize (at a very small scale) for home consumption. Since women were, and still are, largely considered to be in charge of kitchen matters, it was logical that they organise the household menu from the field. However, this attitude is neither confined to the past nor is it a case for *vinyungu* farming alone. There is evidence that women in Tanzania and Africa as a whole still carry a heavier burden in the production process (Shaka et al., 1996; Soko, 2007; Shimba, 2000). For example in her study titled 'Women, weeding and agriculture in Iringa, Tanzania', Shimba (2000) notes that women provide 60-80% of labour for agriculture.

3.4 Farmers' engagement in vinyungu farming 1950s - 1980s

As stated earlier, vinyungu farming has been practiced in various parts of Iringa region long before the 1950s. The main reason reported at that time was to achieve food security. Majule and Mwalyosi attest of this as they reveal that:

> vinyungu farming practice in Kalenga Division [Iringa region] goes back to more than 63 years ago when people were forced to cultivate wetlands due to drought, during 1939/49, a period also devastated by World War II. Prior to that period, people were already cultivating vinyungu although at a relatively small scale (Majule and Mwalyosi, 2003 : 23).

Likewise, farmers who began producing in the valley bottoms from the 1950s to the early 1980s revealed that the reason for engaging in *vinyungu* farming was purely for subsistence. They explained that most of the early valley bottom production was due to hunger. This resulted from either lack of production knowledge (particularly miscalculation in the dry land) or from occasional dry-spells and sometimes severe droughts which affected dry land production. In other words, *vinyungu* farming was to most farmers a way to supplement dry-land food production and/or a risk aversion strategy. A respondent in Magulilwa village narrated how lack of production knowledge drove him and others to the valley bottoms as follows:

> *I engaged in vinyungu farming way back in 1950 after hunger struck. It is not a matter of intelligence; rather the need to survive pushed me to produce in the valley bottom. At the time, we did not have much knowledge on production, we could not estimate how much to produce. We produced at a very small scale and used the rest of the land (i.e. dry land) as pasture. As a result, hunger struck. That was because we did not understand that if we produced on a larger size of land we would acquire more* (75 years old male – Magulilwa village).

The account by this farmer suggests that food shortage resulting from his lack of knowledge in correlating land size, yields and needs was his reason for engaging in *vinyungu* farming. As expressed by the narrator, survival and the need to ensure sufficient food supply influenced his decision. Likewise, other farmers expressed that they engaged in *vinyungu* farming during the dry seasons when they perceived that the food harvest acquired from the rain-fed farms would not carry them through till the next harvest. This was more of a temporary practice occasioned by the fear of food shortage in any given year as stated below:

> *One would just produce in an area perceived sufficient enough to get by, and afterwards she or he would abandon the area till the following year (if the need arose)* (A male elder in a group discussion – Nyololo Village).

Food shortage resulting from occasional dry spells and times of severe droughts forced some farmers into temporary or permanent valley bottom crop production as a means of survival. A young man gave an account of those who only practised valley bottom production temporarily due to drought and thereafter abandoned the practice as he recalled:

> *My mother told me that in the 1970s they produced in the valley bottoms because of hunger – there was severe drought. However, after the rains began, they no longer produced in the valley bottoms* (30 years old male – Mtitu village).

On the other hand, a farmer in Nyololo village (in Mufindi District) recalled how, in earlier years, weather conditions pushed some farmers including himself permanently into valley bottom production:

> *We began with dry land production back in 1949. We changed after noticing that the weather conditions were not so good. We therefore went into valley bottom production in 1959, because it was more productive due to moisture availability. We are practising that dry season production system to date … In 1959 the rain was very minimal but before then, the rains were sufficient* (81 year old male – Nyololo Village).

Something worth noting is that the respondent refers to the valley bottom production as a dry season production system. This indicates that it was only during the dry season or dry spells that he and his colleagues engaged in *vinyungu* production. The realisation that it was more productive (in terms of constant moisture) led him and his colleagues to continue production during the dry seasons even after a good rainy season. It would seem that *vinyungu* production became a mitigation strategy due to their uncertainties (triggered by the 1959 experience) as to what they should expect in the following seasons.

A farmer (group discussion participant) from Bumilayinga village in Mufindi District (bordering Nyololo village from the South) confirmed the preceding farmer's information on rainfall shortage in 1959 as he recalls:

> *In the past years for example 1955 and earlier to 1958 there used to be plenty of 'nyahenge' rains* [light and prolonged rains] *in Mufindi district.*

> *One could grow maize in February (we used to grow until the 20th of February) and you would be surprised that one was able to get a good harvest. However, this was in the dry land, and not in the valley bottoms (vinyungu)* (Estimated to be between 75 and 77 years old male – Bumilayinga village).

The fact that they were able to grow maize as late as February and still get a good harvest shows that it was a significantly long rainy season. In a group discussion in Nyololo Village, it was revealed that before 1986 the rainy season, within the zone, began as early as October (a time in which they would usually sow seeds) and ended as late as April or may (seven to eight months). This may partly explain the majority lack of interest or temporary interest in *vinyungu* farming by the earlier farmers in the district especially considering the hard work the system entails in comparison to dry-land production.

3.4.1 Land acquisition and access in valley bottoms (1950s – 1980s)

Land in both valley bottoms and rain-fed fields were under customary land ownership[6]. There was no official survey or registration of the land. The indigenous farmers either obtained ownership through individual initiatives or from village leaders and elders. Individual initiatives were mostly common before formal village settlements were in place. Prior to 1974, there was no formal village government responsible for land distribution (Daley, 2005). When asked how they were able to obtain land in the valley bottoms in those early days, the respondents explained that in the earlier years, before most of the areas were populated, one acquired land at will (this applied to both dry land and valley bottoms). One would simply approach an unoccupied area, declare ownership and begin to clear and demarcate the land for production. The people in the community recognised and respected the declaration. Daley (2005) refers to this system of early land occupation by the indigenous people as 'first right'. This was how a farmer from Magulilwa village described the process:

> *At that time the area was unoccupied and there was no village government, so one popular (well known or respected) elder came along and said, 'This area here is mine'. Others then claimed the remaining*

[6] This means that the land is privately owned either by individuals, families or by clans. Households and families are usually the owners of farming land. The law recognises the people's rights to such pieces of land. This is despite the fact that there is neither documentation (on the side of the owner) that provides proof of ownership nor registration records that acknowledge the owner of that land. This is to say that no formal survey has been conducted on the land: boundaries are established locally. This is usually done with trees or other natural markers. The land boundaries and their respective owners are well-known to the local land judges or clan elders. They are the mediators in cases of dispute.

> *unclaimed land roundabout him. If there was no more land, they asked those who possessed large tracts of land to offer them some land* (an estimated 75 year old male – Magulilwa village).

This initial uncontrolled form of land acquisition allowed the indigenous farmers to acquire massive tracts of land. The acquisition of large tracts of land occurred in both the dry lands and valley bottoms although the nature of the valleys sometimes limited the amount of land any one person could acquire (especially in the case of narrow valleys). For instance, having studied a village within Mufindi District (Kinyanambo), Daley (2005:367) cites one farmer having given himself possession of as much as 250 acres of land. This was possible because of the dispersed nature of early settlements. However, not all acquired land was necessarily used for production at once. While some applied the fallow system, others simply retained the land as inheritance for their young and/or unborn children. The valley bottoms were at the time more commonly used for grazing. The process of land fragmentation was gradually experienced through inheritance as population increased (naturally). As narrated by this farmer:

> *We are the indigenous people of Magulilwa, so in the beginning, before 'villagisation'*[7] *and the relocation of people into our area, we chose where we wanted to produce and how much land we wanted, and afterwards we claimed ownership over it. We came early; this is the reason why we have more land in the valley bottom… However, what you see here is not the whole area that I had in those days. Back then, I had over three acres in the valley. I had to give some land to my children. They are now producing on it, and I am left with one and a half acres* (Estimated 65 years old female in Magulilwa village).

Land distribution did not take place outside family or clan boundaries. Household heads or clan heads were responsible for land distribution. An outsider could borrow a piece of land for cultivation, however, the land was returned to the owner at the owner's request or by the borrower after having served the purpose. In some instances, land was also given as a gift.
Additionally, farmers acquired land in valley bottoms following the 1973/74 and 1974/75 drought that had hit a large part of Tanzania (Hyden, 1980; Bryceson, 1993). This triggered

[7] Villagisation refers to a settlement operation carried out by the Tanzanian government that was conducted under Nyerere's socialist policies. It involved gathering people into designated areas which were referred to as '*Vijiji vya Ujamaa'* or *Ujamaa* Villages *(ujamaa* meaning socialism or family hood). This was to facilitate service provision to what was an otherwise dispersed population, as well as to encourage collective production in order to further development.

government intervention to ensure food security[8]. The Government gave directives on production; it urged people country wide to produce wherever possible. This included valley bottom farming which was not only specific for the rural areas but even large townships and cities such as Dar es Salaam. For example:

> … the then President of Tanzania, Mwalimu Julius Kambarage Nyerere announced in October 1974 that there should be great intensity in agriculture. He used the slogan 'Kilimo cha kufa na kupona' (Agriculture as a matter of life and death), to express the urgency of increasing food production (Uhuru, October 19, 1974; 1)… This order was immediately followed by allocation of land to various industries and institutions for agriculture. The Uhuru newspaper of November 28, 1974:3, for example, reported that, "*2,310 acres have already been offered for Agriculture use in Dar es Salaam*". Furthermore, it was also reported that, "The TANU[9] District Secretary Mrs. Kunambi said there is land with more than 25,000 acres in Kinyerezi, Mbinga, Msongola, Tabata, Buyuni - Chanika and Msimbazi **Valley** [the emphasis is the author's]. This land is fit for cultivating maize, millet, paddy and vegetables and everybody will be given land according to their wish" (ibid.Nov.28, 1974:3) (Palela, 2000:122-123)

These campaigns had introduced more farmers to valley bottom farming and hence resulting in more land acquisition in valley bottoms. It led to increased smallholder agriculture all over the country. Framers were advised to produce wherever possible to ensure survival. Valley bottoms were among the areas distributed for production. As explained by the following farmer:

> *It happened that in 1974 there was hunger (drought), so the government went and distributed land to people in the valley advising them to look for seeds and produce in the valleys as a way of avoiding hunger* (55 year old male- Magulilwa village).

To worsen the situation, it happened that the drought coincided with the oil price rise of 1973 (Bryceson, 1993; Raikes and Gibbon, 1996) and a nationwide compulsory villagisation operation carried out between 1973 and 1976[10] (Hyden, 1980; Daley, 2005; Bryceson, 1993).

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[8] Among others, "producer prices were raised, technical assistance and marketing services were extended, and the use of improved subsidised seed varieties and chemical fertilizers was widely encouraged. In Iringa Region minimum household food crop acreages were also mandated." (Daley, 2005). Moreover food imports were significantly increased (Bryceson, 1993; Raikes and Gibbon, 1996).

[9] Tanganyika African National Union party which was founded in 1954 through which Tanganyika (now known as Tanzania after the union between Tanganyika and Zanzibar in 1964) gained its independence.

[10] This is considered the largest resettlement effort in the history of Africa (Hyden, 1980) nine million people are claimed to have been relocated by the end of the process which began (voluntarily) in 1969 leading to the existence of 8,299 villages by 1979 (Chachage, 1999: 65 ; Magimbi, 1995). Nonetheless, such large numbers of up to 10 million people that are claimed to have been moved have been contested. They are regarded as exaggerated numbers that were derived from the number of people living in the villages registered after the resettlement had been completed. It is argued that not all people had moved but in many of these villages, "there was already a nucleus settlement before villagisation started. In these instances, the policy required people

The oil price rise, in this period, posed a significant problem for the general economy and for food distribution in Particular. This was due to "Tanzania's heavy reliance on road transport, the country's [large] size, dispersed settlement, and regional crop pattern" (Brysceson, 1993: 8), which made food distribution across the nation difficult.

The villagisation operation, on the other hand, led to induced population growth in the designated villages (Chachage, 1999; Isinika et al., 2003), leading to the creation of artificial land shortage (Magimbi, 1995). A phenomenon claimed to be associated with the decline in agricultural production in the 1970s and 1980s (Raikes and Gibbon, 1996) as the land in and near the villages was quickly over-farmed and over-settled (Magimbi, 1995; Daley, 2005). However, some argue that the movement of people from their former land had caused only temporary disruption in agricultural production and therefore "The argument that villagisation was the principle cause of Tanzania's decline in agricultural production in the mid -1970s does not hold water" (Hyden, 1980:146). Brysceson further argues that:

> Many critics have slated the villagisation programme as the source of Tanzania's economic decline, downplaying the adverse effects of the oil crises and drought…the 'villagisation as disaster' view does not accord with the fact that there was a significant recovery in food crop production in 1977 and 1978 which was achieved by villagized peasants. (Brysceson, 1993:9)

Bryceson's observation on there being "a significant recovery" in 1977 and 1978 does not necessarily rule out the fact that villagisation had a part to play in the decline of food crop production during the villagisation exercise. Her argument seems to base more on the fact that it was not the single responsible factor. Although Hyden agrees that the movement contributed to the decline of cash crop production, like Bryceson (1993) he cites some resultant increases in food production in 1975 as evidence that villagisation was not the main reason for the hunger experienced at the time. Nonetheless, he concedes that the success was not uniform in all parts of the country.

> … Production figures for 1974 were unusually low in some areas. Thus one cannot rule out the possibility that in spite of the recorded increase in production by 1975, it suffered from the fact that many peasant farmers were forced to farm in new and sometimes unfavourable conditions (Hyden, 1980: 147).

Despite the arguments and counter arguments on the impacts of villagisation on agricultural productivity, logic would have it that it would not have been possible for such massive

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living in scattered homesteads near such settlements to move there to set up permanent residence. In other words, not everywhere was it a matter of starting a completely new settlement." (Hyden , 1980: 130 see also Daley 2005: 384). Despite this, the operation is nevertheless acknowledged as having been a gigantic effort that involved the movement of as many as five million rural Tanzanians (Hyden, 1980).

population displacements (particularly from land holdings) to have not resulted to some extent of production disruptions. The founder of the villagisation operation himself the then president of Tanzania, Julius Kambarage Nyerere, had foreseen this possibility prior to the implementation of the villagisation operation, as he cautioned in the Arusha declaration of the 5th February 1967[11]:

> "Unless the purpose and socialist ideology of an Ujamaa village is understood by the members from the beginning-at least to some extent it will not survive the early difficulties. For no-one can guarantee that *there will not be a crop failure in the first or second year - there might be a drought or floods* [the emphasis is mine]. And the greater self-discipline which is necessary when working in a community will only be forthcoming if the people understand what they are doing and why." (Nyerere, 1973: 68)

The villagisation operation was carried out in Iringa region in the second half of 1974. People were moved from their dispersed settlements and land holdings to new areas designated by local officials. The aim, as stipulated by the then *Ujamaa* (or socialist) regime under President Julius Nyerere, was to concentrate rural populations into designated villages for ease of social service provision as well as collective agricultural production (Hyden, 1980; Maghimbi, 1995). At this point, village governments were put in place and land was no longer for grabs, rather it was distributed by the village leaders. This was mostly the case for those who had moved in from far away villages. Those very near to the village of destination were able to maintain their farms in their former locations as well. According to Daley (2005:384-385):

> Before villagisation people's farms had tended to be near their houses, so most of the wenyeji [the indigenous] – those from the various Mahameni areas [areas where people moved from] – kept most of their land at villagisation, with their existing landholdings 'given' to them, or rather, confirmed, by the village government. However, those who lived in the old core area generally lost land for the incomers to build houses on, newcomers and wenyeji of Mahameni alike. House-plots were allocated or confirmed by the village government, while mashamba [dry land farms] and *vinyungu* [the emphasis is mine] were paced out and allocated to newcomers. These new farms were either close to the designated settlement area in the mbuga by the rivers – or on other uncultivated bits of land. Land was allocated for all adult villagers, however in practice, as across Tanzania, this was done by family, with male household heads getting the family land and only those women who were widows or unmarried mothers, for example, able to access land in their own right. In Iringa Region, it only became easier for married women to be allocated their own land [later] during the 1980s.

[11] The declaration was made by the first president of independent Tanzania, outlining Tanzania's policy on socialism and self reliance.

Owing to the severe drought (of 1973/74 and 1974/75) , there was an urgent need to find solutions to the problem of hunger. Some people began to scramble for the valley bottoms acquiring land according to one's needs and capacity. This could explain why, for example, the majority of respondents in Magulilwa who moved in during the villagisation operation, acquired land in the valley bottom and began production in 1974 as the accounts below indicate:

> *I am a resident of this village* [Magulilwa] *since 1974. I came during the villagisation operation. I was given an area both on dry land and in the valley by the village government, since this village is an 'Ujamaa' (socialist / familyhood) village. Every member ('mjamaa') of this village, excluding those who moved in from very nearby areas, was entitled to a portion of land for food production* (71 years old male – Magulilwa village).

> *...frankly speaking, it was in 1974* [during villagisation] *that I began to produce in the valley bottom. It was then that I first recognised the importance of having a kinyungu plot. I went seeking for one, since at that time there was a problem of hunger... so some of us sought land in the valley bottoms in order to minimise the threat of hunger that year...* (67 years old male – Magulilwa village).

The combined effects of drought, high oil prices and the villagisation operation contributed to food shortages necessitating farmers to seek *alternative* means of survival. The farmers sought to meet the *need* for food sufficiency under these *constraining* conditions. With the advantage that valley bottoms had over the dry land (that of constant moisture), together with government directives, *vinyungu* farming proved to be an *opportunity* for the farmers to remedy the problem of food shortage. The general awareness of valley bottom production therefore, increased followed by a period of massive land distribution and acquisition in the valley bottoms.

3.4.2 Marketing of vinyungu products (1950s-1980s)

Having initially engaged in *vinyungu* farming for purely subsistence or for 'survival' reasons, as the respondents put it, vinyungu produce were not marketed. The respondents pointed out that though a government market for grains was present in the 1970s[12], the marketed produce

[12] From 1963 to 1974 the market for most food crops was monopolized by Cooperative Unions and Primary Cooperative Societies (Ponte, 1998; 319; Gibbon, 1995) under the National Agricultural Products Board – NAPB. Thereafter the National Milling Corporation (NMC) established in 1973, replaced NAPB and was

was acquired from the dry land farms (rain-fed production). Very few respondents admitted to having marketed valley bottom produce between the 1970s and 1980s. Nevertheless, most confessed that they engaged in very small scale marketing (of their meagre surplus) within their respective villages. Only a few respondents spoke of marketing beyond their village or neighbourhood borders in those days. The few who sold their produce beyond village borders either used commuter buses (in cases of long distances) or simply carried the products on their heads (to nearby villages). An even fewer number pointed out that produce (mainly from the dry land) was also sold to private traders commonly referred to as *`walanguzi´* who collected a small amount of produce from a number of individual farmers. This is because, at the time, not many individual small farmers could produce enough to fill a pick-up truck. However, before 1989, these traders were illegal (Putterman, 1995). They were only allowed to buy produce from Cooperative Unions and later the National Milling Corporation (NMC) (Ponte, 1998; Putterman, 1995). Parallel markets were at the time prohibited, although this could not be completely prevented (Ponte, 1998; Isinika et al., 2003). Commercial sales of food crops were prohibited allowing only retail sales at local markets. Until 1984, there was a limit for allowable inter-regional movement of staple food grains (Ponte, 1998). This was not to exceed 40kgs unless otherwise with a special permit (Kashuliza and Mbiha, 1995). With the liberalisation of food marketing from 1984 the limit was raised to 500kg followed by the abolition of permits that were issued to allow the movement of food across regions within the country (Kashuliza and Mbiha, 1995; Hammond, 1999; Moshi, 1995; Bryceson, 1993; Isinika et al., 2003). It was in September 1989 under the 1986 Economic Recovery Programme that private traders were allowed to buy grain directly from producers (Ponte, 1998; Putterman, 1995; World Bank, 2000).

However, even at this time, production in valley bottoms remained at a predominantly subsistence level. The farmers placed more effort and concentration on the dry land farms. Most of the produce sold to the government, private traders and local markets was from the dry lands. The valley bottoms retained their status as vegetable sources and dry season life savers, a status that reportedly continued to the early and mid 1990s.

Some few respondents who engaged in vinyungu farming in the 1980s revealed that, at the time, they produced both for subsistence and for the market (in most cases the surplus). These included those who had either obtained or sought employment outside their respective

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responsible for purchasing, processing, storing and selling of staple grains. These included maize, rice, wheat and drought resistant crops such as sorghum, bulrush millet, finger millet and cassava (Suzuki and Bernard, 1987).

villages (after having completed their primary education) and having obtained little or no success, they later returned to their respective villages. Their engagement in market production was a result of new experiences and knowledge acquired from the interactions that they made during their absence from their villages. Those who travelled to big cities and towns within and outside the region experienced a different lifestyle, which they wanted to emulate. Hence, they engaged in *vinyungu* production to fulfil that desire as expressed by a respondent below:

> *I decided to start practicing vinyungu farming in 1982… This is because after completing primary school, I left the village and went to various places in search of a living… While moving around, I came to learn gardening in Kilosa. When I came back, I saw the environment in the valley bottom was good for such practice, and because I already had the knowledge, I acquired land from the village government… My main goal for production was to improve my living standard* (51 years old male - Mtitu village).

This farmer's last statement would suggest a shift in the reasons for engaging in *vinyungu* farming, that is, from pure subsistence to the inclusion of income generation. Nonetheless, these were isolated cases in the 1980s. Valley bottom production remained at a predominantly subsistence level and production was still at a very small scale.

3.5 Conclusion

This chapter has among other things, provided a brief description of the key characteristics of the traditional *vinyungu* farming system that existed from before the 1950s to the late 1970s or early 1980s. The characteristics reflect a typical peasant economy with women as major producers (characteristic of most African peasant societies). In those early times, the *vinyungu* farming system was practised in a very simplistic manner. It was simply a means of ensuring the availability of vegetables and maize (for roasting) during the dry season when this could not be obtained in the dry land fields. Although the practice was perceived significant in Njombe district where it originated, it would seem that this perception was not homogeneously shared with other districts of Iringa. In other districts (with specific reference to the study area) the valleys were most commonly perceived as waste lands or grazing lands. As such, farmers (especially the males) in these areas perceived the practice as a side practice that was not of much significance as far as household food production was concerned. Lema (1990) suggests that until the mid 1990s, this was somewhat the general perception among outsiders as well who considered the practice as a "side-line" agricultural activity.

Between the 1950s and early 1980s farmers adopted vinyungu farming for purely subsistence reasons. Most farmers practiced vinyungu farming for survival. It was only in the event of hunger, resulting from dry spells, or miscalculations in dry land production that some cultivated the valleys for subsistence but still at a very small scale. This was particularly the case during the national hunger crisis of the mid 1970s. Valley bottom production was encouraged by the state to avoid starvation. It would probably be correct at this juncture to construe that weather conditions and government policies at this given period were most responsible for influencing farmers' engagement in valley bottom production, in the attempt to maintain the most important *goal* which was food security.

In the early years of the practice, *vinyungu* farming was never associated with the market (although dry land produce was to some extent marketed). This then qualified *vinyungu* farming, at that time, as a purely subsistence production system with few exceptions in the late 1970s and 1980s. Nevertheless, these characteristics have not all been maintained through the years. There have been significant changes in the valley bottoms as well as with the farmers. The following chapter will concentrate on the changes that have taken place within the *vinyungu* farming system over the years and the reasons behind these changes.

CHAPTER FOUR
TRANSFORMATIONS IN THE VINYUNGU FARMING SYSTEM (1990s – 2005)

4.1 Introduction

> "It is postulated that change is brought about by individual actors who can discover and will apply new methods to achieve new goals and achieve traditional goals more fully even at the cost of constructive destruction of old orders" (Anthony et al., 1979:199).

Chapter three has provided a descriptive and historical overview of the characteristics of the traditional vinyungu farming system from the 1950s to 1980s. This chapter examines the changes in the characteristics of the system from the 1990s to 2005. Among other things, the chapter examines the farmers' reasons for engaging in vinyungu farming. Hence, it distinguishes the farmers' reasons for engagement in vinyungu farming over time and across generations. Furthermore, the chapter highlights the means of land acquisition and/or accessibility in valley bottoms and floodplains within this period and examines the changes undergone in the vinyungu production process.

4.2 Farmers' engagement in vinyungu farming 1990s – 2005

First, it should be noted here that occasional dry spells and droughts were not endemic to the period between 1950s and 1980s. Some farmers reported that the scarcity of rainfall in 1997/1998[1] drove a number of farmers into valley bottom cultivation. Even though the rains resumed in 1998, some people continued to produce in the valley bottoms (alongside the dry land) as they realised that the valleys were more productive (as in the case of some farmers in the previous period, discussed in section 3.4). A farmer from Mtitu village explained the situation as follows:

> *Although there was no more hunger in 1998, people realised that the valley bottom soils were more fertile than in the dry land. Therefore, this attracted people to continue producing in the valley bottoms… It was in that very year that most people actually became aware and realised the potential of valley bottom production. Before that time, very few people produced in valley bottoms* (43 years old male – Mtitu village).

Nonetheless, most respondents who engaged in *vinyungu* farming within this period did not associate their engagement in valley bottom production with rainfall shortages neither did they

[1] This was due to the effects of el-Niño which affected an extensive part of Tanzania and the world in general. In Tanzania it was characterised by droughts and flooding in various parts of the country.

believe this to be a significant reason. For instance, asked on the correlation between rainfall scarcity and farmers' engagement in valley bottoms production at that time, this 47 year old male farmer (also key informant) from Magulilwa confidently pointed out:

> *...In our zone[2], we are certain to receive rainfall each year shortly before Christmas…In this part; we have a consistent rain season. Ask anybody in these parts 'when will it rain?' they will tell you, 'between the 15th and 20th of December it must rain.'... It was only one year that we experienced severe drought –only in the year of el-Niño* [1997/1998]. *To say the truth, we normally experience average rainfall in these parts.*

Question: Can you not even slightly suggest that rainfall shortage pushed farmers to engage in valley bottom production?

Answer: *Not at all*

The following respondent from Magulilwa confirmed the above respondents' account after being asked how he acquired information on rainfall in any give season. He replied:

> *It is a matter of experience because we know when the rainy season (for dry land production) begins in our village. For example, even now if I sow seeds (maize) in the valley, I just irrigate a little and I know that from this month of November to December it will undoubtedly rain and the maize will continue to grow. This is something we are sure of in our zone. We know that even if the rain will delay in the earlier dates, it will definitely rain towards the end of the month [referring to December]* (55 years old male – Magulilwa village).

Likewise, a farmer from Mtitu expressed:

> *...there is enough rainfall; this is a zone[3] with much rain. In this part, one cannot associate increased valley bottom farming with rainfall scarcity...* (44 year old male – Mtitu village).

The suggestion of rainfall unreliability and variability as the reason for engaging in valley bottom production from the 1990s was however, recounted in Mufindi district (Bumilayinga and Nyololo villages) (see for example box 4.1). Nevertheless, this explanation only surfaced during the group discussions (preliminary field research) and in a discussion with the

[2] Magulilwa village is located within the highlands zone (1,600 m – 2,700 m a.s.l.) having a average rainfall between 1000 and 1600 mm per annum

[3] Mtitu village is located within the midlands zone (1,200 m -1,600 m a.s.l.) with average rainfall between 600 and 1,000 mm per annum.

agricultural extension officer in-charge of Bumilayinga village but the same was not communicated by the individual farmers during the individual interviews. This may in turn imply the importance of aspects other than rainfall unreliability and variability in the farmers' engagement in valley bottom and floodplain production. For instance, the following respondent from Nyololo village when asked how rainfall unavailability contributed to his decision to engage in valley bottom production, he expressed:

> *The issue of rainfall shortage is not an everyday phenomenon, it happens occasionally. More important is to meet essential needs, which I believed I could do better in the valley bottom than in the dry land* (39 year old male – Nyololo village).

The farmers' explanations challenge the, popular notion put forward in some studies on *vinyungu* or valley bottom production in Iringa that farmers' have increasingly engaged in valley bottom production due to unreliable and variable rainfall (Majule and Mwalyosi 2003; Mkavidanda and Kaswamila, 2001). This, however, is not to discard the notion of rainfall unreliability and variability as irrelevant or untrue, especially considering the glaring evidence provided in chapter three (section 4.3) on the role played by rainfall scarcity in farmers' engagement in *vinyungu* production, particularly in earlier years. Moreover, topographical differences between different zones within the region could also account for such discrepancies. Furthermore, the question of world wide climate change also justifies such claims (on variable and unreliable rainfall). Nevertheless, explanations put forth by the respondents above suggest other reasons for farmers' engagement in valley bottom production particularly between the mid 1990s and 2005. For instance, the last respondent, above, expressed that for him meeting of essential needs that could not be met through dry land production, was his reason for engagement in vinyungu. This statement would suggest needs other than food.

Although the developments which occurred in the early 1990s were somewhat insignificant in comparison to the late 1980s, the period from mid 1990s to 2005 saw a change in both the number of farmers engaging in vinyungu farming as well as their reasons for engagement. Several categories of people engaged in valley bottom production from the 1990s to 2005 period. These include for instance, *immigrants* from other villages, districts and other regions in general. Those who fall under this category include civil servants such as agricultural extension officers, police officers, teachers, doctors and others assigned to work in the villages. They explained that their reason for engaging in *vinyungu* farming was to

supplement their salaries, which they noted, were insufficient in meeting their needs and financial obligations. This police officer (originally from Northern Tanzania) in one village[4] expressed:

> *This place is not our home. The reason for producing in the valley bottom is to supplement my salary after discovering that it is not enough to cater for my growing family needs…* (50 years old male).

Box 4.1 Narrative on Rainfall in the 1990s - group discussion in Nyololo village

It doesn't rain like it used to in the past so people seek for areas with moisture…It is when people saw that dryness had set in, that they opted to produce in the valleys rather than in the dry lands. This is due to changes in the rainfall pattern. This current Mufindi district is not as I used to know it when I lived in the Kibao area for so many years…To say the truth if someone has a quarter of an acre in the valley bottom at this present time, that person is much better off than the one producing in 10 acres in the dry land. The rainfall condition here is very frightening. We began to experience this change in rainfall more from the 1990s however prior to1986 the rains started early in October to April so here we were sure of producing enough food from the dry land plots. However, from the 1990s the rains have become scarce they begin in December or January and end in March or April. Even this year [2005/2006] the rains are uncertain. In the past it would rain 25 days out of 30 but now in a month it may rain maybe only 10 days out of 30 (Group discussion - Nyololo Village)

Others migrated into the areas in search of land in the valley bottoms due to scarcity of land, absence of valley bottoms, or poor weather condition in their places of origin. These include those who became aware of valley bottom potentials through friends, relatives or through observation or prior experiences from their areas of origin. An example is that of the respondent from Kilimanjaro region in Kitwiru village:

> *It has been five years since I arrived in this village [since 2000] and this was made possible by my brother in-law who came here as a teacher… I was interested in agricultural production so I called him to ask him about the possibility of getting land. Later on he sent me an invitation letter. After my arrival, I acquired land in the valley bottom and started production… Though there is land at home* [i.e. In Kilimanjaro]*, they practice paddy production which I dislike …* (35 years old male – Kitwiru village).

The following respondents in Nyololo village likewise expressed the same opinion:

[4] The village name is concealed to protect respondent's identity.

> *...I am not an indigenous of this village, I am from Ilula village. I was attracted by the weather condition in this area. In my village, it is much drier than here. I came here because of valley bottom farming. Although there are valleys in my village as well, they have no water* (Middle aged Male group discussant – Nyololo village).

> *I began valley bottom production back in my home village - Ihimbo. Nevertheless, I had a very small plot of land. I was not able to attain the amount of land that I required for production in the valley bottom. I had worked around here before, as a forest officer, and saw that this area was not being used for crop production, rather as pasture, so I came and spoke to the owner (an indigene) and was able to obtain enough land. Since they were not familiar with the practice, they willingly gave me the land thinking that I was just wasting my time* (54 years old male – Nyololo village).

The explanations given by the respondents above show the differences in reasons for the engagement in valley bottom production across villages. It seems that the awareness of the valley bottoms' potential for production was recognised earlier in Ihimbo village compared to Nyololo. While in Ihimbo valley bottom land was already becoming scarce because of extensive vinyungu production, the valleys of Nyololo village were still being used for grazing with no or minimal use for crop production. This could be due to the fact that the respondents in the study areas within Mufindi district reported to have had plentiful rain before the 1990s and therefore, rain-fed production was sufficient in meeting subsistence needs at that time. Moreover, the extensive tea plantations (owned by Unilever Tea Tanzania) and the surrounding extensive forest plantations for the Sao Hill sawmill and the Sao Hill pulp and paper mill, functioning under the government owned Sao Hill Forest Project, offered wage – labour opportunities for the people within the district and hence, an alternative means of income generation at the time. The following respondent provided evidence of this as he recalled:

> *When I first came here in 1993, I began with only quarter of an acre. The person from whom I bought the land was used to being employed and saw this valley as unfit for production* (54 years old male – Nyololo village).

Another category of people who adopted *vinyungu* farming within this period includes those previously employed, outside their villages, and for some reasons were no longer working.

As they returned to their respective villages, they sought means of replacing their salaries or wages in order to maintain their living. Most expressed that they found that *vinyungu* farming to have more potential for meeting their financial needs in comparison to the dry land crop production. People in this category include retired workers as well as those who were affected by the retrenchment programme[5] carried out in various government sectors from the early 1990s as a directive under the IMF and World Bank structural adjustment programmes (Raikes and Gibbon, 1996; Gibbon, 1995; Moshi, 1995). These two farmers from Igumbilo village represent those under this category as they recount:

> *I was employed in Mwanza from 1977 as a trade supervisor for the cotton authority. I engaged in agriculture first in Geita district, Mwanza region in 1985 when we were retrenched ... In 1997 I decided to come back to the village since my parents are here and got a small area for crop production* (52 years old male – Igumbilo village).

> *I was working in Dar es Salaam in a depot as a mechanic ... I retired in 1995 after which I engaged in agricultural activities. You know when you retire they give you an axe and a hoe meaning that you should go and farm and not that you should seek office employment, what employment can one seek at 55 years?* (63 year old male – Igumbilo village).

Another category of the farmers consisted of primary school and some few secondary school leavers. Two groups constituted this category. (1) Those who after completing their education realised that they did not possess the required skills for formal employment and hence engaged in agricultural production. (2) Those who after having sought employment and worked for some time in the big cities and towns within and outside the region (without much success) decided to return to their villages to seek their livelihoods through agricultural production. The majority in this category consists of relatively young to middle aged individuals (between 20 or younger and 45 years of age). The study refers to this category as *the new generation farmers* as reflected in the account of this respondent from Mtitu village:

> *When I came back to the village in 1990 it was still possible to get an area in the valley bottoms. At that time, the vinyungu activity had not advanced*

[5] 'The retrenchment programme, a component under the civil service reform programmes implemented under the third phase of economic adjustment programme namely 'Rolling Plan and Forward Budget' (RPFB) involved reducing civil service numbers on the one hand and closing down or selling of most Parastatals on the other' (Gibbon 1995:14). This was aimed at developing a more efficient and adequately remunerated civil service. Those retrenched included central and local government staff. Most of those who could not get employed in the private sectors opted either for self employment or returned to their respective villages and engaged in agricultural activities using their retrenchment benefits as capital in both cases.

> *so much. It is nowadays that people have really become active in these areas. There were only a few people who used to produce in the area mostly old aged, but for the past five years (2000-2005) there are very many young people producing in the area* (39 years old male – Mtitu village).

Yet another respondent from Nyololo Village expressed:

> *There are very few old people producing in the valley nowadays, the common age is now from 45 years downward* (27 years old male – Nyololo village).

With the *new generation farmers* came also new reasons for engaging in valley bottom production. The respondents mentioned the physical advantage of valley bottoms over dry land as being among the main reasons for their engagement in vinyungu farming. The main argument included the possibility to produce more frequently in the valley bottom. As pointed out by respondents in Igumbilo and Nyololo villages respectively:

> *I began valley bottom production because it is an area where one can produce more than twice contrary to the dry land farming*…(31 years old male – Igumbilo village).

> *The reason why I decided to engage in valley bottom is ... one can produce at least two to three times a year contrary to dry land farming where crop production is only once* (39 years old male – Nyololo village).

The respondents linked the possibility for multiple production to constant moisture availability in (some) valley bottoms and to the presence of streams and rivers within the valleys and flood plains which enabled irrigation. With a single rainy season, it was only possible to practice dry land production (or rain-fed production) once a year coupled with a limitation in the varieties of crops that can be produced which, according to the respondents, made the practice unprofitable.

The respondents further indicated that the multiple harvests in valley bottoms were a result of the possibility to grow *fast crops* through irrigation. Many of the *new generation farmers* mentioned this as another reason that attracted their engagement in vinyungu farming. In line with the majority of the young or *new generation farmers* interviewed, this respondent from Kitwiru village gave his reason saying:

> *The actual reason why I decided to engage in valley bottom production is that one is able to produce fast crops* (39 years old male – Kitwiru village).

This farmer's account implies the need to generate (fast) cash. The 'financial profitability' of valley bottom versus dry land production is, however, another strong reason, which we can safely call the ultimate reason, to which many (and particularly the *new generation farmers*) attributed their engagement in valley bottom production during this period. As expressed by this respondent from Nyololo village in Mufindi district:

> *What we have realised in Mufindi district is that valley bottom crop production is more profitable than dry land production…Another thing is that one can set aside some savings in order to produce different varieties in the valley within different seasons. However, in the dry land, production is possible only once a year* (51 years old male – Nyololo village).

Another respondent pointed out:

> *The reason why I engaged in valley bottom or vinyungu production is due to how thinking changed over time. I can see that there is more income in the valley bottom than in the dry land* (63 years old male – Igumbilo village).

The profitability of valley bottom production stems from the possibility of growing more crop varieties which take a shorter time to harvest, in comparison to the dry land whereby maize and beans are the dominant crops grown only during the rainy season. Maize and beans may take between five and six months from the time of sowing to that of harvesting (depending on the type of seeds used). Crops grown in the valley bottom include green maize, beans and vegetable assortments. The length of time from the sowing of seed to harvesting, for most of these crops, ranges from three weeks to three months. This gives valley bottom production some physical and economical advantages over dry land production as suggested by a group discussion participant in Bumilayinga village:

> *…now, rain-fed crop production takes a long time and is not as reliable as irrigation. Moreover, the type of crops produced in the valley bottoms through irrigation, are more marketable than crops produced through rain fed crop production. Therefore, many farmers get more money*

through this irrigation farming system (64 years old male – Bumilayinga village).

Some have argued that a switch to quick or more regular year-round returns compared with those harvested only once or twice a year, is a result of the peasant farmers' reduced access to agrarian capital in form of subsidies, as well as the increased uncertainty of the market (Bryceson, 1999). This argument proves true in the study area for those farmers who, following the removal of subsidies, engaged in year round production of crops such as leafy vegetables which do not require high capital input and have a somewhat stable market. Such crops do not only ensure regular cash inflow for household subsistence, but also serve as means for financing dry land production. Nevertheless, the argument may not hold for those farmers who engaged for the primary purpose of income generation. Those who engaged in the production of highly profitable crops such as rainy season tomatoes (which in most cases enjoy a sure market) and other crop types that require high capital input. Ponte's (1998:317, 337) study in two districts in Morogoro and Songea regions in Tanzania further suggests that the farmers' switch from slow to fast growing cash crops is a result of "the combination of agricultural market liberalisation and the increased commercialisation of rural life". He argues (Somewhat in line with the study's findings to be discussed later in the chapter) that the increasing commercialisation of rural life has translated to increase in the cost of living hence leading households to require cash throughout the year.

4.2.1 Land acquisition and access in valley bottoms (1990s – 2005)

Many respondents who were descendants either of the indigenous villagers or of immigrants (who had secured a reasonable amount of land) acquired land in the valley bottoms through inheritance. The size of land acquired depended on the number of children in the family relative to the size of family land. The land belonged to the family and it was passed from one generation to another by the head of the family, in most cases a male. As explained by the following respondents:

In this part of the region, valley bottoms were not considered as common land. As you see this valley, in those days every household had their own small portion, not given to them by the village leaders, which they owned under customary land ownership. That is to say, most of us have inherited these areas from our fathers and forefathers (Nyololo group discussion – estimated 60 years old male participant).

> *I came here when I was ten years old. The plots I have in the valley bottom belonged to my father. He lived here before… my farther was an agricultural extension officer and was given the area by the village leaders in 1974 because there was hunger. They used to offer areas to people at that time* (55 years old male - Magulilwa village).

As evidence of this, the majority of old respondents confessed that the size of land they had, both in the dry lands and valley bottoms, when they began production (between 1950s and 1970s) was more than what they were left with in 2005. They expressed that they had given part of their land to their children who were now independent. For example, this respondent from Kitwiru village expressed:

> *I am now remaining with only 0.75 of an acre in the dry land. In those days when my parents were still alive I had much land, about 28 acres, but because of the children, I have divided it among them… I have 12 children all from only one wife*[6] (60 years old male – Kitwiru village).

Another means through which land could be acquired was by borrowing. This was mostly common among the immigrants who were not able to secure land through the village government or other means. Occupation of large areas by the indigenous people both in the valley bottoms and in the dry lands resulted in lack of land for those who joined the villages at a later period. At the time land was not considered a commodity hence with the conscious fact that one had acquired it free of charge, it seemed proper to likewise lend a part of it to someone in need, free of charge. Sometimes payments were made in kind as a token of appreciation (Daley, 2005). Under this system of land access or acquisition, one received land for production and returned the land to the owner when he or she needed it no longer. One reason would be in the case where the borrower had acquired personal ownership of land or was moving out of the village. Another case could be where the owner decides to take back the land for various reasons including being envious of the borrower's success. This renders this method of acquisition insecure. An example is the case of this respondent from Kitwiru village:

> *I began with one and a half acres, but they are now reduced to three quarters of an acre. This is because I had borrowed this land from various*

[6] The emphasis, "*from only one wife*" is made because polygamy was a common practice in the region (as in many other regions of the country) especially in the past. One respondent of about 75 years confessed to have married nine wives and had approximately 50 children. Another respondent revealed that his father had six wives. However, these were exceptional cases. The majority of the respondents who practiced polygamy, confessed to having two or three wives.

farmers, and they for some reason decided to take their land back saying that they want to use it (55 year old male – Kitwiru village).

Another respondent explained:

My sister gave these two vinyungu plots to me. Another one was given to me by one 'sister' [meaning lady] out of sympathy, after seeing my efforts… but, at any time, they can tell me they want their plots back. I have been using them for the past eight years [from 1997]*, and I have so far had no problem with the owners* (54 years old female – Igumbilo village).

An increased realisation of the production potential of land in valley bottoms and its subsequent scarcity resulted in the transformation of land to a commodity. The acquisition of land through buying and renting became the main means of land acquisition and /or accessibility. Nonetheless, this varied from place to place depending on the farmers' level of market involvement and land availability in any given area. Buying and renting of land in valley bottoms and floodplains was the predominant means of land acquisition at the time of this study (2005). The majority of those engaged in these two systems of land acquisition included among others, immigrants and the second or third generation of immigrants coming from large families in which land could not be given as inheritance to all or had secured an inadequate amount of land as a result of their large numbers. A respondent in Kitwiru village expressed:

Since my parents were immigrants in this area, I got my land by buying (47 years old male- Kitwiru village).

This implies that immigrants own smaller sizes of land and are hence not able to divide it for inheritance especially in the case of many children. Likewise, in Mtitu village two young men of the same family had resorted to renting pieces of land in the valley bottoms. When asked if their parents could not provide them with land (being the traditional practice), one replied:

Many locals here have land but because we are immigrants, we do not have land. Our father's father came here from Mzegena to work, so when my father came some of his relatives decided to accommodate him. They gave him a small piece of land, which frankly speaking, was not enough to distribute to all of us. This is why we have resorted to hiring land (31 years old male – Mtitu village).

These young men are third generation immigrant descendants. They represent the many young men in valley bottoms who having no ready made future, as far as land ownership is concerned. They have no other option but to hire or buy land in the valley bottoms for production. Vinyungu plots were, however, more expensive compared to dry land because of their potential for year-round production. It would therefore seem logical, from an economic perspective, that if they were to rent or buy land for market production, it should be in an area that is able to give them more than just satisfactory returns for their capital investment. As expressed by these farmers:

> *There are changes in land accessibility and /or acquisition. In the past, one could simply borrow land and used it until the owner decided to take it back. At that time one could then give the owner a token. This could be in form of money or in kind, just as a sign of appreciation. This is no more the case, you have to either buy or rent it. One pays 3000 Tshs*[7] *for one kinyungu plot. The plots may range in size (e.g. plots can be 5x7, 7x8, 10x10…strides or more) but the price is somewhat fixed. Vinyungu plots are much more expensive than dry land plots which range between 10,000 and 15,000 Tshs per acre – one needs many vinyungu plots to reach one acre, hence making them very expensive…nevertheless people still buy and rent vinyungu plots. This is because vinyungu plots are currently considered more for market production, rather than for subsistence as was the case in the past* (65 years old male – Kitwiru village).

> *…If you announce now that you are selling one acre of land in the valley bottom, you will get a customer in a flash. Not only that, but you will also sell it at a high price because gardens fetch higher returns than the dry land* (47 year old male – Magulilwa village).

However, by 2005 the possibility of buying land in the valley bottoms seemed somewhat difficult in some parts of the study area. The profitability and certainty of production resulted in reluctance of selling or even leasing out land in the valley bottoms and floodplains on the part of land owners. For instance when asked whether she had the intention of increasing her land holding in the valley bottom, this respondent in Nyololo village replied:

[7] Equivalent to $2.5 (rate of 1200 Shs to one dollar) or 1.76€ (rate of 1700 Shs. To one Euro) as at the time of this study

> *If it were possible, I would have liked to add more land. All the land in the valley is under ownership, the issue is how to get someone who is offering their land for sale. Even if it were to rent, there are very few farmers who lease out land in the valley bottom. The majority of farmers would rather abandon dry land and lease it out, but not the valley bottom. This area is more profitable. One can grow a variety of crops and does not have to wait for rain in order to produce* (21 years old female -Nyololo village).

It should be noted though that these various means of land acquisition were not linear or as systematic as presented here. Neither did they occur homogeneously in all parts of the region. This might have depended very much on the function, location and accessibility of the individual villages. This, together with other factors, might have determined to some extent how soon land was transformed to a commodity. For instance Daley (2005) reports that in Kinyanambo village (Mufindi District) commoditization increased from the 1960s due to increasing migration for work in the village, resulting from the prospect of the creation of a new town. This process was probably still not common in many other parts of the district that did not have the same prospect. It would not be surprising to find that in some areas, there is still a possibility of borrowing land or even receiving it as a gift; given the remoteness of the area or the absence of transport infrastructure - a necessary condition for market production. For an example, a statement that suggested such a possibility was made in Bumilayinga village during a group discussion. When the discussants were asked concerning their reactions if the village government decided to distribute part of their land in the valley bottom (given that it was owned under customary law) one discussant expressed:

> *If they try to take our land that will cause a dispute, maybe if one comes and asks "please can I have three vinyungus in this area?"... For example, even you mama* [referring to the researcher] *can come and ask me for a kinyungu or two to farm on, I will give you an area to clear for production, but that will not mean that the area now belongs to you, I will still be the rightful owner.*

The discussant's explanation does not only suggest that it was still possible for someone to receive land in the valley bottom through borrowing in 2005, but also reflects the sensitivity with which matters of land ownership need to be dealt with, especially by the governments.

4.3 Change in the characteristics of vinyungu farming (1990s-2005)

4.3.1 Land size and extent

The change in the farmers' reasons for engagement in valley bottom cultivation, from production for food or survival to production for cash income, had subsequently led to changes in the characteristics of vinyungu farming. The scene in the valley bottoms and floodplains from the mid 1990s to 2005, in most parts of Iringa region and in the study area in particular, could not be compared to that of the 1950s to the 1980s. There were significant notable changes within these areas. One could vividly see plots of diverse nature (in terms of shape and size) with crops planted in straight parallel rows as opposed to the earlier chaotic arrangement (see photo 3.3a and 3.3b). As described by this respondent from Igumbilo:

> *Until the 1990s crop production was not practiced in a professional way but now it is. Frankly speaking in the past, we were not educated on production but most of my colleagues are now farming in the professional way* (42-years old male –Igumbilo village).

Contrary to the traditional practice, there was an increase in the size of vinyungu (camber-beds) as well as an expansion in the total area under production within the valley bottoms and floodplains as a whole (compare photos 3.3a and 3.3b in pp.35 with 4.1a and 4.1b in pp.62). Studies from other parts of the region also confirmed this phenomenon. For instance, Lema (1996:141) in his study of Njombe district points out that while

> In the past the vinyungu plots were small in size, nowadays, they are larger and more extensive. One kinyungu can be considered as a garden in its own right.

Having studied five villages, in three divisions within Iringa Rural District, Mkavidanda and Kaswamila (2001) likewise observed that there had been a significant increase in the extent of valley bottom production. The increased valley bottom production had expanded into areas which in earlier years would not have qualified for this traditional practice. For example, the practice had expanded to relatively drier land, on the fringes of the valleys. These farmers confirm these changes saying:

> *Before the 1950s the area was just grass or bush. There were wild animals in the area. Not a single person was producing* (75 years old male – Magulilwa).

Photo 4.1a: The scene of valley bottom / floodplain crop production in most parts of the study area by the year 2005[9]

Source: Author's fieldwork 2005

Photo 4.1b: The scene of valley bottom / floodplain crop production in the study area by the year 2005.

Source: Author's fieldwork 2005

[9] Still in some form of mixed cropping, the plot consists of maize stocks grown in parallel rows mixed with vegetables. The vegetables in the foreground are pumpkin leaves. The predominance of maize in the photograph is due to the fact that the rain season was approaching, and being a flood plain, only maize stocks could survive the excess moisture (the vegetables were harvested before the heavy rains began). Moreover the environment in which production has taken place appears much larger compared to photos 3.3a and 3.3b in chapter three. The remaining trees (middle ground) could be evidence of former vegetation cover.

In the past, only the areas very near to the streams and rivers were being used for production this whole area was reserved for grazing (34 year old male - Kitwiru village).

In 1994 the valley bottom was not like this. There was still an extensive uncultivated area. Bushes mainly covered the area. People began to produce more seriously in 1995, and by the year 2000, the whole area was covered with plots. No more bushes were in sight (31 years old male - Mtitu village).

To confirm the third respondent's observation, the following respondent pointed out:

Since my arrival in 2000 I have not really seen much change. The whole area in the valley was already occupied (29 year old male -Mtitu village).

In relation to plot sizes, the farmers expressed:

These years, people have larger vinyungu plots than those of the past. In previous years, people did not have up to one acre of land for vinyungu. They would only produce in two or three small vinyungu plots for vegetable and that was it (35 year old male – Igumbilo village).

Nowadays people have larger vinyungu plots than those of the past. In the past, one had less than 0.25 of an acre. One with 0.25 of an acre was considered as having a considerable size of land in the valley, but now one considered having the least, has 0.25 of an acre. However, those who are better-off or market producers, have from two up to four, five, or more acres[8] (35 years old male -Magulilwa village).

In the past, the vinyungu plots were like small gardens with a mixture of crops especially vegetables. They were very small in nature and in most cases situated in less than 0.25 of an acre. However, in recent years, farmers have tended to expand these plots. The size of vinyungu plots is therefore no longer what it used to be traditionally. Some have a combined area of vinyungus reaching as large as six acres... (Group discussion - Nyololo Village).

[8] These acres are not necessarily found collectively in one valley. One may have several vinyungu plots in separate valley bottoms. Usually their combination is what constitutes the acres.

4.3.2 Crop types

Another significant observation and central to this study is that most *vinyungu* plots in the study area no longer reflected only individual household requirements, as was the case in the past, but also market requirements. New crops had been introduced in addition to the traditional crops, which had not been abandoned but in some cases improved in terms of quality. *New generation farmers* together with the new comers were reported to have been instrumental in introducing most of the new commercial crops that were earlier unknown or of little significance to the older generations (see box 4.2). For instance, some farmers revealed that in the 1970s they did not know crops such as tomatoes *(Lycopersicon esculentum)*, green bell/sweet peppers *(Capsicum C. annuum)*, eggplants *(Solanum melongena)* and such. Other newly introduced crops included carrots *(Daucus carota)*, onions *(Allium cepa)*, garlic *(Allium sativum)* cabbages (*Brassica oleracea var. capitata)*, bitter tomatoes *(Solanum aethiopicum L.)*, paprika *(Capsicum C. annuum)*, and in some cases asparagus (*Asparagus officinalis)*, beetroots *(Beta vulgaris)*, and cauliflower *(Brassica oleracea)*, (see photo 4.2a and 4.2b) just to mention a few. These respondents report:

> *...these green peppers only came about four years ago (2000 / 2001) and they were grown by one young man who had the expertise on how to grow them* (55 year old male – Mtitu Village).
>
> *To say the truth one head teacher, who immigrated into Magulilwa, and I are the ones who introduced tomato production in the Magulilwa area. This was in 1992. At that time, those who produced in valley bottoms produced mostly maize, beans and green peas. However, they produced only for subsistence* (35 years old male – Magulilwa Village).
>
> *There came some experts form Arusha and Kilimanjaro region mainly of the Chaga tribe*[10]*. They asked for some plots and began to cultivate. Where they found a place that was idle, they asked for it and began to clear it. They sowed seeds in the nursery then planted the seedlings. They bought insecticide, pesticide, pumps and they were producing a lot of tomatoes. They began to improve tomato growing in the area; they are very hard working and committed. They had capital and with that they were able to make the land productive. Until now, they are the leading*

[10] This tribe is considered to be one among the most industrious and business oriented tribes in Tanzania.

group in production in comparison to the indigenous people of this area. (65 year old male – Kitwiru village).

I was the one who introduced gardening or vinyungu (it is the same thing) here in 1994. No one knew anything about it. When I came newly from Wilole, I went to the village office and enquired whether there was an area close to water. The officials showed me an area that belonged to the village and said if I wanted, I could produce there because no one was producing and no one knew about dry season farming. Therefore, I proceeded and tried to grow beans and maize in the first year. The outcome was very good and when others saw this they came to consult me asking how I went about it so I explained to them and we continued together until there were many people (42-years old male –Igumbilo village).

Box 4.2 Introduction of crops by new comers in Kitwiru village – Group discussion

When I came here I saw that the older people grew those crops that they had need of only during the dry season. The type of crops they produced were those that they were already used to like 'figiri' this type of leafy vegetable they produce by sowing seed and thereafter they pick single leafs allowing it to continue to sprout… They did not harvest by completely uprooting the plants… I remember later they began to produce amaranthus; there was one Mr. M [name withheld] he was a pastor and was the first to produce amaranthus and was very popular. He produced and harvested by completely uprooting the amaranth plants and tied them in small bunches for sale.

Later there came other people from various parts who began to produce tomatoes. They came with the expertise to produce tomatoes. Later people saw them and began to imitate them. I think what made people to produce what they had been producing for so long, is that maybe they did not have the expertise and others probably didn't know that such a practice existed. Take for example tomato production, they had no awareness that they needed to spray pesticides or fungicides to protect the crop. They produced during the rainy season and as a result, the tomatoes got destroyed by rain. If one was lucky, one could get at least three tomato fruits for household consumption and that was all.

However, after the arrival of people who had the expertise, the indigenes began to imitate them and the practice began to spread. The practice expanded to areas which at first were believed to be unfit during the dry season. So what made people not to produce at first was that they were not knowledgeable about the practice… now there is one friend of mine who is producing crops that we neither know or eat them. These are probably only eaten by the white tourists coming here… I strongly believe that after some time, I too will begin to produce such crops.

Photo 4.2a: An example of newly introduced crops: broccoli, which is not a traditional dietary preference of the natives in the area.

Source: Author's fieldwork 2005

Photo 4.2b: An example of newly introduced crops: Asparagus and red Cabbage which are not a traditional dietary preference of the natives.

Source: Author's fieldwork 2005

In an interview held with one village agricultural officer, it was learnt that the influx of outsiders who knew how to eat such crops as green peppers and carrots, together with the secondary schools recently introduced into the various wards, provided market for such crops. Furthermore, in the 1970s to 1990s, maize was largely sold as grain. However, by the year 2005 most of the young and middle aged farmers who produced maize, particularly in the valley bottoms, chose to sell either all or part of their maize produce as green maize (maize on the cob) locally referred to as *'gobo'*. As expressed by this discussant:

> *The young farmers have largely introduced 'gobo' [green maize] production ... In the past, maize was not considered to be a cash crop. Maize was only for food and even then, its production was difficult and was not enough to feed people. At present, people can sell 'gobo' grown in the valley bottoms and it is a very good business for those who are able to produce it* (Group discussion – Bumilayinga village).

Marketing of green maize resulted mainly from the high demand for green maize in big cities, towns as well as within the villages brought about by a flourishing roasted-maize business[7] that emerged from the late 1990s which in turn provide farmers with quick cash returns. Although maize is a traditional crop and a major staple produced by the majority of farmers for subsistence in Iringa region, the respondent's expression "for those able to produce it" suggests that valley bottom maize production is not the same as what the majority of farmers practice in the dry lands. Some respondents, in the study area revealed that green maize from valley bottoms (if properly managed), was preferred by traders more than that produced in the dry land. This, they noted, was due to the better quality of maize produced in valley bottoms through irrigation. On the other hand, this farmer from Magulilwa village provides an explanation on why farmers prefer to market valley bottom green maize as compared to that from the dry land.

> *In 1998 Magulilwa village was invaded by 'gobo' market production. In earlier times, maize was just for 'ugali'* [stiff porridge]. *In 1998 is when market production was widespread, people began to sell 'gobo'. Now as it is, this 'gobo' is a better business compared to grain maize therefore, we began to produce it extensively in the valley bottoms. When one produces gobo in the valley, it is more profitable than in the dry land. This is*

[7] Despite the government having banned the business across the nation, the marketing of green maize was (and still is) carried out. Selling green maize in large quantities is feared to lead to food shortages. This is especially so, given the fact that maize is among the major staples in Tanzania.

because production in valley bottoms is in somewhat smaller scale in comparison to the dry land. In the valley bottoms, people produce maize on small plots. However, not all produce. Therefore, when the traders come they are desperate and the farmers are at liberty to negotiate price. This is, however, not the case for the rain-fed or dry land gobo production whereby everybody produces extensively. The traders simply come and can fill a truck or pick up from a single farmer's dry land farm leaving the rest of the farmers without a buyer. Therefore, when another trader comes along, he finds farmers fighting over him to buy their green maize and as a result, he offers a very low price leaving the farmers with no choice but to sell at that low price (30 year old male –Magulilwa village).

Notwithstanding, the introduction of new crops (non-traditional crops) in various parts of the region was not uniform and the *new generation farmers* were not responsible for introducing new crops in all the valleys and floodplains. Some villages reported having known certain crops earlier than other villages. For example, some reported that they became aware of a variety of crops through foreigners who, during and after the colonial era, were producing in or near their villages. As expressed by these farmers from Magulilwa and Mtitu villages respectively:

... The 'wazungu' (whites) [referring to the British] *used to live here… they taught us how to produce cabbage, carrots, onions (big ones) or rather I should say we imitated them. The whites used to produce all of these. Later we produced them in village gardens under villagisation …* (70 years old female – Magulilwa village).

We began producing green peas since the 1970s. There came one ' mzungu' [a white man] *from Britain, he is the one who brought it along… he began to distribute the seeds to the indigenous people so that they would produce in their farms, and sell the produce to him. Later we discovered that there was a market for the product in Dar es Salaam city and so we began to produce it for the market. That is how green peas production began to spread all over our valleys in Mtitu* (65 years old male – Mtitu village).

Others pointed out that foreign investors[8] who owned companies that required particular crops for processing in their factories had recently introduced some crops. These companies provided the seeds and necessary training, and later bought the produce from the farmers according to an agreed price. An example of a crop introduced under such arrangements is paprika.

> In 2001, the Spanish company EVESA — a major producer and processor of spices — established Tanzania Spices Limited to increase supplies of raw paprika to their EVESA factory. Tanzania's Iringa and Ruvuma regions were chosen as sites to establish paprika as a cash crop for small farmers… USAID is supporting efforts to help Tanzanian farmers understand the paprika market and learn how to successfully grow this new crop. In close collaboration with Tanzania Spices Limited, USAID is helping establish farmer associations, allowing the Agency to work directly with individual farmers (USAID, 2003:1).

One farmer producing paprika informed that he became aware of the company and the paprika crop through newspapers and radio:

> *I got the information through advertisements. The company made the information public in newspapers and on radio and they provided their office address located at Mlandege - Iringa where people who were interested could reach them. On visiting their offices, they provided information on how to produce paprika. After receiving the information, I decided to try out this new crop* (between 40-43 years old male – Mtitu village).

Nonetheless, others reported to have learned of new crop types through their interaction with other villages, districts and even regions. They decided to experiment with the crops in their home villages and where successful, they continued to produce. In so doing, they attracted the interest of other farmers within the village. Ngatunga (2008) refers to such farmers as *farmer innovators* defining them as:

> *Those farmers who have developed new technique(s) or method(s) and /or creative modifications of the recommendations or picked up ideas from*

[8] The Tanzania government has been making efforts to attract foreign investors into the agricultural sector in order to boost the sectors performance in the national economy. For example, the Agricultural Sector Development Programme (ASDP)framework and process document states that "At the heart of [Agricultural Sector Development Strategy] ASDS is… establishing an enabling environment which attracts and encourages private sector investment in agriculture (URT, 2003).

different sources and incorporated into the recommended practices (Ngatunga, 2008:86) (emphasis is author's).

Most of the newly introduced crops were not traditional dietary preferences of the people in the region. Some farmers pointed out that they just produced these new crops for the market. Some claimed to have attempted to consume them once or twice and were not satisfied. Others had never tasted these crops at all, with some never intending to. Yet others had not yet tasted, but had left the possibility open. They point out that:

> *Maize and beans are our traditional foods, but other things we grow for the market so as to assist us with income* (71 year old male – Kitwiru village).
>
> *I decided to produce special vegetables* [uncommon in the region] *in the valley, which are not common in the everyday market... I personally do not eat any of these special vegetables; my only concern is to market them* (34 year old male – Kitwiru Village).
>
> *…You will not find anyone eating plantain around here; people consider it to be food for the Nyakyusa and Chaga tribes. We only produce for the market… Likewise, though we have tomatoes and onions produced in the village, no one eats 'kachumbari'*[13]*, the people here perceive it as awkward for one to eat such a thing. It is the same case with garlic. Garlic is produced, but the locals produce it only for the market, and consider it as medicine in case of 'degedege'*[14]*. However, they will not eat it, they say it stinks…Another thing is that if I were to keep one bag of beans for subsistence and you keep one bag of green peas, our community will be surprised saying "this person has kept so much peas can he manage it?" People buy peas as seeds for production and not for consumption. Therefore if you go around advertising that "I am selling dried peas [as food]", the people will say, "this guy has gone crazy"* (43 year old male – Mtitu village).

The narratives above provide further evidence of the transformation of vinyungu farming towards a market production system, with farmers beginning to produce what they did not

[13] This is a popular salad in some urban and coastal parts of Tanzania. The standard preparation constitutes of tomatoes, onions, lemons / limes with salt and chilli (this is optional).
[14] Degedege is a disease characterized by high fever and convulsions usually triggered by malaria. Infants and young children are the most affected by it.

consume. The new crop *preferences* began to reflect the market rather than household consumption needs.

4.3.3 Irrigation methods

Apart from the change in plot sizes, the farmers reported that some of the areas which experienced constant moisture throughout the year were relatively dry necessitating the application of irrigation. Various studies have attributed this to unstable land use practices among them being over cultivation around the water sources (Lema, 1996) and clearing of vegetation (Mkavidanda and Kaswamila, 2001) for further production (see photos 4.1a and 4.1b). Irrigation was mainly carried out using plastic water buckets (see photo 4.3a) with few farmers using watering cans (see photo 4.3b). The high water table, which is characteristic of most valley bottoms in Iringa region, enabled the creation of water holes near the plots for irrigation (see photo 4.3c). Some farmers (who had enough capital) resorted to the use of motorized or manually operated water pumps (see photo 4.3d). Another common irrigation method was that of constructing earth canals (see photo 4.3e and 4.3f), which diverted water from rivers, streams and /or springs, into the relatively dry areas within the valleys. This was especially common along the fringes of the valley bottoms and flood plains, to which valley bottom production had extended. One could say that the *vinyungu* crop production system had advanced from a traditional natural-moisture-dependant horticulture system, into a commercial horticulture system largely dependent on irrigation. This was expressed in a discussion in Mtitu village as follows:

> *In the past we did not irrigate because there was plenty of moisture, but because of continuous production the area has been drained and now we have to irrigate. At present you will not find vinyungu along the Mtitu River anymore, rather you will find gardens. The creation of irrigation channels has enabled the extension of these gardens to the dry land. It is along small streams that you will now find the vinyungu system of production utilising natural moisture.* (A discussion with the village chairman together with the agricultural extension officer of Mtitu village).

Photo 4.3a: A farmer irrigating on the fringes (slopes) of the Ihambili stream (connecting to the Little Ruaha River) valley using plastic buckets.

Source: Author's fieldwork 2005

Photo 4.3b: A young boy irrigating[15] (paprika) using a watering can (along the fringes of Mtitu/ Ruaha River valley)

Source: Author's fieldwork 2005

[15] Children are trained from an early age. This boy is given the watering can to demonstrate whether he is able to fulfil the task, while the father (not visible on the photo) looks on and provides guidance and encouragement as well as to ensure the boy's safety (in case the need arises). Notice that the area is relatively dry.

Photo 4.3c: A water hole in the valley bottom for irrigation (fore ground) dug near a plot with young onion plants.

Source: Author's fieldwork 2005

Photo 4.3d: A manual irrigation pump (money maker) on a constructed well in the vicinity of gardens developed on dry land. (Water pumping is performed using feet).

Source: Author's fieldwork 2005

The construction of irrigation channels was more prominent in Kitwiru and Mtitu villages. In Kitwiru, the farmers adopted this method because a greater part of production was undertaken some distance (about 100 to 200 meters)[9] away from the Little Ruaha River. They therefore diverted water from surrounding streams and springs that feed into the Little Ruaha River. Mtitu village, on the other hand, is endowed with two rivers (Mtitu and the Little Ruaha) and Ihambili. The farmers expressed that they adopted this method of irrigation from a foreigner who had lived in the village during colonial times and had constructed a channel which he had used for production. When they began to expand to the dryer parts of the valleys, they recalled how this foreigner was able to produce successfully using the constructed channel that he had used to divert water from the Mtitu River for irrigation. Therefore, they likewise began to construct channels (of comparatively lower standards) directed to their fields.

> *At the very beginning there was a channel that was constructed by a white man but ended a short distance from the river…One old man, now late, began to trace the channel that was constructed by the white man, and directed water to his own area and we all began to imitate him according to the white man's pattern* (34 years old male – Mtitu village).

Nevertheless, not all respondents acquired their knowledge in this manner. Some farmers had learned this irrigation method from other parts of the region. As narrated by the following respondent:

> *… For all the 25 years that I lived in Magulilwa, I never saw the importance of valley bottom production. It was after I was transferred to Mahenge and Kalenga divisions, as a civil servant, between 1997 and 2000 that I realised its potential. This is because in both divisions, they practice irrigation farming through diverting water from rivers and streams, and so I learned the practice and engaged in it. I realised that it was far more beneficial than relying on rain fed agricultural production. Therefore, when I returned to Magulilwa I applied the knowledge that I had received and began irrigation farming in this Little Ruaha River valley. However, since this part of the river is deep, it does not flood. It is therefore not possible to construct channels for irrigation. I use a*

[9] This distance is in accordance with the national water management regulations and village bylaws.

motorized water pump (Honda in type) instead, to draw water from the river to my garden plots (65 years old male – Magulilwa village).

Photo 4.3e: A channel (fore ground –see arrow) diverting water from the Mtitu River (hidden in the middle ground) for irrigation.

Source: Author's fieldwork 2005

Photo 4.3f: A main channel (diverting water from a stream) with secondary channels (see arrows) distributing water to different parts of the field for irrigation (note plots in the background – left hand corner).

Source: Author's fieldwork 2005

Though the traditional *vinyungu* cultivation was earlier regarded as a purely dry season practice, it had become a year round practice in most parts of the region by the year 2005. However, it was difficult to produce vegetables in areas which experienced flooding during the rainy season, nonetheless, some farmers still managed to grow maize, since it could endure the excessive moisture (having stronger and deeper roots in comparison to vegetables). The year-round production was more common in relatively dry areas, such as on the fringes of the valleys and flood plains, as well as in areas with significant natural moisture reduction. In such areas, farmers irrigated during the dry season and utilised natural precipitation during the rainy season.

> *In the past, people did not see these areas as being important for production, most people took them for granted. One thought, "well, because there is moisture let me grow a few vegetables" and that was all. Now things have changed, in the sense that one uses the area throughout the year. Farmers are now rotating crops. After harvesting one, they grow another and so on* (Group discussion in Nyololo Village).

4.3.4 Production implements

Although the hand hoe was still the predominant tool in valley bottom production, the use of ox plough was also gaining momentum. Nevertheless, this depended very much on the characteristics of the valley. Areas with excessive moisture necessitated high ridges, which in turn, resulted to deep ditches (as the case in Mtitu village along the Ihambili stream and Bumilayinga village endowed, in some parts, with a number of springs) that jeopardised the safety of the oxen. The application of this technology was therefore more common in relatively dry parts of the valleys and floodplains and along their fringes. A few farmers who owned ploughs hired them out to other farmers as a means of generating income. One farmer went as far as suggesting the possibility of tractor usage in the valleys and floodplains due to what he termed as the transition 'from vinyungu to gardens'. He pointed out that:

> *Vinyungu plots are somewhat disorganised, they are like little maps they are not really decent in shape they can only be constructed using the hand hoe. However, in these gardens one can use a plough or even a tractor. People who came from Sokoine University of Agriculture in Morogoro, are the ones who told us that these are gardens and that the other ones*

that looked like little maps, are the vinyungu plots (65 year old male – Mtitu village).

Unfortunately, the author did not encounter any farmer who confirmed to use a tractor in the valleys. Notwithstanding, the respondent provides an interesting observation as he points out that it was through researchers and/or academicians that they became aware of the fact that they were no longer practicing *vinyungu* farming, but gardening. This would explain why most of the respondents producing within the Mtitu valley referred to their plots as gardens rather than *vinyungu*. It suggests a replacement of the traditional concept of *vinyungu* production system with that of a relatively 'modern' horticultural production system. It also reveals the role of academicians and researchers in the provision new *(learning) experiences* and knowledge which could in turn trigger changes.

4.3.5 Fertiliser and pesticide use

Another change worth noting in valley bottom production by 2005 is the use of inputs such as pesticides and fertiliser. For instance, fertiliser use in the valley bottoms (specifically inorganic or chemical) was not common among farmers (not even in the dry land) in the 1950s and earlier (see chapter three). At the time, one could have referred to the valleys as virgin lands, possessing rich fertile alluvial soils. Arguments put forward, suggest that the increased intensity of production on valley bottom and floodplain soils together with improper irrigation methods, have led to the depletion of the natural soil fertility hence necessitating the use of fertilisers (Majule and Mwalyosi, 2003; Kyando, 2007). Moreover, the fact that production has advanced to somewhat dry land (which does not posses the attributes of valley bottom soils) also necessitates the use of fertilisers. These farmers note:

Right now there is no distinction between dry land and valley bottom production (that is apart from irrigation). The same production techniques used in the dry land are applied in the valley bottoms. For instance, fertiliser is used in both the valley bottoms and dry lands (65 years old male – Igumbilo village).

When I came in 1998, people were already in the valley bottom. The main difference between then and now is that they are now using modern methods of production. In the past, we did not use fertiliser in the valley bottoms, but now no body produces without fertiliser. Therefore, production has increased compared to the past… To say the truth, people have changed significantly. Now one earns more producing in a small

area, while in the past one produced in a large area but with less returns (45 years old male – Mtitu village).

As pointed out by the second farmer above, in the past fertiliser was not used in the valley bottoms. In other words, the production knowledge obtained from dry land production was transferred to valley bottoms, therefore intensifying valley bottom production through the application of fertiliser. More was being realised from a smaller unit of land as compared to the past. However, this study discovered that farmers had devised their own methods of fertiliser application through a try and error procedure. For instance, in a group discussion in Bumilayinga village, some discussants expressed that they had to apply more fertiliser in the valley bottoms compared to the dry land due to excessive cold and moisture in the former. They clarified that more fertiliser was needed to ensure warmth for the plant (this is based on farmers' understanding and is not scientific). They also pointed out that water carried much of the fertiliser away before it could work on the plant. Hence, by applying more, they were assured that a reasonable amount would still be available for the plant. Such practices resulted in higher initial costs in valley bottom production than in dry land production. Notwithstanding, they pointed out that it was still worth it as they were certain of obtaining a good harvest afterwards (implying good income returns).

On the contrary, most of the farmers who produced primarily for subsistence (i.e. a greater proportion of the total produce) confessed to having used none, or less than required fertiliser due to limited financial capital. They expressed that they did not have enough capital to buy pesticides and fertiliser to cater for both valley bottom and dry land production. Some studies have attributed the farmers' predicament to the removal of subsidies on inputs following market liberalisation implemented under structural adjustment programs in Tanzania and many other African countries. Among other things, liberalisation has been blamed for the rise in pesticide and fertiliser prices beyond the reach of the majority of smallholder farmers leading to low productivity (Mwakalobo and Kashuliza, 1998; Hammond, 1999; Bertow, 2007). For instance, having encountered a somewhat similar situation among their respondents, in a study conducted in Mbeya region (within the southern highlands of Tanzania), Mwakalobo and Kashuliza (1998) have suggested that:

> *Structural adjustment policies… have had a considerable impact on smallholder farming systems. High input prices and lack of credit inputs are among the major constraints which have compelled farmers to use less amounts of purchased inputs in their farms…*(Mwakalobo and Kashuliza, 1998:1) - (emphasis is from authors).

The researcher learned of various available credit schemes[10] that the farmers could join to increase their capital. However, not all of the respondents seemed to be aware of such schemes. Among those who were aware, an insignificant number were actually members of any scheme. Some farmers, who were asked on why they were not members of any scheme, expressed that someone had to have something to give before one could receive anything (referring to the credit conditions). Others were simply afraid of loosing the little property they had in the case they could not repay the debt in time.

> *I have not made a follow up but I hear that this year there are loans available, but I am not well-off so I am afraid. What will I pay back if I take a loan?... I am afraid because I have not yet seen others. Some received credit last year but I have not yet been able to observe them well. I said let me first see how the others are faring. Let me first see their outcome for I am afraid* (51 years old female – Magulilwa village).

The farmers' anxieties towards credit resulted from the fact that most credit schemes required weekly or monthly repayments which proved unrealistic to those solely dependent on agriculture for their income. As expressed by these discussants:

> *We have a bank here that offers credit. However, the type of credit that it provides requires weekly repayments. To expect me to pay every week when I am expecting to harvest maize after five months is not possible* (Group discussion - Nyololo village)

> *These credit offers that require people to pay on weekly basis are not suitable for us farmers because we need to wait until the crops are ripe before we can harvest, sell and get money to pay back the interest.* (Group discussion – Igumbilo village)

> *"There are plenty of people here in the village who are members in these credit schemes but I refused. If I take credit, it means I can not continue with crop production. I will have to be buying cow and slaughtering repeatedly so that I can come up with the required interest... The scheme requires one to pay 20,000/- every month therefore if your brain is not*

[10] These include Foundation for International Community Assistance (FINCA) (Village banking and business loans), MuCoBa (Mufindi Community Bank)

alert or creative enough to think of something else to do to get money, and you are only dependent on crop production, where do you think you will get such money? That is why I decided that it was not a good thing to do, because you will take these people's money and then you will start to struggle, running to and fro in search of cow to slaughter to get the monthly payments. If you are not able to pay them, they take away your property that is why I refused to join…There is one person here, they have taken away his house and it was big. He had borrowed 300,000/- from the scheme (46 years old male – Bumilayinga village).

The respondent's account seems to suggest that those who are members within these schemes have had to devise other income generating activities alongside crop production in order to meet the loan requirements. However, it was further learned that most of these credit schemes provided credit to groups[11] rather than individuals whereby the group acted as security for each individual member within the group. That is to say, the group members become responsible for one another (through peer pressure) ensuring that each pays their part of the debt within the given time. Otherwise, in the case where one or more members did not pay their part in time, the remaining group members would have to bear the burden on behalf of those who did not pay. They would have to ensure the settlement of the required sum. That is why the respondent continues to say:

This is the reason why I have refused to join, because we cannot trust one another. There may be five who have taken the loan then immediately you will begin to observe that some among you are not keeping themselves busy to ensure they get the money to pay back. You may observe two or three that are making the effort while the other two are doing nothing which is a loss to those who are making effort. At the end of the day, you find that you have gained nothing rather you have been working for

[11] An example is that of "MuCoBa group loan" offered by the Mufindi Community Bank Ltd. According to the bank, "These are loans given to individual members in a group in order to support their small economic activities. These loans are designed to clients who need relatively small loans due to the nature of their businesses and who in one way or another cannot get reliable collateral under conditions of individual loans. Another reason for the use of this methodology is for the bank to provide this service more efficiently due to the size of transactions … Normally clients select themselves in subgroups between 5 and 7 members and form a group ranging between 20 and 40 members. Individual members are issued loans in accordance with their respective savings at a ratio of 1:3 (save one borrow three). In addition to savings, the loan is guaranteed by peer pressure in solidarity groups, mutually guaranteeing each others loans. A group has to receive training with regular savings before it qualifies to get a loan. The duration of the loan lasts for 12 months and grace period is fixed depending on the nature of businesses although in most cases it is one month" (extracted from MuCoBa official website: http://www.mucobatz.com/services/loans.htm).

> *others. That is why I concluded that there is absolutely no relief in taking credit the only relief is for me to struggle on my own* (46 years old male – Bumilayinga village)

This respondent's concerns were echoed by most of those who refused to take up credit. Like this respondent, it was far better for them to continue struggling to build up their own capital though small, but with peace of mind. Some therefore opted for compost (having received training from agricultural experts) or animal manure, for those who possessed livestock. Though manure served as a good substitute for inorganic fertilisers, it was only a limited number of farmers who possessed livestock. Moreover, the number of livestock for the majority who possessed them was very small. Most spoke of having one or two cows or two to five pigs with the majority naming chickens and guinea pigs as their sources of manure (also used to accelerate the decomposition of the compost). The little chemical fertiliser that they were able to buy, they used in the dry land for food production. Therefore their *insufficient resources* had somewhat *constrained* them from effectively engaging in market production. Pingali (1997) acknowledges that farm yard manure is commonly used in replenishing soil nutrients in subsistence societies. However, he argues that it is not possible to realise output growth in intensive commercially oriented food production systems in the absence of chemical fertilizers, citing the reasons, among others, to be:

> (i) the physical quantities of farmyard manure required for sustaining soil fertility would make it uneconomical relative to chemical fertilizers because of the labour requirements for manure production, the feed requirements for maintaining the number of livestock required to meet manure requirements, and the high cost of transporting it to the field; (ii) on efficiency grounds, high-bulk, low-value materials - manure, agricultural by-products, and crop residues - do not repay labor-intensive management simply because they have such dilute concentrations of useful ingredients relative to chemical fertilizers;… (Pingali, 1997:631-632).

When asked whether they had access to information on how to apply the inputs that they used, some respondents reported that in the past, advice on such things as the use of fertilisers and pesticides was only provided for dry land production. The agricultural extension officers did not bother with the valley bottom production as it seemed insignificant at the time. To confirm this report Lema (1996) who conducted his study in Njombe district among other things concluded:

> Farmers also suffer from a lack of extension services. The dominant view among district agricultural staff as well as … policy-makers seems to be that vinyungu cultivation is a side-line, an informal land-use activity which is largely confined to women (Lema, 1996:144).

Mkavidanda and Kaswamila (2001) also echoed the lack of extension advisory services in their study area. They observed that although there was an agricultural extension staff serving each of the studied villages, the officers themselves had admitted that they rarely offered technical assistance in *vinyungu* farms. However, by the time fieldwork for this study was conducted in 2005 some respondents acknowledged that the agricultural extension officers and other experts were becoming very helpful and were ready to assist them regardless whether it was in dry land or valley bottom production. The information they received among others, included proper seed types, proper spacing, proper types and quantities of pesticides and fertilisers to be applied, together with the time for their application. However, not all respondents reported to have received their production knowledge from the agricultural experts, with few reporting that they rarely saw them. They informed that they simply asked or observed, and emulated those farmers who, to them, seemed more knowledgeable and successful in their production techniques (which were in some cases realised through trial and error). These could be either within or beyond their village boundaries. The following respondent revealed:

> *The expertise that we are applying is frankly that of imitating one another. Your neighbour / friend may tell you "I measured certain millilitres of a pesticide and it did not affect the maize so we share this information. We have reached a stage whereby it has created the perception that if one measures certain millilitres, it does not affect the maize. We apply the same method* [that of try and error] *to other crops and at the end, it is as if we have applied true expertise.*

Question: So this is to say you have devised the measurements on your own and not that you have received advice from the agricultural experts?

Answer: *frankly, I personally find experts to be a very scarce thing around here. You may hear that there is someone with the name "an agricultural extension worker" in the village and he is being paid, but you will not hear that this expert has gone around to see what the farmers are doing. Unless you decide to go to him and tell him "Mr. expert, I have this or that problem" then he can assist you. This could be given to the fact that the experts that are assigned here are usually newcomers* [or outsiders] *and therefore there is a need to first build a close relationship before receiving assistance* (30 years old male – village name withheld due to the sensitivity of information).

New generation farmers, including new comers, were reported to have adopted more productive production techniques even with former crops which guaranteed greater returns for their capital investment. For example, the use of fertilizers and pesticides in valley bottoms and flood plains were common among those young and middle aged farmers who had managed to raise some amount of capital.

> *The younger generation has brought about change such as the introduction of new specialised production methods. Our former production in the valley bottoms was not specialized. Now the young people who have come about from year 2000, have paid attention to specialised agricultural advice on how to produce. Though one may not have enough money to buy enough inputs such as fertilizers, one uses the little that is available and buys more inputs after harvesting and selling the produce* (55 year old male – Nyololo).

This does not imply that fertilisers and other inputs came about with *the new generation farmers*. Daley's (2005) findings suggest that chemical fertilisers began to be widely used during the Arusha declaration decade which was between 1967 and 1977 (the villagisation period inclusive). However, at the time it was used in dry land rain-fed production. This farmer confirmed it as follows:

> *During 'ujamaa' there came Koreans as agricultural advisers (or extension workers). This was in the 1970s after villagisation (1974). When we began to produce in large areas, they taught us to use ropes. The extension workers in those days really knew how to teach. They also taught us how to use fertilizers, since in the past we never used fertilizers* (70 years old female – Magulilwa village).

4.3.6 Labour input

The adoption of a commercial status had likewise increased the level of labour input in valley bottom production. Whereas the traditional subsistence *vinyungu* farming system was sometimes practised with a minimum labour input of one person (a woman to be more precise) and a simple hand hoe, by 2005 most commercial farmers, having land holding of half an acre or more, were engaging hired labour at various stages of the production process. These included the preparation of camber beds, sowing, weeding, manual irrigation and harvesting. Alternatively, a group of friends or neighbours together with family members came together and took turns working on each member's plot. This system known as the 'mgowe' was more common for dry land farm preparation than in valley bottoms.

Nevertheless, family labour was still the major source of labour for those who had large families. Not having a large family, a husband and wife in Nyololo village explained:

> *We have occasionally been hiring labour for dry land production, especially during the sowing and weeding stages… For land preparation, we hire an ox-plough; this is because the area is too big for the two of us. There are about four acres in the dry land…Starting this year, we have decided to engage hired labour in the valley bottom, in the past it was just me and my wife. The reason for hiring this year is because we have increased the size of land in the valley bottom from half and acre, which we were able to manage, to one and a half acres. Therefore, in order to be more effective, I decided to hire two more people to assist us…*

Ponte (1998) suggests that increased labour hire, as in the case of the valley bottoms, is due to the farmers' adoption of fast crops which have high labour demands that household labour alone may not be able to satisfy. Adding that this is particularly so given that fast crops require more labour inputs over shorter periods in comparison to slow crops. Confirming Ponte's observation, when asked why she was not participating in tomato production given its profitability, this respondent pointed out that:

> *It is not that tomatoes need so much capital*[12]*but if you observe closely, you will discover that those who produce tomatoes in the valley need to hire labour for irrigating as tomatoes need a lot of water especially now during the dry season. At the same time, one needs to apply pesticides and fungicides…* (38 year old female – Igumbilo village).

The hired labourers came from within the respective villages or nearby villages. They were mostly those who did not have enough land or were unable to produce effectively in their farms (particularly dry land) due to lack of capital for inputs such as fertilisers and pesticides. They therefore opted to sell their labour to those who were better off, to get money to buy household necessities and/ or to buy inputs for dry land production (the resultant social and economic implications of this practice are discussed in chapter five).

> *There are times when there are insects which attack maize. If you delay in applying insecticides the maize will be destroyed but some seasons, you find yourself not having money to buy pesticides. Therefore you have to*

[12] This depends however on the season of production. Rainy season tomatoes tend to require higher capital input as it requires frequent applications of pesticides and fungicides as compared to the dry season tomatoes.

seek employment from others to work in their farms in order to get money to purchase the required pesticides... however, with my age I do not have the strength to work for others so I send my sons instead (69 years old male - Magulilwa village).

I produce primarily for subsistence. It is only when I am hard pressed for money that I can sell part of that which I have set aside for subsistence. If that is not possible, then I search for employment from others in order to sustain myself during the difficult times … The problem is capital, if one has capital then all is well (67 years old male - Mtitu village).

4.3.7 Gender roles

Another major and significant change is that of gender roles in valley bottom production. In the past, the practice was essentially for women. In most cases, men only participated in the land preparation particularly the preparation of camber-beds or ridges (Lema, 1996) as this is a difficult task requiring muscular strength. From the mid 1990s, valley bottom production became a household affair involving all members irrespective of gender (Mkavidanda and Kaswamila, 2001). Nevertheless, the majority who produced in the valley bottoms from the year 2000 onwards were predominantly young to middle aged men (with women assisting them). Two farmers give an account of this change saying:

In the past our fathers did not produce vinyungu. They claimed it was for women to produce vegetables for family subsistence. Likewise, the young men questioned how they could possibly produce vinyungu. They perceived it as a shameful thing to do. Rather, it was considered honourable for a young man to produce in large tracts of dry land. However, the younger generation of today have discovered that vinyungu production is more profitable than the dry land production system. This is due to the fact that vinyungu production can be carried out more than once a year, whereas, dry land has a single production season… Some men have even taken plots away from the women, and the majority of producers in valley bottoms are now young and middle aged men. But in the past it was like an insult for a young man to produce in vinyungu (45 years old male – Igumbilo village).

Truthfully speaking, men did not produce in the vinyungu, it was the women who produced and harvested maize. However, when the vinyungu

> *became financially profitable everybody, including men, decided to engage in vinyungu farming. No longer was the activity left to women alone…Many people have recently engaged in vinyungu production, the majority of which are young men* (67 year old male - Mtitu Village).

A study conducted later by Kyando (2007) along the Mtitu river basin reported that 75% of the farmers involved in *vinyungu* farming were men and only 25% were women. Notwithstanding, the shift in gender roles in relation to agricultural production within valley bottom production is not endemic to this particular system, rather it has been identified as being characteristic of nearly all African farming systems. As Koopman (1997) and Anthony et al. (1979) express:

> In the production of food crops, women's responsibilities and labour inputs normally exceed men's.… In nearly all African farming systems men alone control export-crop production and the resulting income. If export crops are not grown, men normally control the production of the most lucrative food crops grown for market sale… (Koopman, 1997: 134-135).
>
> New crops that have been adopted into the farming system have often led to modifications of traditional definitions of "male" and "female" crops when their economic potentials was large…cultivation of food crops is no longer exclusively a woman's activity in those parts of Africa where the domestic demand for staple food has led to increasing commercialisation (Anthony et al., 1979: 218).

The fact that women were considered to be solely responsible for vinyungu farming in those early years could also account for the men's late engagement in vinyungu farming in the study area. Most male respondents had already engaged in dry land production some time before engaging in vinyungu farming despite the fact that the valleys have always been at their disposal. One example is of this respondent from Bumilayinga village who revealed:

> *This is my fourth year in valley bottom production. I began dry land production in late 1979… I began to produce in the valley bottom in 2001…this is because we never knew the importance of vinyungu. However, our mother used to practice valley bottom farming in one place called Magamba…* (46 year old male – Bumilayinga Village).

4.4 Farmer's decision making under transition towards market production

> "…agricultural change occurs on a daily basis, as farmers…make decisions about what, where, and how to cultivate (Stone, 2001).

Vinyungu farming was in the past for subsistence with no application of inputs such as fertilisers and pesticides and with minimum technology and labour requirements, hence little, if any, time and effort to decide on what or how to produce was necessary. The farmers' rather produced as a matter of routine or habit (limited to their traditional daily dietary requirements of maize, beans, vegetables and potatoes etc.). The task of choosing crops to be produced in valley bottoms and floodplains was to them unfamiliar or rather unnecessary. The narratives in sub-section 4.3.2 are indications of the transition of traditional *vinyungu* crop production system from a purely traditional subsistence horticulture system towards a commercial horticulture system. Some farmers began to produce not only what they consumed, as was the case in the past, but also what they did not consume (a typical market orientation). Whereas in the past crop choice in valley bottoms was strictly determined by household food requirements, there had been a change in trends particularly for the market oriented farmers. For some farmers, the valley bottom no longer contributed to their food production; it was strictly for the market. This trend was especially common among the *new generation* farmers as revealed below by the respondents in Kitwiru village:

> *I don't have farm land in the dry land. I have no interest in dry land production because then, I would have to look at the sky every day* [meaning to check for rain]. *I buy my food requirements from the income I earn from the valley...* (34 year old male – Kitwiru Village).

> *No, I do not have a farm in the dry land, I buy food. What I do is that I sell tomatoes and buy maize flour, rice and other essential things and life goes on*…(35 years old male – Kitwiru village).

> *I only produce for the market, and I buy food with the money that I earn. I feel it is easier than to produce food…This is because I would use a lot of energy, and profit less. If I produce other crops such as tomatoes, green maize and other vegetables in the same area that I would have produced maize for food, I am able to get enough money to buy food maybe for the whole year and still have some remaining cash to do other things* (36 year old male – Kitwiru village).

The farmers' accounts not only convey transformations in *vinyungu* farming but transformations in the farmers' production decisions as well. Bandura (1986) and others refer to such behaviour as being adoptive in nature. They suggest that:

> Adoptive behaviour is highly susceptible to incentive influences. Some of the motivating incentives derive from the utility of the adoptive behaviour. People who have the means embrace innovations that produce tangible benefits, whereas they discard those that do not work well. The greater the benefits provided by an innovation, the higher is the incentive to adopt it (Ostlund, 1974; Rogers and Shoemaker, 1971 quoted in Bandura, 1986:148).

On the other hand, actors are said to be forward-looking maximisers who assign subjective probabilities to various future states of the world, based on the *available information* and their best estimates of what the future holds, and make their decisions according to these subjective probabilities (Hechter and Kanazawa 1997: 209). It is not the goal of this study to quantify the farmers' earnings from valley bottom production as this has been done elsewhere (see for example Majule and Mwalyosi, 2003; 2005 and Mkavidanda and Kaswamila, 2001). Hence, the study can not verify the arguments put forth by the third respondent above. However, calculations provided by one of the studies on maize marketing seem to support the above respondent's argument:

> If a farmer sells green maize…at a reported price of 50 Tsh/ Pc, s/he gets Tsh 750 from 15 cobs which are equivalent to 1 kg of dried maize grain sold at only Tsh 120 /kg. This is almost six times the income from dried maize grain. This explains why farmers keep selling [green maize] … (Mkavidanda and Kaswamila, 2001:15).

Contrary to the past, these farmers seem to operate under principles of economic reasoning. Under market, production farmers were faced with critical decisions to ensure survival both in the market and within the household. Decisions taken into consideration included those involving crop choices, combination of enterprises, input use and scale of production. Nevertheless, it was observed that the degree to which individual farmers considered such decisions was very much dependent on the farmer's level of market involvement which was relative to available information (and the ability to apply it), resources and land size among other things. As a result, two major categories of market producers were identified within the study area. These are categorised as *completely market oriented* and *partially market oriented farmers*. The *completely market oriented* farmers will in this context refer to those who produced in the valley strictly for the market, using part of the realised income and/or dry land produce (where one engaged also in dry land production) for subsistence needs. While the *partially market oriented* farmers will refer to those who although engaged in market

production, also produced for direct consumption within the valley bottoms. The later category can, however, be further subdivided into (1) farmers with 'clear divisions' between produce for the market and produce for consumption and (2) farmers who produced without such clear divisions, selling the surplus after having set aside produce for consumption (this category basically produces for subsistence). Farmers with clear divisions tended to posses somewhat similar decision making characteristics as the *completely market oriented* farmers in dealing with market production.

It has been suggested that '"partial integration into markets" and "limitations in the operation of market principles"' are characteristics of peasant societies in developing countries (Zaibet and Dunn, 1998:831). Zaibet and Dunn propose that the rationale for such a relationship between peasants and markets is found, on the one hand, in the opportunities offered by the markets in enabling higher living standards and more diverse consumption and on the other hand, in the risk of market participation created by unstable prices and market imperfections. They further opine that peasants may choose to preserve a nonmarket basis for survival when faced with unequal power and variable prices for outputs and inputs.

The *completely market oriented* farmers tended to choose crops that fetched high market price at any given time. Consequently, crop choice became a continuous process. However, this process required constant information about the market. It was observed that most of the *completely market oriented* farmers, had some means of searching for and acquiring information. They engaged in information search which enabled the selection of enterprise(s) and enterprise combinations that would, according to the information and resources available to them, guarantee higher cash returns at any given time relative to demand and production costs. This involved, among other means, personal market visits to determine what and at what price particular crops were marketable within any given period. This suggests the farmers' use of heuristic methods in obtaining information. A repetition of this exercise for several months or years enabled these farmers to establish the time of the year in which certain crops fetched high market prices. With this knowledge the farmers were able to decide on what to grow and when. As expressed by the following respondents:

> *...in general I search for the crop that fetches the highest market price at any given time... I want a higher income that is why I usually conduct research to find out what crops are scarce in which months, so that I can produce them...* (35 year old male - Igumbilo village).

> *I have been travelling around. I observed that in the cities / town centres there is a high demand for vegetables. I used to go to Makambako and Iringa markets. I visited these areas frequently. I also observed traders as they come into the village as they asked around for tomatoes. I used to see them pass here. They would buy from the farmers and transport them. Then I thought, maybe I should also engage myself in the same* (43 years old male – Nyololo village).

The farmers' explanations further imply the acquisition of information through enactive experience. Information provided by such experiences is said to be useful in making corrective adjustments in spatial and temporal features of action until a close match is eventually achieved between internal conception and performance (Carrol and Bandura, 1985 cited in Bandura, 1986). This was expressed by the majority of farmers who applied this method in acquiring market information when they confessed having adopted a try and error approach with whatsoever little information they had before they acquired their present knowledge. Found (1971) associates such knowledge acquisition to human limitations[13] which, he suggests, may not permit the accurate and deliberate decision making necessary to formulate a complete optimum [agricultural] land use at any given moment in time maintaining that "gradual adjustments of existing [practices] to optimum ones can be achieved over many seasons" (Found, 1971: 130).

Another means through which *completely market oriented* farmers were informed of market crop prices was through *'madalali'* and *'wafanyabiashara'* (middle-men and traders), especially those with whom they had created business relationships (that is, social capital). This was either by means of face-to-face interaction or by mobile phones a means which played a significant role not only as source of information, but also in reducing transport costs incurred during personal market searches. The mobile phones were used to communicate with traders in the various markets either to receive orders or to enquire information on market conditions.

> *At first, we used to go personally to traders in Nyololo to inform them that we have plenty of beans. For instance, for the beans produced in vinyungu plots, it was necessary to go and inform them so that they could come and buy. However, nowadays my neighbour has a mobile phone so I can just tell him that I have a certain amount of beans and that he should call*

[13] Humans are said to be limited in that they do not and can not have complete knowledge, and can not process all information necessary in achieving maximization or optimality at once (Simon , 1997)

someone to come and buy. When the trader(s) come, he brings them to me (46 year old male – Bumilayinga village).

...Since we now have these mobile phones, we receive information directly from the markets. We have some customers operating in the Tandale[14] *market so they provide us with information. A greater percentage of traders who come here market the produce in Tandale. Therefore, we get the information while we are here in the village* (47 year old male – Magulilwa village).

The introduction of mobile phone use in the early and mid 1990s and their subsequent outstanding adoption in Africa (EPROM[15], 2009; LaFraniere, 2005) and Tanzania in particular is reported to have accelerated economic development among micro-entrepreneurs (Donner, 2005) among which are small holder farmers. However, the overriding disadvantage with distance communication for most Tanzanian farmers, unlike their Kenyan counterparts who receive commodity information directly (via text message) from the Kenya Agricultural Commodity Exchange (KACE) (EPROM, 2009), lies in the fact that most farmers in Tanzania and the study area in particular use mobile phones to enquire information on supply and demand from their *'dalalis'* which in turn relies on the *'dalalis'* being truthful in the replies they provide (Molony, 2008). To avoid being cheated, some farmers reported that their contacts in Dar es Salaam were actually fellow village members and relatives who went to Dar es Salaam and became traders in Dar es Salaam's central market -Kariakoo and Tandale grain market. Such interactions inform on the significant role played by social capital in the farmers' decision making in the marketing process.

Concerning market information, we have middle men or traders that are from our village (indigenes). They are in Dar es Salaam at Kariakoo – the central market so they give us information concerning what is marketable for the coming season and what is not. They inform us either by mobile phones or through letters (34 years old male – Mtitu village).

I normally sell my produce in Dar es Salaam ... I have my younger brothers in Dar es Salaam with whom we have very close communication. Even if it were not for them, I have lived in Dar es Salaam for eight years. I was a store keeper in the army so I have fellow storekeepers who I left

[14] Tandale is a major grain market located in Dar es Salaam city (with a population approaching four million).
[15] Entrepreneurial programming and research on mobiles

behind with whom I still have good communication. If I do not manage to sell in the market, I can sell my tomatoes to them. So my markets are in Dar es Salaam, Mafinga and Makambako. I have connections with people in all these places who can inform me of the market conditions (51 years old male - Nyololo village).

In cases where this farmer-middleman/trader-trust had not been firmly secured farmers preferred face-to-face contact so as to avoid the risk of being duped. Notwithstanding, while such caution may be justified as a way of ensuring that one obtains the best returns possible, it also tends to increase the farmers' transaction costs (in terms of transport and time spent) which are most likely not taken into consideration by the farmers when calculating their net profits. The following respondent is an example of farmers reluctant to take the risk of marketing their produce without prior market information.

When you are a farmer, you must be informed about the market. Many times I go to the market to investigate and get the actual market prices. I don't trust in anyone telling me, because he may be a 'mlanguzi' [middle man or trader seeking a super profit] *who will offer a small price whereas if I had taken my produce to the market on bicycle I would have at least gotten a better price. So I am not convinced until I personally visit the market. For example you find that at times maize is sold for 15,000/- or 16,000/- per bag* [usually 100kg] *so even if someone comes I would have already known the price. If the price is 16,000/- then I will sell for 15,000/- a reduction of 1,000 per bag as his transport costs* (36 years old male – Kitwiru village).

Mass media such as radios and newspapers were also mentioned by a few as being a source of relevant seasonal market information. The media reported on such aspects as produce currently flooding the market, shortages or scarcity of produce in the market. Information on possible market prices was also provided. Moreover, reports on rainfall or harvest failures in any given part of the country also served as an indicator for higher market prices. Some farmers 'studied' the information on scarcities and market flooding over time to determine which crops sold at a profit at any given time. When asked on how he knew about the market prices of specific crops, the following respondent informed that:

We get information through the radio. For example when you hear that this year some parts of the country are experiencing hunger or they did

not receive enough rain, then you know that this year the market for crops such as maize, beans, and even fresh produce such as cabbage, peas etc. will be good. Any crop produced in abundance tends to lower the price, but when it is produced in small quantities or if it happens that, some areas face rainfall shortages, then the price rises (65 years old male - Mtitu village).

This channel of information would, however, prove more useful whereby a region or district has a comparative advantage in the demanded produce. This is because most of the information is obtained from national radio and hence the information is assessed nationwide leading to further uncertainty and risk as one is unaware of the reactions of farmers in other regions. That could explain why despite having access to such information, most farmers still based their decisions on personal experience, traders and middlemen.

On the other hand, most of the *partially market oriented* respondents indicated that they did not have the means of accessing market information and hence acquired their information from *successful others*[16]. They observed and imitated those who, to them, seemed to be profiting. For example, when asked how they went about choosing the crops that they produced, these respondents revealed:

I asked the price of green peppers, at the time they were selling three or even two at a price of 100/- to 200/-... There was a person in the village who had tried to produce green peppers on a very small plot of land and he was successful but because the area was so small, it was more or less for his home consumption. On seeing that the area yielded such results, I decided to produce green peppers for the market (30 year old male – Magulilwa village).

From my side, I observed one guy nearby. He has been producing tomatoes for two years. He produces on two plots both approximately eight strides wide, and forty strides long and he got 95,000/- last year. Then he produced again this year not even up to a quarter of an acre, however, because his partner left for Kilombero, he did not have anyone to assist him. As a result, a lot of tomatoes perished before he could sell.

[16] Manda, 2002 suggests that this is "... because a majority of the people are illiterate, access to mass media is limited, the social and economic infrastructure is completely underdeveloped and interpersonal communication is the dominant means of communication." (Pg.184)

> *Nevertheless, he still realised something like 200,000/-from what he managed to sell which was a little over nine 'debes' [a 20 litre tin can]. In seeing this, I decided to grow tomatoes* (31 years old male – Bumilayinga village).

When questioned on whether he knew the production costs incurred by the '*successful other*', he responded:

> *We were together when he was planting, I used to go to observe. I remember the first time he used manure and pesticides worth 20,000/- that was all. This year he used 39,000/- an amount which he recovered from his first sales of tomatoes* (31 years old male – Bumilayinga village).

In what would seem to be a response on behalf of the majority, when asked why he had not attempted to produce other crops that were equally or more profitable than what he was producing, this respondent from Mtitu village revealed:

> *The problem is that we usually wait until we see someone grow a particular crop and obtain good results, before we also begin to imitate and produce the crop in our own respective areas* (43 years old male - Mtitu village).

The last farmer's use of the term 'problem' may refer to the inability by some farmers to personally search for and obtain the required information. The three respondents like many other respondents under this category portray characteristics of sideways-looking cultural imitators (Hachathorn cited in Hechter and Kanazawa, 1997:209). It is argued that human decision makers routinely ignore their own, fully conscious, preferences in making decisions and follow rules, traditions, hunches, and the advice or actions of others (March, 1988). On the other hand, Jager et al, (2000) define imitation as a strategy to economise cognitive efforts, and/or to compensate for an absence of knowledge. Rather than to experience with new unfamiliar practices, imitation of the successful others helps the farmer to avoid the risk of making poor decisions (Jager et al, 2000; Found, 1971; Ilbery, 1985; Edwards, 1992). In what he refers to as "Learning through modelling", Bandura suggests that:

> Learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do. Fortunately most human behaviour is learned observationally through modelling: from observing others one forms an idea of how new behaviours are performed, and on later occasions this coded information serves as a guide for action." (Bandura, 1977:22)

Albeit (as demonstrated by the third respondent above), people will exhibit initial reluctance "to embark on new undertakings that involve costs and risks until they see the advantages that have been gained by earlier adopters" (Bandura, 1986: 146). This was observed in this study whereby most farmers tended to imitate those practices that they perceived would result in greater satisfaction (in terms of meeting the farmers' need and goals) at a lesser cost and/or effort in comparison to what the farmer was already practicing. Some farmers found it safer to continue producing crops which they already had experience. Although this could be interpreted as a risk-averse behaviour, it could also be due to cultural reasons which may compel the farmers to stick to traditional and earlier practices best known to them although they may be quite conscious of new developments and their benefits (Legesse, 2004).

Apart from the personal efforts made by individual famers, another more formal means in which farmers received information and technical advice was through seminars and various training programmes conducted either at village, district or regional levels through government and non government initiatives. These proved instrumental, to some extent, in providing the farmers with skills and techniques for choosing and producing crops for marketing, information search on markets, record keeping and more profitable production methods.

> *Some experts came and gave a seminar – they were helpful because for example in April (2005) there came people for 'mchakato'* [for village assessment/evaluation] *so we did some calculations concerning what we ought to grow that is able to give us profit. For instance which crops could one grow to realise more profit? We found out that one acre of maize will give 300,000/- but if one was to grow banana / plantain trees, in the same size of land one would realize 700,000/- that is why now you see a number of plantain / banana trees* (43 year old male -Mtitu village).

Despite the farmers' acknowledgement of the usefulness of knowledge they obtained through the various trainings, capital to put such training into practice was the central concern of most farmers. Lack of financial capital resources seemed to be a *constraining* factor to many farmers who, though ambitious and willing to embark in a more profit oriented production system, lacked this important production factor. As a result some farmers responded by either holding the information pending the realisation of capital, shying away from putting the obtained knowledge into practice or by partially or improperly implementing the obtained

knowledge which lead to inadequate returns. The farmers' concern was echoed in a group discussion in Igumbilo as a participant pointed out:

> *However, it is not so easy to comply with the training we receive because you can not apply knowledge without money. You have to have at least something in your pocket since one has to take into consideration such requirements as inputs, irrigation, etc* (group discussant – Igumbilo village).

This farmer's concerns confirm Monu's (1982) observation that:

> The assumption that the acquisition of knowledge is the basic process of agricultural modernization may lead to overemphasis on the factors of ignorance and unwillingness and disregard the factor inability. For the farmers to adopt or not to adopt must be able to acquire the inputs, recover the expenditure and make profit from the innovation (quoted in Manda, 2002: 183-184).

Bandura (1986) further argues that images of benefits will not stir decision makers to action if they place low confidence in their cost- benefit estimates. Nevertheless, this does not discard the significance and influence of such trainings in some farmers' production decisions. Financial capital resources acted as an *enabling* factor where one had the means. This allowed the farmer to take advantage of profitable opportunities. An example of those enabled through such training is this *completely market oriented* farmer from Nyololo who expressed:

> *I have attended seminars twice, that is the year before last* [2003] *and this year [2005]. They train on how to search for markets, how to keep accounts in production, on changes and use of pesticides etc. There is one organisation called CDTF* [Community Development Trust Fund of Tanzania] *it is based at Mafinga. I truly appreciate this organisation…although I had some basic agricultural knowledge, what I am personally grateful for is that they have taught me how to prepare a project write-up…indicating all that I need to include in my production. I used to produce without knowing whether I am making profit or loss. Now I know how much I spend, and how much I will sell to realise profit. Since 2003 things have really change for me. The seminars have really helped me. They have taught me all these things that I now practice* (51 years old male– Nyololo village).

The researcher learnt that the majority of farmers did not attend the various seminars and trainings that were held outside the village. It was reported that only a few farmers capable of understanding and transferring the knowledge to others were selected. For instance, the respondent above revealed that only five of them attended the seminar. However, the task of knowledge-transfer to other farmers was not systematic. It was somewhat dependent on the willingness and readiness of the trainee to train others. Otherwise, those requiring the knowledge had to individually inquire from the trainees, as the respondent above went on to explain:

> *I only instruct those farmers near to my area since I was not assigned any specific area or farmers. I observe those farmers who seem to be making effort then I direct them on what they should do but for those who don't share the same interests with me, even if I were to direct them they would not understand* (51 years old male- Nyololo village).

Most *completely market oriented* respondents were endowed with financial capital which gave them the ability to choose from a wider range of crops. These farmers opted for, among others, crops that required high capital inputs which not only posed less competition but also guaranteed somewhat higher returns (see box 4.3). Included among these and most common, were crops such as 'nyanya ya kifuku' (rainy season tomatoes). The farmers revealed that dry season tomatoes where grown by the majority of farmers as the capital investment was much lower during this season. This resulted to low market prices for tomatoes during dry season a time when the market was normally flooded. Nevertheless, the minimal capital input ensured at least a minimum profit. On the contrary, the rainy season tomatoes required high capital input due to large amounts and frequent application of pesticides and fungicides needed which the majority of farmers could not afford. A discussion with one of the village agricultural extension officers revealed that one needed to spray the tomatoes as frequently as it rained saying: "If the rains are frequent then one must spray frequently, if it rains every week then one must spray every week". He informed that as at that time a packet of one kilogram which was enough for one application per half an acre, was sold between 8,000/- and 8,200/- proving to be beyond the reach of the majority of farmers.

Keeping of accounts as mentioned by the respondent above, was another area in which the farmers expressed having received training, subsequently assisting in their decision making. Most of the *completely market oriented* farmers and *partially market oriented* farmers (those having a clear division in their production) reported having kept written records of their activities. Unfortunately, none had the reported records in their possession at the time of the

interview as most interviews were conducted at the respective farmers' vinyungu areas. The records were kept to determine whether the farmer was operating at a profit or loss. Moreover, they enabled the farmer to make *evaluations* or keep track of all activities. In case of undesirable outcomes, the farmer was able to trace back to where the problem may have arisen, and make necessary adjustments in subsequent seasons. When asked how he could determine whether he had realised a profit or loss, the following respondent replied:

Box 4.3 A completely market oriented and new generation farmer's account on crop choice – Kitwiru village

In 1993, I grew tomatoes, onions, and other crops. The market for tomatoes fluctuated seasonally. The prices were high in some seasons and low in others. I therefore also increased or reduced tomato production in accordance to these fluctuations. However, in 2001 I decided to make some changes… You know, if you want to solve a problem, you have to first know the problem within the given community, and then find the means of solving the problem and once you do that you will eat [or make profit]. *So what do I mean? I investigated to know what was missing in this Iringa town, and I realised that there were certain things missing although consumers were available. The consumers were available and were in need but did not know where exactly to get what they needed. Therefore, I was obliged to solve the problem that these people were facing, in order to get the money that was in their hands in return.*

Instead of growing tomatoes, onions Chinese cabbage and amaranthus…after investigating, I decided from 2001 to produce special crops for foreigners who come to Iringa for work or for tourism… These crops are not found in just any market, they have a specific market. I produce such vegetables as Coli flower, broccoli, melons, squash, fresh beans, snow peas, beetroots, red cabbage, asparagus, leaks, yellow pepper and others. The more common crops that I produce, but at smaller scale, include tomatoes, garden eggs, egg plants, and green pepper…I chose these to avoid competition after realising that many are not aware of them. Moreover, I attended a secondary school (at ordinary level) which specialises in agriculture. I therefore have the knowledge on how to produce such crops ... with this knowledge I can experiment with any new crop and be able to discover how to produce it...(34 year old male – Kitwiru Village).

I know if I have realised profit because I am lucky to have been educated a bit. I have attended training on vegetable and fruit production many times. I learnt that in order for farmers to know whether they have realised profit or loss, they have to use a book. They should not just produce haphazardly. This I do by keeping written records. The kept records include first the purchase of seeds, then the cost of my personal labour and that of hired labour. Then after harvest and sale of produce, I deduct the costs I incurred

and the remaining amount is my profit and then I ask myself "imelipa au haikulipa" [meaning has the effort paid off or has it not paid off?] This knowledge I obtained just last year [2004] before that I did not keep such records. We got this knowledge through the assistance of one 'mzungu' [white man] who is a German in Dar es Salaam. He has volunteered to help us in our ward. We received the training at the Ruaha development college in Iringa where we learnt to grow vegetables, tomatoes and others. They taught us through examples. We have been educated through this assistance and frankly, it has been very helpful. We now make decisions like real experts (60 years old male – Kitwiru village).

Furthermore, keeping of records over time assisted the farmer in determining the crops with higher returns relative to the level of inputs (cost-benefit analysis) which in turn assisted in crop choice for subsequent seasons. The following farmer explains how he came to discover the more profitable enterprise through such cost-benefit analysis.

After receiving information on paprika production…I decided to try it on two or three acres and discovered that it was profitable. One kilogram of paprika seeds is sold for 20,000/- and can cover up to three acres. When I compared it to the same 20,000/- for 10 kg of maize seeds per acre, I decided it was better for me to grow paprika rather than maize because returns are much higher than those I obtain from maize. If I produce one acre of maize, I can not realise the income that I get from one acre of paprika (between 40 and 43 years old-male – Mtitu village).

The study discovered that, as in the case of crop choice and production methods, those who were incapable of keeping such records and accounts (either not having obtained training or uneducated) resorted to observing *successful others.* They weighed their consequences against those that were gained by others for similar production practices, using others as a standard for judging their own outcomes (Bandura, 1986). Attempts to take corrective measures, usually by inquiring from those who seemed to have had better results, were made in case of discrepancies in outcome.

…We always observe each other here. Say I have grown maize one acre and my neighbour has done likewise, and then I harvest two bags while he harvests five, I definitely begin to ask myself: "where did I go wrong?" in finding no answer, then I approach my neighbour and ask how he went

about it. Next time I do according to his explanation and I compare the outcome again. If it is still not working out, I continue to do research to know why I did not succeed" (43 years old male – Mtitu village).

The farmers' training programmes could be considered as the enactment of Tanzania's Agricultural sector development strategy (ASDS) and Agricultural sector development programme (ASDP) documents of 2001 and 2003 respectively. They lay emphasis on the role of public and private sectors in providing training and extension services to small scale farmers as a means for improving the productivity and profitability of the sector and reducing rural poverty (see box 4.4).

Box 4. 4 Statements in the ASDS and ASDP in relation to farmers' training

The primary objective of the ASDS is therefore to create an enabling and conducive environment for improving the productivity and profitability of the sector. This will serve as the basis for improved farm incomes and rural poverty reduction in the long term (Agricultural Sector Development Strategy- URT, 2001: 27).

Subsistence agriculture must become profitable smallholder agriculture… Greater use is made of outsourcing through contracts with private sector service providers, Non Government Organisations (NGO), and Community-Based Organisations (CBO) (Agricultural Sector Development Programme- URT, 2003: vii).

Training institutions including the Ministry of Agriculture Training Institutes (MATIs), the Livestock Industry Training Institutes (LITIs), the Cooperative College Moshi and others will play an important role in updating the knowledge and skills of farmers, extension staff and other agricultural professionals. Entrepreneurial skills will be critical for the commercially oriented agricultural clientele. Extension staff will play a leading role in imparting those skills… There will also be modules for demand-driven short courses for farmers and other stakeholders (URT, 2001: 52).

Knowledge obtained through formal education also proved to contribute to the farmers' decision making. It is clear from the narrative in box 4.3 above that apart from personal investigations and entrepreneurial skills (possibly acquired through formal education), the farmer has the knowledge needed to adopt and produce what he terms as 'special vegetables' which are unknown to most of the locals in the region. He associates this knowledge to the formal training which he received in a secondary school specialising in agriculture. Several studies have proven that the degree to which farmers that have higher formal education are able to seek and use new information is greater than that of those with less formal education, with those having a higher level of education adopting innovations relatively early (Mbata, 1997; Found, 1978: 142; Ilbery, 1978: 456). Furthermore, farmers who have experience over

a wide range of different enterprises may adopt complex structures more easily (Edwards, 1992).

The majority of the young farmers interviewed had at least primary school education with very few who had acquired secondary school education. Apart from the knowledge which was handed down to them from their parents or guardians, most of them acquired some practical knowledge of production in the school farms[17] in their respective villages which seemed to play a role in their decision making. For example when asked where he got the knowledge on how to produce compost, this young farmer recollected:

> *I remembered the time when we were in school we used to dig pits, then we put all the 'mabua' (dried maize stocks) from the farm (after harvest), and covered the pit with soil. So now, I do the same. I use grass and 'mabua' [remainder of maize stocks after harvest] and during the sugar cane season, I collect the peelings from the roadside (where they sell sugar cane) and combine all into my pit* (43 years old male-Nyololo village).

In addition, the narrative in box 4.3 reveals the strategy the respondent adopted to avoid competition. While under subsistence production all farmers produced more or less the same crops, under market production farmers found themselves competing to have their products marketed at the best possible price. However, a strategy such as that adopted by the narrator (in box 4.3) constituted the minority. In the absence of formal information or farmers´ inability to obtain market information through formal channels, the most commonly used strategy revealed by the respondents was that of observing and investigating what the majority of farmers within and in near-by villages were producing. One tried to find out before hand the production plans of those surrounding him. Once this information was obtained, one chose the crop(s) that had fewer producers with the hope of fetching a good price. These investigations and observations were in some cases carried out through trickery or wisdom at social gatherings such as at the bars or pubs over a glass of beer or local brew. The conversation would be directed towards finding out what the others were intending to produce for that given season. One considers the conversations of others while careful not to

[17] Agricultural production was carried out in Tanzanian rural schools as part of a policy directive in 1967 under the principle of socialism and self-reliance. It was referred to as 'education for self reliance' (Nyerere's vision on education) under which, teachers and students were to engage together in productive activities and students were to participate in the planning and decision-making process of organizing these activities. Productive work was to become an integral part of the school curriculum and it was to provide meaningful learning experience through the integration of theory and practice (Nyerere, 1968; Kassam, 1995: 253; Okoko, 1987). Urban schools engaged in other productive projects such as running of school shops. However, Nyerere's vision was short lived.

expose one's own plans (this could involve being untruthful about one's own plans). The following respondents provide an illustration of the strategies they used in determining their enterprise choices:

> *When we sit over a drink, the conversations involve what people are producing that year. Therefore, you get to know what the majority will produce in that given year. Hence, if you have any other alternative crop (which is not preferred by many) then you produce it, because if you all produce one crop, where will you market it? That is why you see some have maize, some beans, some peas etc. Every one is trying their luck* (65 years old male-Mtitu village).

> *My crop choice in the valley bottom is dependent on the fluctuation in profit of any given crop. I used to first observe the market condition of a particular crop. For example, if I perceive that the market for potatoes will be good, I go back and produce potatoes. However, if I realise that everyone else has discovered it, and everyone is imitating everyone else, I would then change and produce green peas or beans... we here at Magulilwa village know one another. For instance, I discovered that right now everybody is producing potatoes so I decided to grow peas. This you have to research because if all of you grow the same produce, chances are that the market will be difficult* (30 year old male – Magulilwa village).

> *You speak to the middlemen/ traders in Dar es Salaam, Makambako, Mafinga and Iringa town and you also visit other farmers. This will help you to determine what has been produced in excess and what not, so that you know what to produce for that year and the timing for its production in order to make profit. Another method is that you go to areas that are popular in growing certain crops, say for example maize, and you see how they are doing that year. If they are not doing so good, you seek to know why. If you have the means to overcome the obstacle, you produce and your produce will fetch market. You observe what your colleagues have been producing and the types of problems they have faced then you know what to produce ...* (51 years old male - Nyololo village).

However, it was learnt that such strategies sometimes misguided farmers whose decisions depended on successful others. The majority comprising of the *partially market oriented*

farmers. The profits realised by the few, who diverted their attention from that which was produced by the majority, tended to attract the majority to produce that given crop in the following season (relative to the crops' capital requirements) leading, in turn, to over production and low returns in the respective season for the particular crops. The experience of low returns or losses for any given crop, tended to discourage many from repeating its production in the subsequent season, partly because their capital would have been significantly reduced requiring them to produce other crops with lower capital requirements. However, if they did repeat, it was in a smaller scale and therefore reducing the risk and in turn giving way to the few (who observed such trends) to produce and profit. Macy (cited in Hechter and Kanazawa, 1997: 209) refers to such individuals as "backward-looking adoptive learners" who adjust their decisions on basis of the past outcomes associated with their choices. Bandura, with regard to the regulatory influence of response consequences and vicarious motivators asserts:

> Behaviour is, in fact, extensively regulated by its effects. Actions that bring rewards are generally repeated, whereas those that bring unrewarding or punishing outcomes tend to be discarded… Seeing others rewarded or punished functions as a motivator by arousing expectations in observers that they, too, are likely to experience similar outcomes for comparable performances (Bandura 1986: 228, 301).

It would seem that the farmers' strategy of information seeking was more or less a try and error procedure as it was not possible for a farmer to know with complete certainty the market status of any given crop within or beyond the region. The first respondent above suggests this, as he completes by stating, "Everyone is trying their luck." Trying of luck would imply uncertainty in their enterprise choice. With such uncertainties, the majority (including *completely market oriented* respondents) produced more than one crop for the market (either applying mixed cropping or a single crop per kinyungu or several vinyungus). They argued that with such combinations one was sure of obtaining good returns from at least one or two of the selected enterprises, hence reducing the risk of a total loss (Edwards, 1992) and ensuring a maximum gain in the case where all the chosen enterprises fetched a good payoff.

> *If you choose to produce only one type of crop and it happens that it does not fetch market in that particular season, then you will have fallen completely* (43 years old male – Mtitu village).

Nevertheless, one needed to have an effective social capital network spread over a wide coverage (perhaps with the assistance of a mobile phone), to acquire information that would ensure some level of certainty. This was especially the case where marketing was to be

conducted outside the village, district and/or regional boundaries. The strategy proved more effective where the targeted market involved one's immediate village or district. A respondent in Kitwiru explained one of the means through which they obtained production information from other areas.

> *"There is a way of exchanging information among ourselves without knowing that one is providing information. Someone may be passing by from another village, and then you ask them "how are things going on your side". For example, somebody passed here some days ago and I asked him and he responded that "maize is what many of us have produced but tomatoes production is not at a very significant scale" so this kind of informal exchange of information gives one hope that maybe tomatoes will sell well this year* (36 years old male – Kitwiru village).

The findings further revealed that enterprise choice among most *partially market oriented* respondents also took into consideration the marketability of enterprises that could be consumed by the household at any given time and in some few cases the acceptability of the crop within the community (see for example box 4.5). The majority chose to produce leafy vegetables and green maize. Although these crops were not highly priced, their market was almost constant and therefore there was a degree of certainty (and minimised risk) in producing such crops. The crops could easily fetch market within the village. These crops usually required low to medium financial capital and labour input hence providing the majority of farmers, even those with small financial capacity, with the opportunity to produce them. Furthermore, the household could easily consume these crops in case they failed to market them.

> *You know when you do any type of business you have to consider the market; you can't start a business which has an unreliable market I decided to produce the crops I produce because they are needed everyday* (31 years old male – Kitwiru village).

> *"We consider ourselves to be small scale market producers. The crops we have chosen are for the market. We have chosen these crops because these are the marketable crops in our zone…Nevertheless; maize is more for subsistence because it normally does not fetch a very high price. It assists us for subsistence and if there is any surplus, we sell it"* (45 years old male – Nyololo village).

> *It's like this, when we say there is no market it really depends on our own cleverness. One needs to ask "if I produce this crop, will I be able to market it easily?"... You have to personally assess "if I produce this particular crop will I realise profit?" the majority who produce are poor and are not able to go to Dar es Salaam* [or rather market their produce in Dar es Salaam]. *Therefore those going to Dar es Salaam, are those who are in position* [meaning financially well off] *so what happens to the one with small capital?* (Group discussion - Nyololo village)

Despite the reportedly low market price for maize, the study still observed its extensive production alongside other crops within the valleys and floodplains. When asked why this was the case, some farmers (including the *completely market oriented*) revealed that they grew maize because it was a multipurpose crop which provided multiple *opportunities*. This would imply some level of uncertainty and risk averting strategy. Enumerating these opportunities, they pointed out that firstly, the crop could sell fresh as green maize relative to market availability. Secondly, they could allow the maize to fully ripen and sell as grain. This was the case where there was no market (or where no traders came seeking for the crop) or the price for green maize was intolerably low[18]. This option led some farmers to apply speculation where the current price was too low for a desirable profit. They stocked the maize in anticipation of higher market prices. However, speculative techniques proved unsuccessful in remote areas such as Bumilayinga where most farmers complained that maize grain had for the majority ceased to be a priority market produce due to traders' lack of interest. Nevertheless, they revealed that they still stocked some amount of maize to sell within the village and to nearby villages to those waiting for the dry land maize harvest. These constituted of those who either had no vinyungu plots, had not produced maize in their vinyungus or their vinyungus could not suffice their household requirements. Only those who had the means to hire transport continued in large scale maize production for marketing outside the village. The third possibility provided by maize production was that the household could always consume the maize grain in case the other two options failed. Nevertheless, some decided to produce maize having somewhat fixed preferences as expressed by this *completely market oriented* discussant from Bumilayinga village:

[18] Farmers reported that they normally experienced low green maize prices with dry land maize produce (due to massive production) and/or with valley bottom maize produced during the rainy season (when only maize could be grown in those valley bottoms and floodplains which experienced flooding) hence coinciding with dry land mass maize production.

In my case, I have put a boundary for myself "No marketing of green maize". Of course, there are some who sell green maize at Mafinga town and Nyololo, but that is a personal decision. Production in valley bottom is more certain in comparison to dry land. If the rains fail in the dry land, it means there is no food [implying better market opportunities] *but even if it does rain, I will still sell my maize as grain. I will stock it, wait until the market price is good and then sell* (male group discussant – Bumilayinga village).

4.5: A partially market oriented farmer's considerations for enterprise choice in Mtitu village

If I have to choose between two crops with little or no difference in their market price, I will take into consideration whether the crops are perishables and whether the household can consume them… Of course, I would also have to consider whether I have the experience to produce either of them and whether I have the required capital to produce either of the crops. The total amount of output I can obtain from a given crop is also important. Moreover, I have to consider whether the community accepts it, because the community may not understand me. For example, there was one person here who attempted to produce paddy everybody was surprised. They could not understand him. However, it was unfortunate that the rains were very heavy that year and he did not get any harvest. As a result, people laughed at him. If however, he had succeeded everybody else would have wanted to engage in paddy production (43 years old male Mtitu village).

A general observation indicated that farmers chose crops that would guarantee higher returns (more in terms of subjective probability[19]) relative to the farmer's capital and experience. Crops produced in valley bottoms tended to vary in terms of production costs, consequently influencing the farmers' crop choice. For instance, inputs such as fertilisers, pesticides, seeds and labour seemed to play a dominant role in guiding the farmers' crop choice especially among the *partially market oriented* farmers (particularly those with no clear division in production). For example, it was noted that this category of farmers tended to avoid crops that were more susceptible to diseases and /or pests. Some disease prone crops, though profitable marketwise, required sufficient financial capital for purchase of pesticides. Therefore, only the few who had the financial means opted for such crops. The inability of most farmers' to produce such crops gave the financially able farmers an advantage. They faced less competition and hence secured 'better' market prices.

[19] "In the absents of known probabilities, individuals might select probabilities on the basis of their psychological characteristics, and apply them to decision making" (Found 1971:128)

I selected maize as an alternative crop because, first of all, it is easy to manage. You can not compare it to some of the other crops which demand high quantities of pesticides. At most, maize requires fertilizer you don't need such high quantities of pesticides (36 years old male - Kitwiru village).

Pesticides are very expensive these days. Just one small bottle costs 9,000/- a quarter for 2000/- I see that as a lot of money. Apart from that, you produce and find that the majority have produced the same crop. So instead of selling a 'debe'(20kg tin can) for 5000 /- you end up selling for 500/- and you end up getting a loss. I produce crops that can give me at least a little profit. I prefer producing what is within my capacity all these pesticides just reduce my income earnings [sounding somewhat irritated] *(*60 years old male – Kitwiru village).

Highly priced hybrid maize seed[20] (with higher output), requiring fertiliser for best outputs, was also shunned by many *partially market oriented* farmers (particularly those without a clear division), opting instead for a local variety which could be obtained from their harvests. An extension officer revealed that within his jurisdiction no more than 10 farmers could afford to use hybrid seeds alongside fertilisers. Again, this gave advantage to those financially able to produce especially in the case of '*gobo'* (green maize) production.

Road accessibility also played an influential role in the farmers' choice of enterprise. Some farmers were cautious in making enterprise choices due to the perishable nature of most crops produced in the valley bottoms (with the exception of maize and beans), which in turn called for prompt marketing. Some farmers revealed that they chose to produce certain crops not because they preferred them to others, but because they had no choice given the transportation *constraints*. This was, however, more the case in remote areas, having unreliable roads, as compared to villages located along the TAZAMA (Tanzania – Zambia) highway. For example, this *partially market oriented* farmer (with clear divisions) from Magulilwa explains his reasons for crop choice stating:

Actually, my main aim was to produce tomatoes, but the problem facing us in this place is that we begin to harvest tomatoes in the months of December, January and February which is during the rainy season. Now,

[20] One kilogram of hybrid maize seed was sold for 2,000/- with 10 kilograms required per acre, making a total amount of 20,000/-

our road is very bad during this period and once tomatoes begin to ripen if after one week you have not found the means to transport them then it's a complete loss. I tried to grow tomatoes sometimes back and I experienced a loss. I have now decided to produce maize. You know during the rainy season tomatoes sell at a very good price. If there was a sure way of transporting, I would not consider growing maize at all. I would have grown tomatoes. So transport is the main reason for choosing maize, I have no other option. I could have also considered growing other crops such as green peas since it also fetches a good market but the problem is the same, if it rains I can't transport it but with maize, I can always sell it green where transport is available, if not, I can sell it as grain (Approx. 60 years old male – Magulilwa village) .

The respondents account on the road condition was experienced first hand by the researcher as the vehicle she was using got stuck (in red clay soils) during one of the field visits in the village which happened to be on a rainy day. Notwithstanding many of the respondents in Magulilwa village mentioned green peas as one among their enterprise choices. However, it was learnt that the majority of them produced in the dry land and harvested when the rains had subsided. Nonetheless, some farmers were not bogged down by the road condition. They found a solution that would enable them to produce the crop of their preference at the time when all others had abandoned its production, hence allowing them to realise higher returns. An example of those with such determination includes the following respondent who explained:

Take for example a crop such as green peas, there is a time when it has a good market but transporting the produce from the village may be a problem. Vehicles are not able to enter the village during the rainy season due to the clay nature of our soils. We have therefore devised other means of transportation. We hire a tractor which transports peas to the next village and from there we hire a vehicle (47 years old male – Magulilwa village).

Opposed to the former respondent, whose explanations apart from revealing the reality also revealed his personal characteristics toward risk, the latter portrays the characteristics of profit oriented producers willing to take the necessary risks to acquire higher returns.

Additionally, land size in the valley bottom was mentioned to influence the choice and combination of enterprise(s). Some expressed that their small vinyungu area would not permit or would render the production of certain crops profitless as they required a larger area for profitable production, implying that those possessing larger areas in the valley were more advantageous in this respect. One *completely market oriented* farmer verified this citing that his large area of vinyungu was due to his determination to produce for the market stating:

> *If the case was just to satisfy household subsistence, then this area is too big, I could as well reduce it (35 year old male - Igumbilo village).*

On the contrary, the following *partially market oriented* farmer expresses:

> *If I had a large area, say two times what I now have, I would have grown tomatoes and onions in order to get fast income. But if I grow tomatoes and onions here, I will not have 'ugali'* [stiff potage prepared from maize] (69 years old male- Magulilwa village).

However, large land holdings also translated to higher labour input and only those able to hire labour or those with large enough families or with technologies such as ox-plough, motorised water pumps could engage in larger scale production. Some farmers confessed that though they had large land holdings, they could not produce on the entire holding every season. While ox-ploughs were obtainable through hire (applicable only in relatively dry areas), some stated other constraints such as not having enough capital to buy seeds and other inputs such as required amounts of fertilisers and pesticides to cater for the entire area. Yet others mentioned the inability to purchase water pumps or to engage hired labour for daily irrigation. The following respondent explains why he produced half an acre less from his total land holding.

> *The actual area under irrigation production is one and a half acres. Last year (2004/2005), I was able to produce two acres but this year (2005/2006), I am not able because of the rise in fuel prices. I use a motorised water pump and that needs fuel so I decided to reduce the size of land under production relative to the fuel prices* (Approx. 60 year old male- Magulilwa village).

Moreover, the physical environment, particularly temperature and soil type were also mentioned by some farmers as having influenced their crop choices. The researcher also observed that some crops were confined to particular villages, with others (specifically maize and beans) being produced in all villages (however, with variations in output). One of the

agricultural extension officers revealed that apart from the soil differences commonly experienced at a broader scale between villages, districts or regions, there were parts of the study area where soils could vary within meters. The researcher verified this when she came across some farmers who reported that they could only grow certain crops in specific locations within their vinyungu areas. The following farmers in Kitwiru and Mtitu villages expressed:

> *Our soils here are not good for maize production that is why you will find that any farmer producing maize here in Kitwiru, will not get far. A great percent of the soils are sandy soils* (41 years old male- Kitwiru village).
>
> *We tried to grow carrots but we were not successful then we tried to grow watermelons we realised that they also could not grow on this soil* (60 years old – Kitwiru village).
>
> *When choosing the crops to produce, we consider the type of soil, because you may choose a particular crop and it may not grow very well* (29years old male – Mtitu village).

The first respondent's account would explain why some *new generation* and *completely market oriented* farmers in Kitwiru village reported that they did not produce maize (see box 4.6) and why some did not have farms in the dry land, where the majority of the farmers produce maize. However, the fact that there are respondents who admitted to producing maize in the same village, would suggest that importance was placed on the profitability of maize rather than that of unsuitable soils. The respondent seems to suggest this when he points out that "any farmer producing maize here in Kitwiru will not get far". In line with this observation, a farmer in Magulilwa bluntly pointed out that:

> *"I have produced green peas, beans, maize, round potatoes and a variety of leafy vegetables such as Chinese cabbage and onions. All these can be grown on this soil. However, in gardening we consider the income. You can grow them all, but at the end are they profitable? What matters most is the cash return provided by each crop. The crop(s) with good returns, you continue with and you discard the rest"* (54 years old male – Magulilwa village).

The respondent's argument somewhat supports Grigg's (1982) suggestion that the inability to produce on a given land quality is not so much that of the land itself but rather that of the costs involved in producing certain crops on certain lands. While some lands given their

characteristics such as abundant rain and good soils will allow a wide range of crops and produce high yields, other lands may only be able to produce the same outcomes at a 'prohibitively high cost' and hence lower returns in comparison to the former. Grigg's argument would then imply that the physical environment does not exclusively determine the agricultural practice carried out. Rather the difference in the costs of production or capital requirements from one environmental condition to the other is what would, in this case, seem to guide the farmer's decision on the production practice to adopt. In response to a suggested inability of farmers in Saskatchewan to produce grains, attributed to soils not being good enough, and other similar explanations Bartlett (1980:551) states: "there [soils] "poor" quality comes from an interaction of prices, markets, technology… and are not based on an absolute agronomic capability". He also cites an example of how land that could not be put to use by Africans in Kenya due to erratic rainfall was able to "set off the profits of a good year" by white settlers, suggesting sufficient capital investments on technology to be the explanation behind the different productivity of the lands. Likewise, Tarrant points out that:

> Poor environmental conditions imply a limited range of options and this is aggravated by shortage or virtual non-existence of capital for investment (Tarrant, 1974: 12).

4.6: A completely market oriented and new generation farmer's views on maize vs. tomato production

After harvesting tomatoes [rainy season tomatoes] *from the valley bottom I usually leave the plots idle… it is in very few cases that I decide to grow something else. When I do grow something, it is mostly vegetables… one can grow maize but what we look at is profit. We practice market production; we don't just produce for the sake of producing. When I perceive that the market is not good, then I decide it is better not to produce at all… Yes, there are people who are producing green maize but you cannot compare tomatoes and maize these are completely two different things. For example, if you produce an acre of maize the amount of money that you will realise is very small compared to that of tomatoes. A friend of mine produced maize last year, we wanted to experiment, and he got 300,000/- , whereas half an acre of tomatoes guarantees you 600,000/- and this is when the harvest is not so good. To avoid incurring costs unnecessarily I decide to do other things that are more productive in-between tomato production rather than grow maize. I usually engage in trade. While I leave the plots fallow for five months* (41 years old male – Kitwiru village).

Such explanations would seem to shed light on why most research has associated rainfall unreliability and/or variability and reduced soil fertility in the dry land to increased valley bottom engagement. With the majority of farmers in the study area not possessing the required capital and technology for improving their lands' productivity, such environmental

aspects (though not deterministic) tend to play a significant role in their production decisions. In addition, Found (1971) suggests that land-use decisions depend partly on the decision environment (actual information available to the decision maker) in which an individual operates rather than the real environment (the complete set of (existing) information available). Differentiating the two, he points out that:

> The decision and extended environments are seldom the same for two reasons (1) man seldom feels the need or the ability to learn about the extended environment. If he does recognize the need to obtain a mass of information, his limited perceptual abilities force him to simplify the real environment into something with which he can cope. (2) Imperfect communication restricts the information with which he can come into contact (Found, 1971: 131).

Whereas information has proved to play a significant role in the farmers' production decisions the findings suggest (as Found has) that this role is only partial. Apart from available information (whether formally induced, personally searched for or imitated), the farmers in the study area tended to consider that which they had at their disposal given their personal experiences, resources available to them, perceived risks and uncertainties and other social personal factors (Mwamfupe, 1987, Lema, 1986) and with these, they endeavoured to realise the best possible outcome. Therefore, rather than being limited by perceptual limitations, even where some farmers had 'enough information' at there disposal and the knowledge to execute it in order to realise relatively better outcomes, the mentioned aspects seemed to act as *constraints*. It would then seem appropriate in this regard, to extend the description of the 'decision environment' to include not only information available to the individual but all aspects taken into account by an individual that affect the decision outcome. This would include, apart from the above mentioned aspects, the *constraints* and *opportunities* perceived by the individual decision maker as well as the *goal(s)* influencing the decision making.

The primary goal motivating the farmers' market production decisions would according to the evidence in the presented findings, appear to be either that of a satisfactory income, in the case of *partially market oriented* farmers or that of profit maximisation in the case of the *completely market oriented* farmers. However, further findings suggest that to most farmers the goal of income was instrumental to achieving more desired ends (to be discussed in the following section), which proved to be among the main motivations behind the farmers' decisions, rather than income being a self sufficient end. This finding is in line with Ilbery who points out that: "The decision making of farmers can be viewed as a reflection of a wide

range of goals" (Ilbery, 1985:30). The following section will examine the reasons behind the farmers' engagement in market production.

4.5 Reasons for transformations in traditional vinyungu farming system: A farmers' perspective

> If we want to know how or why a farmer acts in a certain way…, we have to enquire why men act, and especially why men act as they do when they live in the sort of social environment and general circumstances in which farmers live (Ashby, 1926: 5 in Gasson, 1973: 521).

The quotation above summarises the purpose of this section. Sections 4.2 through to 4.4 have given accounts on the transformations in *vinyungu* farming between 1990 and 2005. The sections have among other things, highlighted the changes in the farmers' reasons for engagement; changes in the characteristics of the farming system, from a traditional subsistence horticulture system towards a commercial horticulture system, including the means through which the various innovations in production had been defused; changes in the farmers' decision making under market production. Given the humble beginnings of the traditional *vinyungu* farming system as characterised in chapter three, one can not help but to ponder over such significant transformations.

The available literature on traditional irrigation systems in general and *vinyungu* production in particular associate the transformation from subsistence toward market orientation with *market liberalisation*[21] in Tanzania (Mkavidanda and Kaswamila, 2001; Majule and Mwalyosi, 2003; Sokoni and shechambo, 2005 Mpayo, 20005). It has been argued that with the liberalisation of markets farmers have been increasingly attracted to market their produce. For example, in their study of changes in the *Ndiwa* irrigation system in the West Usambara Mountains in Tanzania, Sokoni and Shechambo cite rural-urban linkages as among influences for farmers' engagement in market production as they state:

> The growth in rural-urban linkages, especially the flow of agricultural products to urban markets is the engine for the development of irrigated agriculture in the West Usambara Mountains. Urban demand for high value crop products has encouraged the growth in vegetable production and growth of marketing networks (Sokoni and Shechambo, 2005:27).

However, this study would argue that market liberalisation and the development of rural-urban linkages, being a product of the former, only explain the *enabling conditions* or

[21] The agricultural market liberalisation in Tanzania entails: "removal of direct production and marketing subsidies; abolition of price controls and price announcement by the state; and the removal of import / export trade restrictions and opening the market to overseas traders" (Moshi, 1995).

opportunities created for farmers' market participation and do not alone suffice as reasons behind the farmers' involvement in market production. The explanations seem to point to exogenous influences and do not reflect the agents responsible for the changes. Though we do not dispute the role played by market liberalisation, our concern is that there is still much that is left unsaid with regard to the role played by the agents of these changes. There seems to be an evolutionary gap in explanations between the farmer who was once satisfied with food alone and the one who is now more or equally concerned about acquiring income. The question here is, '*what is it that motivated the once pure subsistence vinyungu farmers to produce for the market which, in turn, led to the significant changes within this traditional production system?'* According to Dietrich and Christian,

> A reason which is currently salient for the agent in the appropriate sense and whose effect on the agent's preferences is thereby operational is called motivating for him or her (Dietrich and Christian, 2009: 5).

This section aims to answer this question, hence reducing this knowledge gap. It examines the motivation behind the transformation of *vinyungu* from a purely subsistence towards a market oriented production system over time and across generations from the farmers' own perspectives.

4.5.1 Introduction of money economy

As indicated in the previous chapter, the main production goal in vinyungu in the past was food security. The rain-fed dry land farms provided maize and beans which are the main staples for the indigenous people in Iringa. The *vinyungu* plots (for the few who produced) served as vegetable sources which complimented the main staple requirements especially during the dry season as the farmers waited upon the dry land harvest. For this reason, *vinyungu* farming in valley bottoms was at a very insignificant scale. Although some farmers had ownership over land in the valley bottoms, it was not utilised for crop production, rather the majority used the land for grazing. The dry land seemed to satisfy their subsistence needs, hence rendering valley bottom production irrelevant (see box 4.7).

Describing life in the villages in the 1950s and even earlier the (older) respondents expressed that although food was the major concern its preparation was simple. Spices and flavouring were not common in their meals. Most foods such as beans and vegetables were simply boiled with salt. Clothing was also not a priority at the time. One was well at peace with one or two clothes. Children had no real need of having too many clothes either. Items such as kerosene, cooking oil, matchsticks, and even sugar were unknown to some (depending on the remoteness of the village relative to urban centres), and to others they were simply deemed unnecessary or

unaffordable. Respondents who were over 65 years of age recounted that back then, they did not have too many needs and that survival was of uttermost importance (see box 4.7). Since the main need was food, they practised barter trade to obtain what they could not individually produce. Although money was in use in those days, they stressed that it was not very important.

> *In the past, that is in the 1950s and earlier, one could comfortably live without money. It was not easy to see someone buying something in the village. We used to live by barter trade. One could have milk and the other crops, so we exchanged according to everyone's needs. The search for money began in the 1970s. This is when traders came and wanted to buy maize. Before that, we had no awareness* (71 years old male -Mtitu village).

The time which the respondent refers to as the time of traders searching for maize corresponds with the time of both villagisation (that is in1974 for Iringa region) and the establishment of the National Milling Corporation (NMC) in 1973 (Suzuki and Bernard, 1987; Msambichaka , 1995). The respondents pointed out that markets were set near production areas to ease accessibility for the established ujamaa villages as well as individual farmers who sold their meagre surplus to the corporation.

> *In the past there was really no specific goal apart from subsistence, and to sell whatever little remained, because back then there was a market where you could take maize and beans. The market was government controlled* (65 years old male - Nyololo village).

> *Before the 1960s and 1970s, production was basically only for food. Market production was very minimal. Selling of maize began from the 1970s with introduction of villagisation and NMC* (75 years old male – Magulilwa village).

Daley (2005) further informs that the imposition of various council fees and fines from 1979 and a nation-wide annual development tax introduced in 1984 contributed greatly to the pressure to earn cash. With increased awareness of what money could accomplish the once purely subsistence producers gradually began to market their produce (from the dry land). Many explained that their marketing started within their villages selling their small surplus. At the time, one only sought to get little money to buy essentials such as salt and soap that were previously not considered as necessities. As a result, some saw the introduction of

money economy as the main catalyst behind changes that had been taking place in their villages. Ponte expresses similar views in his study, referring to this phenomenon as "the increasing of commercialisation of rural life" (Ponte, 1998; 132).

> *After receiving money is when we understood 'ahhaaa', there is money and that when one has money, one can buy things, travel, and so on. Today one uses as much as 3000/- Tshs for milling maize flour at the milling machine. At that time with the same amount, one could buy plenty of cattle. I remember at the time a cow was sold for 60/-*[22] *...To say the truth, today without money one can not survive* (66 years old female – Magulilwa village).

4.5.2 Acquisition of new and /or improved production goals and preferences

Subsistence or food security whether self-produced or bought has been and will, for a long time continue to be the most important goal of production among most small holder farmers. This is due to the simple fact that there is no survival without food. Things that had come to motivate farmers to seek money by 2005 were not so important in the past. With time, the people became aware of other goals, apart from food, which were unknown to them before. This was made possible through intra- and, or inter-regional contacts resulting from: improvements in the mobility of people, contact with newcomers, and through information from both government and non-government agents. They also realised that they needed to improve on what they had previously perceived as a standard way of life (see box 4.7). They became aware of the possibility of a different life style that made life relatively 'more comfortable' hence acquiring a new definition of development and possibly a new world view.

However, this awareness came hand in hand with the awareness that most if not all of their newly found needs required money. The adoption of market liberalisation policy by the Tanzanian government in the mid 1980s among other things provided an *opportunity* for the farmers to meet and to acquire *new goals* of production. The availability of markets for their produce was both a means through which the farmers were able to meet and or improve long standing goals and needs as well as a motivation for seeking and attaining new goals that one could only acquire with adequate financial capacity.

[22] The devaluation of the Tanzanian shilling initially came about between 1985 and 1995, being among measures recommended under the Structural adjustment programs (SAPs). Waters (1997) records that within this interval the Shilling had dropped from an official rate of 17 per dollar (80-100 Shillings on the parallel market) in 1985 to rates ranging between 520 – 620 Shillings in 1995. By the time this study was conducted in 2005 the rates ranged between 1,150 and 1,250 Shillings per dollar.

Box 4.7: Mama M's historical narrative on changing goals and needs over time - Magulilwa village

We didn't see ourselves wanting for anything back then. This is why we never even bothered with vinyungu farming. I gave birth to a number of children but at the time we never knew anything about valley bottom farming…at that time, if you had 100/- or 200/- shillings, you had a lot of money. 50 shillings could last someone a whole week but nowadays can anyone have 50 shillings till the setting of the sun? In the past, we perceived money as something unimportant…

We were satisfied with what we had, if we had one clothe to wear, that was enough. No one would say "how comes he /she is wearing the same clothes everyday" since he/she also had only one as well. We washed after, I don't know how long. We did not even use washing detergents at the time we just used some kind of rubbish out there for washing. As a child grows, you find another one or two clothes and if by chance it tares, it is mended and continues to be worn. So with such a life why would we need money? However, do you think that today a child will agree to such a life? These days it is not possible to give a child one cloth…even I, would personally not agree to have one clothe while I see others changing every day. These days clothes are sold in the village. We have markets here every Saturday the traders come from town. I would also like to have many clothes and shoes, so I have to find money…

Another thing is that in the past, we could go for a whole year without catching cold [makes a noise as if blowing nose] *not even once. Where sickness comes from these days, I don't know whether it's God's will or satan tormenting us with diseases. What can I say? Frankly speaking, we were not affected by sicknesses that is, until the time when I bore my children who are approximately your age* [referring to the interviewer]. *It was not usual for someone to visit the hospital two or three times in a year as is the case now. At most, one would go once and that was it. One would use traditional herbs once healthy, one would proceed with work…*

My child, at that time we had no match-sticks to light the fire or kerosene lamps we only used firewood. We produced fire by twirling a stick in the hole of a log or a much bigger stick. However, today I can no longer twirl a stick to make fire, I have to have matches otherwise there is no fire. Back then, you would have to make sure you keep the fire from going out because if it does, then you have to twirl again. It was not proper to go and ask for fire from a neighbour, who also underwent the same strenuous twirling process. This you learnt from the time you got married…

We grew up using a burning stick to find our way in the house, or to collect a plate at night ready for serving supper. We did not have or know kerosene lamps as we do today. Today your generation is very comfortable. My children are in Dar es Salaam city they don't want to come back here because there is no electricity [she laughs]...

Nowadays you people are educated. You are used to changing foods. In those days we just ate 'ugali' and potatoes, but these days there is meat, rice, and you use cooking oil. We also desire to change foods these days [she laughs] *we also like to use cooking oil. In the past, it was just salt and if one had no salt, then one cooked without it. At most, one would pound some sunflower seeds and add into ones vegetables (that is if one had sunflower)… I tell you the truth, back then we used to mill maize flour with stones. However, these years we have milling machines which also require money. Nowadays you people have taught us something different that's why we are increasingly looking for money. A lot of people to whom I narrate this story, think it's not true. We grew up in difficulty but at the time, we saw everything as being all right we were happy. However now we know better.*

Moreover, increased supply, availability and accessibility of consumer goods[23] as noted by Mama M (in box 4.7) had among other things, introduced new preferences and worked as a motivator for people to produce for the market. This section assesses some specific goals as revealed by the farmers to have played a significant role in influencing their decisions to produce for the market and in turn contributing to the transformation of the traditional *vinyungu* crop production system to a commercial horticulture system.

Child education

Many elderly farmers that were interviewed confessed not having received formal education. As evidence to this, the researcher encountered cases whereby the age of some respondents had to be obtained through popular events such as colonialism, world wars and in the case of women, the ages of their first born were used for estimations. They noted that in the earlier years, their fathers and forefathers did not prioritise education. Instead, girls were to be married off while the male children looked after the livestock (see box 4.8). Asked of her age, this woman points out:

> *Frankly speaking, I have been around for a very long time. Back then, women did not receive any schooling. They neither knew how to read nor write and they also did not know how to count the years* (estimated to be between 64 and 67 years old female – Igumbilo village).

Referring to the colonial times, another respondent recounts:

> *When we were born [1940s], schools were very difficult to come about. After the Germans, the British took over. However, the British were not prepared at the time to build schools extensively. Nevertheless, I have managed through personal efforts to learn how to read and to write…*(65 year old male - Mtitu village).

While the majority of the older generation had not received formal education during their time, child education was, among other things, strongly referred to by the majority of farmers as having influenced their adoption of a market oriented production system. Many of the respondents who had gradually changed their valley bottom production system from a purely subsistence production toward market orientation, had expressed that obtaining the ability to

[23] The renewal of supplies of consumer goods to the mass of the rural population after a decade of increasing scarcity (which resulted from economic difficulties within the nation) is a phenomenon noted by Gibbon (1995) to have been among the most important gains resulting from a decade (1984 -1994) of both official and unofficial adjustments experienced by Tanzania.

educate their children beyond primary school level was of top priority, after having secured food requirements for their households. A range of reasons for this attitude was given. Important to most parents and of concern among the old and middle aged was that their children would not end up facing the same predicaments that they faced because of their lack of formal education.

Box 4.8 A farmers' recollection on past education – Mtitu village

In the earlier years agriculture had no value, people did not produce for the market one produced only for subsistence at a very small scale. From 1972 to 1974 I recall my father produced in a very small area to get money. He would sell a small amount of pyrethrum to the cooperative unions to get money for school fees and other needs. Unfortunately, Pyrethrum was later no longer marketable. Those who managed to sell a reasonable amount of pyrethrum before its market collapsed, managed to give their children good education. However, there were very few who took their children to school maybe one, two or three households in the entire village. Nevertheless, one would find that these households also possessed a significant amount of livestock, so they could sell and get enough money to further educate their children. Today people have recognised the importance of education and the government has put great emphasis on education but today you will not find one with100 cattle that can be used as a source of income to educate one's children. The pastures have been replaced by farms. Therefore, the solution is to seek means within farming (60 years old male – Mtitu village).

One farmer in Magulilwa village described a range of changes that he had made since he began the *vinyungu* traditional irrigation farming in 1984. The changes among other things included change in crop types (from maize and beans to include green peas and leafy vegetables), production methods as well as the purpose of production. Whereas in 1984 the production was mainly for subsistence with little for the market, and with no or very little input, at the time of this research in 2005 most of his production was for market with specific demarcations made to specify what was for subsistence use and what proportion was for the market. He expressed that he also applied fertilisers and pesticides as required and advised by the agricultural extension officers to ensure maximum returns. When asked the reason why he had been changing his crop production, he responded saying:

> *It is not as if I am seeking to be rich or anything, the main reason why I am struggling is for the education of these children. To say the truth what causes me to change is when I remember my own life. I am a civil servant a position which sometimes provides me with opportunities, but in several occasions, I have found myself unable to take advantage of these opportunities because I lack the required level of education. Therefore,*

when I think of it, I say to myself: 'it means if I do not make enough effort, my children will end up living a life of struggles as I have'. It is this thought that motivates me to seek further production knowledge. I am encouraged to push myself further (47 years old male – Magulilwa village).

Another farmer from Kitwiru village likewise expressed:

What actually causes us to produce in the valley bottoms and to stress ourselves is to ensure we educate our children in the family. This is what makes me produce because without educating your child you have worked for nothing (55 years old male – Kitwiru village).

Another somewhat disturbing reason for the increased efforts towards the provision of secondary education was given in Magulilwa village. The respondents (including the village executive officer and the agricultural extension officer) stated:

If you don't take a child to school, you will cry. Children have become very aggressive in demanding for education. There are reported suicide cases in this village of children who have been denied secondary school education, after having passed their primary school national exams, because their parents did not have the ability to pay for further education. Children have realised that without education one does not have much to look forward to in life. They see the differences between the lives of those who are educated and those who are not. Hence, when they realise that they can not obtain it, they opt to end their lives. As a result, parents are terrified. That is why parents are forced to seek every means possible to obtain the money needed to take their children to secondary school.

Out of fear of more suicide cases, parents are left with no choice but to seek all means possible to ensure equal education opportunities for all children. On the other hand, those returning home from school have also played a role in the increased focus on child education. As this respondent explained:

…those returning home from school for holidays motivate their siblings at home with their stories, experiences, and new abilities such as that of speaking English. Therefore, whether you like it or not all the remaining children will demand to go to secondary school. Therefore, one needs to

put twice as much effort as before in order to do so (65 years old male – Magulilwa village).

The returning school children do not only influence their siblings, but also tend to influence other parents to take their children to secondary school as well. As expressed by this 51 years old male respondent in Igumbilo village when interviewed:

Question: You said that you started taking your children to primary school since 1985. Why are you now so determined to take the rest of the children to secondary school?

Answer: *You know normally one begins with a bad condition going to a better one. I have many children, but the first ones, that is the older children, did not make it to secondary school, but later my mind expanded and I began to send the remaining to secondary school.*

Question: What is it that expanded your mind to cause you to take your remaining children to secondary school?

Answer: *I saw my colleagues educating their children, and so I decided to take mine also to secondary school… My colleagues' children were coming back with very good progress and so I decided to educate my own children.*

Some mentioned the role of the government's emphasis on child education, pointing out that if one would not take to school a child who had reached school age (seven years), one would be liable to face a fine and/or imprisonment. Nevertheless implementing the government directives required money.

…The living standards have risen. For example in the 1980s, 1990s and thereabout, people did not see the importance of taking children to school, but now there is no one who will allow a child to stay home. Although there is a law now that all children of age must go to school, when the child goes to school this is an expense and if you do not have money then it becomes a problem. Therefore, people are seeking every means possible to get an income and one of those means is valley bottom production (Group discussion –Bumilayinga village).

However, since the government removed school fees for primary education from year 2002 (under the primary education development program- PEDP), this argument does not seem to carry too much weight. Notwithstanding other necessary expenses such as school uniform, books and in some cases school contributions were still a burden to many. This proved more difficult for those who had more than one child attending primary school simultaneously.

Nevertheless, it would seem that parents had come to realise the importance of education for their children. They were determined to give them secondary school education and to some, this was the case even if it meant having to pay for private secondary schools (see box 4.9). This was possible because the government had endorsed private school operators since the 1980s. However, the country began to experience the proliferation of private primary and secondary schools from the late 1990s. Moreover, the government had also introduced community supported ward secondary schools in 2004 under the Secondary Education Development program – SEDP (URT, 2004). The objective was, and still is, to ensure that every ward in the country has a secondary school. Nevertheless, such options were limited to those who could muster the means to do so**.** A respondent from Bumilayinga revealed the yearly secondary school requirements per child per year explaining:

> *The school fees has been set at 20,000/- per year per child. In addition, we contribute, for the same child, one debe of beans, one debe of maize and nine kilograms of sugar (for porridge) on quarterly basis. Once these are finished, we receive a letter from school informing us to provide more. Apart from this, we also have to buy a hand hoe and a bed* (46 years old male – Bumilayinga village).

The respondent seems to have recalled what he considered to be out of the norm or additional to what is generally expected. He treats other necessary requirements, which contribute significantly to the costs, such as school uniform, reading and writing materials as known facts.

The desire to educate children above primary level was evidenced through another very interesting phenomenon. For many years Iringa region was a major source for house maids (popularly known as house girls), bar maids, and other domestic servants catering for big cities such as Dar es Salaam (Kashaija, 2007). They were sought immediately after completing standard seven national examinations in October and before or after the release of their results in December which revealed whether or not the candidates had been selected for secondary education. Parents were also eager to release their children (especially those who were not selected for secondary school) for this was perceived as a means to obtain income for both their children and themselves (through remunerations gained). For the girls, going to the big city was a dream that had led some to drop out of school to experience the city glamour. During the field work, the researcher witnessed someone who went about in search

of a maid (not seeming to have much luck). One farmer who sounded somewhat displeased with that particular person, vehemently expressed:

> *We are no longer offering our daughters to go and serve the city dwellers; we are taking them to school, so they do not have to suffer. They take our children and mistreat them. We will educate them so that they can get respectable jobs as well* (Estimated 55 years old male – Mtitu village).

This farmer's lamentations were later confirmed in 'The Sunday Observer' in an article titled: "*Iringa ceases to be a pool for cheap female labour*" which reported:

> … how difficult it is today for someone to get a girl from Iringa to work as a housemaid, yayah[24], bar attendant or street hawker… You will no longer find the situation easier. Many girls who complete their primary education have a changed mentality… They want to get into secondary schools, unlike in the past when they almost dreamed of getting out of the primary schools to secure employment in major urban centres…"I would not look for a house girl from Iringa Region now" says Mwenzegule, who works as a watchman at Mwembe Togwe Secondary school (Ndakaru, 2007).

This change in attitude has nevertheless been reported to be a result of efforts exerted by a former regional commissioner for Iringa region who the paper further reported was displeased with the label that had been attached to young girls from the Region.

> Halima Kasungu, former Regional Commissioner for Iringa, was unhappy that girls from her region wore a distinction of its kind; they were the subject of loose domestic labour in urban centres, especially Dar es Salaam City or in bars and roadside hawking. She was uncomfortable. Sensing the going was too tough to tackle single-handedly, she hatched a plan that would rescue these young girls from their exodus to towns, always in search of easy but cheap labour. The plan was incorporated in a special programme of absorbing more girls into mainstream secondary education. "The programme has paid dividends. It has achieved about 95 per cent of the anticipated results, thanks to Mama Kasungu," says Elaston Mbwilo, the Iringa District Commissioner ... (Ndakaru, 2007).

There is no doubt that through this program, the parents were made aware of the disadvantages of sending their girls to the city as cheap labourers and were convinced to take them to school instead. This in turn introduced a new goal to these parents, a goal of which its fulfilment needed money. Hence, parents became obligated to seek means of raising the required money for secondary education.

[24] Meaning baby sitter

Box 4.9: Farmer's narrative on education - Mtitu Village

Primary education is free. You know they say primary education is the foundation. That is just the beginning. Even when one builds a house, one begins with a foundation. After completing, the foundation is when the construction of the main house begins. Therefore, primary school is like the foundation after they complete, I am supposed to take the children to secondary school and these days secondary education has to be bought. If you do not have money, your child can not go to school and as you can see these days, public secondary schools are built in wards. Nonetheless, it is not all who will attend these schools. That is why you will see some of us are struggling so that if a child fails to be selected into these ward schools, one can take the child to a private secondary school. This is because failing to be selected does not necessarily mean that the child is not intelligent, he or she may have panicked on the day of examination and did not perform well… So that's why you see us making effort so that we can at least help move these children forward...

These days standard seven is not enough. The good thing is that today education is for oneself and not necessarily to be employed, as was the case in the past whereby people sought education to obtain employment. Today this is not the case, we educate our children to empower them to be self employed and to be able to manage their lives. Where we are heading to is difficult. One cannot do anything without education (45 years old male – Mtitu village).

The *new generation* farmers who were single, recently married or had very young children at the time also seemed to have ready-made educational plans for their children. The majority of these respondents had only primary school education and few managed to secure secondary school education of which some were not able to complete due to their parent's inability to pay to the end of their education. Some seemed to have realised the need to prepare much earlier for their unborn or very young children so that they would be able to educate their children more conveniently when the time came. One respondent in Magulilwa village expressed:

> *When you work, you have to have goals or targets... for example our children are still very young and will need to go to school in the future. We were not well educated by our parents, but we have set the goal that we must educate our children. In order to fulfil this goal, I have to work hard from the beginning so that I will be established by the time they grow up. That is why I am putting much effort…Truthfully speaking, the needs of our forefathers back then and our needs are different. First of all in those days educating a child was seldom. Our grandfathers would say, "I can not educate a girl" not knowing that a child is a child regardless of its gender. However, today whether you have girls or boys, one thing is to educate them. In the past, the male child would go and tend livestock.*

> *However, it is impossible with the young people of today to tell a child to go and tend livestock it is just not possible. Therefore, I am working hard so that later on I can educate my children as others have done* (35 years old male - Magulilwa village).

Following the same line of argument, another young farmer (between 30 and 33) in Igumbilo village who was only able to attend primary school up to standard two and was therefore not able to give his accurate age expressed:

> *I am preparing for the small child that I have, perhaps God will help him so that he will not have the same level of education as I have, which is very uncertain. I live an uncertain life therefore, I am preparing so that life will be good and I will be able to comfortably educate my child. That is why I am struggling with the garden because I know this is the only way to bring education into my family and clan* (between 30 and 33 years old male – Igumbilo village).

The shift in emphasis on education is evident. Parents were seeking all possible means to cope with this *new goal* of educating their children beyond primary school. An interesting observation is that apart from government initiatives which had, to some extent, provided *opportunities* for the farmers to educate their children, most of the interviewed farmers had learned from their own experiences. Having experienced the disadvantages of being uneducated, they refused to allow their children to undergo the same distresses. The farmers' life histories had therefore acted as strong motivators, complemented by government efforts in creating an *enabling environment*.

The majority of farmers acknowledged that valley bottom production addressed this need best. They expressed that the advantage of being able to produce more than once and the possibility to produce a variety of fast crops which were marketable, with little risk of rain failure, was what made the valley bottom a sure option to meet such an important need, one that dry land production alone could not meet. They further expressed that with valley bottom production, one could strategically plan what and when to produce (sometimes in conjunction with dry land production) in order to meet needs such as school fees at the appropriate time. A respondent from Magulilwa illustrates:

> *We usually time our production…I mean for example, this month (November) you may prepare the vinyungus and grow maize [for green maize production]. Then next month, you prepare the dry land field to*

> *grow green peas so that the two will be ready for harvest at the same time. You may sometimes find that you end up selling both crops to the same customer which means receiving a lump sum payment which would be enough to pay school fees for all the children at once* (47 years old male – Magulilwa village).

This knowledge, some confessed to have acquired from agricultural extension officers and others from seminars and various trainings that were offered to the farmers. Yet others said they had acquired the knowledge through inactive learning (that is experience gained through try and error).

Modern housing

Apart from the strong desire to educate children to and above secondary school level, the desire to possess a brick house was another strong influence for marketing valley bottom produce. This was the case for many of the respondents interviewed, particularly the young and middle aged. Only a few older respondents mentioned building of a brick house as one of their production goals. This could be because the older generation do not see themselves as having much time left for embarking on such a taxing venture (Found, 1978). This respondent explained:

> *Apart from seeking money for educating children, another thing is that there is a competition of building houses in the village. This is a result of the income earned. In the past, our fathers used to marry more wives whenever they got money. For example, my father has more than six wives. On the contrary, today when the young men get money they either build houses or use it as capital for setting up a business or to improve their farm implements for further production* (41 years old male-Magulilwa village).

The above quotation seems to suggest a *change in goals across generations*, that is, between the old and the new (see box 4.10). In the past, many wives depicted wealth and prestige but to the *new generation farmers* material wealth is of greater importance. This could be due to the differences in the social environments in which the two generations have evolved. While older generation argued that in the past money was not very important for survival, it would seem impossible for the younger generation to survive in today's world without an income. The majority of young and middle aged respondents producing in the valley bottoms either

had plans for constructing, were in the process of constructing, or had recently completed constructing a brick house.

> *Earlier I did not even have a 'kibanda' [a shed] to live in, but now my thinking has expanded I have to have a brick house* (51 years old male- Kitwiru village).

> *First I started with a goal. Because without goals even if you get a million shillings, you may not be able to do anything important, but if you have set goals, even if you get a small amount of money, you are still able to put it to good use after some time. My main goal, when I began valley bottom production, was to do away with being crowded in the same house with my parents. I wanted to at least build my own house and live an independent life* (36 years old male- Kitwiru village).

The respondents argued that the time for mud houses and thatched roofs had passed and that one needed a modern and healthy house with a corrugated iron roof, a floor, windows and a proper door (see photo 5.4a). One farmer revealed that he was gradually replacing his traditional houses with modern ones. He had three houses on his compound. One built by bricks and a corrugated roof the other two constructed traditionally with mud and grass roofs (see photo 5.4b). When questioned on what had prompted this new desire for brick houses, the majority explained that they were now *more knowledgeable* and had *gained experience* from observing how *others* lived as can be deduced from this farmer's response in the interview:

> *People want to build modern houses and one can not do so without money.*

Question: Did people not want modern houses in the past?

Answer: *People wanted them but you know nowadays we are observing and imitating we are no longer satisfied with these grass-thatched shacks ...*

Question: Where do you see the houses that you imitate?

Answer: *...when we go to the city we see. We move around. Likewise when our children go to school in other regions, when they return they feel upset and complain when it rains at night and the thatched roofs begin to leak. They are forced to shift from one position to another throughout the night. These things encourage us to change* (65 years old male -Magulilwa village).

Box 4.10: A new generation farmer in Magulilwa village narrates on housing as evidence of progress

During the villagisation programme of 1974, the women really produced in valley bottoms since there was no rain in the dry land. So they produced extensively in the valleys but after the rain resumed, they abandoned the valleys. When we completed our primary education in 1994, there was a great awareness among the youths. There was a lot of competitions and imitation among them. We observed those who were producing in the valley bottoms and noticed that as they continued to produce, there was a significant change in comparison to dry land production.

These changes were brought about by the fact that one produced more times (maybe two times) hence realising more profit than in the dry land where production is only once. On seeing this the youth realised that this is not an opportunity to be missed so most of us who had just completed school decided to throw ourselves into the valley (where the women / our mothers had abandoned).This was in 1994/1995 and up to this day we are still producing and will continue to produce 'vinyungu'.

Frankly speaking as the young people continued imitating one another there have been noticeable changes. I am not talking about changes in land use, rather in development. In the past, you find that the women were producing but they were dwelling in thatched huts year in year out (I don't mean to be insulting to women) though even the men produced in the valleys as a group. However, in the past when our elders produced the issue of development / progress was not there. When one speaks of development / progress, we first consider change in ones living condition or environment. There should be observable evidence that this person has been producing and as a result has advanced from this point to that point. Let us say for example a person was living in a thatched mud house we expect that when he says that agriculture is profitable he already possesses a permanent house (brick house). Then we can say that truly this person has advanced.

But looking at the past, this was not the case. People had great herds of livestock but they did not improve their living environment such as having better housing. For example, I lived for a long time with my mother and she had a lot of cattle but the kind of house we were living in was somehow controversial it was a thatched mud house. Although the cattle we had, were of great wealth we used to keep them 'mahameni' [from where they were relocated to join the ujamaa village]. *We come home to sleep in a thatched house while cattle worth hundreds of thousands are out there.*

However, when we the younger generation came in to the valleys, the trend changed. We did not rush to buy cattle; we wanted first to build durable houses and to improve production in the valley bottoms. Instead of growing only maize, we started to grow green peas, beans and potatoes. Therefore, the valleys became more profitable to us. (30 years old male)

Photo 4. 4a: An example of a brick house built in the study area

Source: Author's fieldwork 2005

Photo 4.4b: The back ground shows a small brick house with a corrugated iron roof constructed in the midst of two traditionally built houses (foreground).

Source: Author's fieldwork 2005

Another respondent explained:

> *When I began valley bottom cultivation in 1995, I was still young and therefore my main aim was business. I only needed a very small amount for food at the time and so I sold the greater portion. My main goal was to*

sell so that I can lift up my living standard a bit. This included building a house … I had been living in a house in the past, but the quality was poor. It was a mud house with a thatched roof, with no floor. True, it was a house but lacked some qualities"…Presently I am living in a mud house with a corrugated roof, a floor and it has three bedrooms and a sitting room. The house that I am now building is constructed out of burnt bricks, a corrugated roof and has five bedrooms and a sitting room (31 years old male –Magulilwa village).

The complementary role of valley bottom production

Another frequently expressed reason behind the transformation of *vinyungu* crop production from a purely subsistence to a market oriented crop production system was its ability to complement dry land (that is rain-fed) production. Apart from meeting needs such as those of subsistence, education and house construction, valley bottom production was also mentioned as one of the major sources of income for dry land production. The majority of respondents noted that dry land production had become increasingly difficult. With the liberalisation of the market for farm implements and inputs, valley bottom production provided a means for managing dry land production. For example, these three farmers expressed:

Irrigation farming also assists me in rain-fed production, for instance right now I can prepare my rain-fed fields with the money acquired from sales of the irrigated produce [implying that he can hire labour]. (Approx. 30 years old male – Igumbilo village)

I find it difficult to produce during the dry land production period, because of the required farm implements and other inputs. Therefore, when I sell maize in February or January from the valley bottom, the income assists me in buying inputs for dry land production enabling me to produce well. Therefore one can say that it is one of the means which helps us boost dry land production (65 years old male - Nyololo village).

Yes, the produce from the valley and dry land are dependent. For example, you may produce a certain crop in the garden [or *kinyungu*] *and expect that after selling it you will get money, go to the shop and buy fertiliser and pesticides for a crop in the dry land. However, if it happens that you realise poor returns from the crop produced in the garden, then you have a problem. This is because you did not get what you expected*

and as a result, things go wrong…produce from the garden is what is mostly depended on (34 years old male- Mtitu village)

Due to the low nutrient contents in the southern highland soils (Mwalyosi and Majule, 2003; SMUWC, 2001; Hammond 1999) heavy fertilizer applications are required for production in Iringa. With market liberalisation which went hand in hand with the removal of subsidies (leading to increased prices) on inputs and farm implements resulting from structural adjustment programmes[25]adopted by the Tanzanian government in the mid 1980s, many farmers were left to fend for themselves **(**Hammond 1999; Mwakalobe, 1997; Mueller, 2009). Although, some form of subsidisation had been re-introduced from 2003/4, only few seemed to have benefited from it. This is firstly due to poor distribution mechanisms and secondly, the majority of farmers were not able to afford the amount of fertiliser required relative to farm size even at a subsidised price[26], hence resorting to under application. In the past subsidies were given through cooperative unions in form of inputs and implements to be paid for after the selling of produce. The re-introduction of subsidies was now in the form of reduced input prices particularly fertilisers. Under this programme, the government shoulders part of the transport costs incurred up to the designated distribution point. Nevertheless, the subsidised fertiliser was only available during the rain-fed production season and not throughout the year, meaning that valley bottom producers had to either buy and stock the fertiliser or buy the unsubsidised. Some respondents claimed that *vinyungu* crop production provided them with a significant amount of income which enabled them to finance the preparation of dry land fields and to buy the required implements and inputs. Although what is obtained does not cover the total costs, for some farmers, it greatly eases their burden.

Another means through which valley bottom was considered complimentary was that it enabled the purchase of ox, ploughs and even tractors (box 4.11) for dry land production. Moreover, income from valley bottom had also been targeted for the commencement or improvement of livestock keeping especially those livestock with the potential to further increase income. Such included hybrid cattle for milk production and Pigs. Pigs were said to be profitable livestock due to their ease in feeding and their increased demand as a delicacy in the local pubs.

[25] The aim of this move was to promote efficiency in resource allocation and distribution. It was to allow the market forces to dictate the direction of the economy.

[26] Two 50 kilogram bags of fertiliser are required for basal and top dressing per one acre of land. In 2005 the subsidised price for both types of fertiliser was 19,000/- from a market price of 26,000/-

> *The major goal is to buy some livestock, so I say to myself "the money I get I want to by a cow" and then I say "let me go down to the valley and cultivate half an acre". When I sell and find that I have made profit, I buy the cow and target another one with the next income. Other goals I have include constructing a house and buying land. I have separated the farms for example I have set aside one acre for food. The other two acres which are for the market, are for fulfilling such goals* (34 years old male – Nyololo village).

Obtaining capital for further investments.

Although the preceding goals more or less cut across all age groups, the goal of utilising valley bottoms as a means of obtaining capital for further investment was predominant among the *new generation farmers*. Some young farmers pointed out that *vinyungu* or valley bottom production was, to them, a means of accumulating quick capital for further investments.

> *I got land from my brother who bought the area since 1971 whom after having obtained sufficient capital, decided to move to Dar es Salaam to run other businesses. He therefore left the land for me to also earn something for myself* (35 years old male – Kitwiru Village).

The respondents' account touches on three significant issues. First, it reveals the channel through which the respondent acquired land (from a relative). Secondly, it implies that the land was given to the respondent for him to follow the steps of the original owner, which was to obtain his own capital. Thirdly, the account reveals that the capital obtained from valley bottom production was not necessarily for investment within the respective village from which it was obtained. The capital could be transferred to other areas (even outside the region) if perceived to have better opportunities. The investments mentioned ranged from further expansion of agricultural production through the adoption of improved technologies (see for example box 4.11), to engagement in off–farm businesses such as opening shops, building houses for rent, and purchasing vehicles for transporting agricultural produce from the villages to towns and cities such as Iringa , Dar es Salaam and beyond. This finding is in line with Ilbery (1978) who observed that younger farmers tend to concentrate on plans which will lead to a quick turnover of capital. As expressed by these *completely market oriented* farmers:

Frankly, the main goal that I have set for myself is that after two years I will abandon valley bottom production. This is because I will have already acquired enough capital to establish another business. That is what I am looking for (41 years old male –Kitwiru village).

It is three years now since I engaged in tomato production in the valley bottom. In the first year, I produced and built myself a house; in the second year, I opened a shop which now has a capital of 1.2 million shillings. This year I intend to seek out another business (35 years old male – Kitwiru village).

Another respondent also acknowledged:

I produce in the valley bottom so that I can change jobs, so that one day I can get enough money to help me start a business. In other words, I want to get capital for a business. The type of business I am thinking of is that of buying and selling grains such as maize, beans, and rice. Nonetheless I will not stop crop production; this is for me an inborn trait (35 years old male- Igumbilo).

Box 4.11: Linking goals with production decisions – Magulilwa village

When it comes to making decisions in production, you really don't have anyone but yourself. This you do depending on your problems and other things such as first, the goals that you have. Everyone has to have goals /objectives for every year. I have to ask myself "what do I want to do this year for my development?" Once you answer yourself "I want to do this" then you ask yourself "How will I do it?" this you must answer yourself that "in order to do this, I must to do this" therefore my decisions depend on my goals…For example the goal for this year was that after producing, I wanted to buy a tractor on loan. I wanted to use the acquired income to, at least, negotiate and buy a tractor on loan ['negotiate' could refer to costs for processing a loan or a down payment for the tractor]...

Since I am a farmer and have no other income source and my main occupation is agriculture, I decided to increase the size of land for production in order to realise the income that I needed… Unfortunately, though I increased the size of land, I encountered a problem this year (since we are referring to this year's goal and this year is not yet complete). The seed that I used, expecting that it would give me a sufficient income, was not good. I sowed and it did not grow, so I had to repeat. However, the harvest was not as I had expected. I realised a very small income to the extent that I was not able to meet my set goal. Notwithstanding I have not given up my goal still stands. (60 years old male – Magulilwa)

Nevertheless, the research revealed that most of the young farmers did not have enough capital to begin production in a big way. This being the case, some young farmers sought to work together bringing their small capital in a common pool and used what they had to produce and increase their capital until each could stand on their own. Another means of creating capital was for one to start with maize production. It was claimed that since maize could be produced with minimal inputs (though this depended much on the natural fertility of the area) one could produce maize and accumulate capital over time before switching to the production of more profitable but capital intensive enterprises. Moreover, engagement in off farm activities such as buying and selling of farm produce (as middle men) was for some a way of boosting their capital for further production. Though the majority spoke of opening businesses, apart from farming, some accumulated capital for the purpose of expanding their agricultural production through such means as increasing land size in the valley bottoms, and improving their production technologies. These technological improvements included acquisition of oxen, ploughs, tractors (also for lease) and water pumps for irrigation.

Household needs

Apart from the specific goals mentioned above some farmers, the majority of whom were *partially market oriented* farmers, indicated that their engagement in market production was in response to their growing families and changing needs coupled with the high cost of living which demanded one to have money. The daily family needs motivated these farmers to produce for the market (*problem-solving motivation*) as they illustrate:

> *We decided to adopt valley bottom production to meet needs as a result of life's hardships. The main goal is to ensure that we are able to serve the family* (35 years old male - Magulilwa village).
>
> *You know one cannot be satisfied and say for me this is it. Right now, my family has increased and even my mind has expanded. It is true I used to get five or six bags, but right now, I would like to get even 20 bags unless the soil refuses to produce. Therefore, what I am searching for in producing so many crops is to get money to assist me* (33 years old male-Igumbilo village).
>
> *In the past, what made us happy was the fact that we had food and a variety of it. Nevertheless the family has grown, needs have increased and hence economic hardship. It has reached a point where one begins to*

think, "Maybe if I do this, I may be able to solve a certain problem" even as one sees what others are doing (45 year old male – Nyololo village).

The goal of getting a big profit comes about because you never know, as you continue to produce, human needs do not remain stagnant. If you used to wear one pair of trousers, you will want to have two or three to wear in case you want to go for an outing. If you don't continue to produce, the money you have will soon finish. At the same time grand children are being born that may need assistance therefore, I have to have a saving (55 years old male- Magulilwa village).

The researcher discovered that major crops such as tomatoes, maize grain / green maize, green peas, carrots, paprika and the like (recquiring between one and five months before harvest), served to meet goals that demanded large sums of cash (such as those mentioned above). The production of simple crops such as leafy vegetables including amaranthus, Chinese cabbage, pumpkin leaves to mention only a few, contributed significantly in covering daily household expenses. Items such as salt, sugar, cooking oil, soap and the like, were usually obtained from the sales of such crops. Though this was a common means among the *partially market oriented* farmers, to some *completely market oriented* farmers, who due to their large land holdings had managed to take advantage of markets provided by institutions such as secondary schools, it proved to be a vary lucrative business. The following new generation and completely market oriented farmer points out:

Frankly speaking, in this village tomatoes are the leading crop for the market. However, even leafy vegetables are leading. This is because with tomatoes you have to wait three months before the crop is ripe for harvest and you are not sure of the price it will fetch. However with leafy vegetables, you can harvest every day. I make sure I realise at least 20,000/- every day from vegetable sales. I usually sell to traders that come directly to my plots. This is why I said it is also a leading crop; it plays a significant role as far as meeting daily expenses... Vegetables help us to survive. I have to produce vegetables and ensure that I realise a daily income because I have a wife and children who depend on me (33 year old male – Kitwiru village).

4.6 Conclusion

This chapter has highlighted some of the major changes that the traditional *vinyungu* farming system had undergone between the 1990s and 2005 relative to earlier years. The engagement in valley bottom farming has taken different forms for different reasons in different periods and under different conditions. One can conclude that the reasons for engaging in valley bottom crop production have evolved over time from reasons of pure subsistence and food security (that is, survival) to include reasons of income generation. As valley bottom production gradually evolved from pure subsistence to include market production, the value of land in valley bottoms had likewise gradually evolved from a free holding to a commodity.

Moreover, the 1990s and 2005 saw some major changes in traditional *vinyungu* farming. This period saw an expansion in valley bottom production as well as the adoption of new production methods, and the improvement of old methods in *vinyungu* farming practiced prior to and between the 1950s and 1980s. The period also witnessed the commencement of intensive valley bottom production in Iringa region, characterised by the introduction of input usage. Application of inorganic or chemical fertilisers and pesticides, which were unknown in the traditional system, had become the order of the day. Moreover, irrigation techniques such as water buckets, cans, and water pumps had been introduced apart from the traditional use of natural residual moisture. Although the use of the hand hoe was still predominant, ox-ploughs were gradually being introduced into valley bottom production and hired labour was engaged for increased efficiency. Crop choices were no longer solely based on subsistence needs but also reflected market demand. New crop types had been introduced into vinyungu farming and some farmers (particularly the *completely market oriented*) no longer produced only that which they consumed but also what they did not consume.

Most of the technological or methodological changes in vinyungu farming were to a great extent a result of diffusion of innovation. Farmers became aware of new production methods through formal channels such as government and non-government initiatives through the provision of seminars and various practical training programmes. Despite formal channels of information, it seemed that the major means through which the majority of farmers accessed information on innovations was through inter–regional and intra–regional interactions, facilitated through the increased mobility of people, migration and immigration. The diffusion of information within the villages was mostly through imitations and emulations of successful others within the village. The farmers' knowledge and information sharing and emulation of neighboring farmers who were doing well, could be said to have partly

contributed to the relative homogeneity in the farmers' land use practices within the valley bottoms and floodplains (Found, 1971).

Traditionally, women carried out vinyungu farming, with men only assisting in the difficult task of preparing the vinyungu or camber beds. However, the period between 1990s and 2005 saw a new era in valley bottom farming with a male predominance. The majority of the producers were young and middle aged men referred to in this study as *new generation farmers*. The change in gender roles in vinyungu farming would not be viewed, as out of the ordinary as it has been a common practice in Africa and Tanzania in particular for men to switch to, and control profitable income generating activities. Nevertheless, this observation would mostly apply to the middle and old aged male farmers (or *old generation farmers*) who had actually switched to vinyungu production. *New generation farmers* seemed to have had a different world view from that of the older generation. Having been born and/or brought up in a socio-economic environment where financial gains were increasingly being sought after for survival and status, the *new generation farmers* increasingly engaged in valley bottom production for economic reasons. This in turn, contributed significantly to the change from subsistence towards market production in valley bottoms.

With the adoption of a market oriented production system, the farmers in the study area exhibited a significant change in their decision making characteristics in relation to valley bottom production. In the past (1950s – 1980s) farmers marketed the surplus of that which they produced primarily for their household consumption. They seemed satisfied with whatsoever they got without much consideration as to whether a profit had been realised. Furthermore, the marketed produce was in that period obtained from dry land production and rarely (from the mid 1980s) was it from vinyungu. The findings in section 4.4 reveal a more cautious tendency in farmers' decision making under market production, particularly in the case of *completely market oriented* farmers. Contrary to the past, decisions are characterised by trade-offs, opportunity costs, profit or loss and a cost - benefit analysis, though basic, is applied. Although incomplete knowledge is clearly evident among the majority of farmers, they nonetheless prove to possess a level of economic orientation. The question here is not that of their level of accuracy or sophistication in applying economic principles in production decisions (as suggested in classical economic theories), traits revealed only by few farmers, but rather the basic economic orientation and mentality with which the majority of farmers approach production. This is despite the *constraints* (including capital insufficiency, imperfect information, risk and uncertainty) which seemed to dominate the farmers' decision environments and in turn limiting the possibility of optimum decision outcomes. The

individual farmer's decision environment seemed to constitute of the information available (and the ability to apply it) which with exception of a few, was increasingly obtained from other farmers, perceived by the individual, as being successful. Other factors considered were the resources available (particularly financial), perceived risks, uncertainties, constraints, opportunities and other social personal factors.

The respondents' repeated acknowledgement of their passed ignorance and subsequent acquisition of knowledge and experience, expressed throughout most of the chapter, demonstrates the role of the farmers' *learning experiences* in effecting change in vinyungu farming. The acquired knowledge led to changes in not only the farmers' perceptions and decision making behaviour, as regards vinyungu farming, but also in the farmers' goals of production. Apart from providing an *enabling* environment for marketing their produce, the introduction of money economy and market liberalisation (which aided rural-urban links), introduced farmers to manufactured goods, material wealth and a generally different lifestyle, consequently changing the farmers' world views particularly in connection to what constitutes 'development'. The farmers' acquisition of new goals and preferences and their awareness of the need (or their desire) to improve on existing ones (*goal-directional motivation*), such as housing, education and dry land production, as demonstrated in section 4.5 of this chapter, contributed to the farmers' engagement in market production which in turn contributed to changes in vinyungu farming. Moreover, the need to pay for health, education and other social services, as a result of government policy reforms in Tanzania, had also contributed to the quest for money (*problem-solving motivation*). These findings support a range of studies which provide evidence on the role of farmers' goals or multiple goals on their production decisions (Gasson, 1973; Ilbery, 1983; Fairweather and Keating, 1994; Padilla-Fernandez and Nuthall, 2001; Mishra and Gillespie1, 2007; Berkhout et al, 2009). While other studies, especially those conducted in the developed countries, reveal the importance of intrinsic goals/values, instrumental goals seem to be of importance to vinyungu farmers. However, this could be explained as a consequence of poverty and the desperation of the farmers in the study area to raise their living standards, hence in line with Gasson (1973) who observed that poor farmers were more likely to give more weight to instrumental goals/values relative to intrinsic, expressive, and social values/goals (see appendix 4 for details).

The study does not claim that the farmers' changing goals and preferences were the sole motivators in the transformation of the traditional vinyungu farming system towards a market

oriented farming system. However, I will conclude that the transformations undergone by individual farmers in the study area, relative to their changing physical and social environment through time and across generations, have contributed significantly to the transformations undergone in the traditional *vinyungu* production system.

These findings challenge, to some extent, the generalised arguments that farmers increasingly produced in valley bottoms for reasons of population growth, rainfall shortage and reduced fertility in the dry land (*problem-solving motivation*). The argument would probably hold for those who practised subsistence production in the valley bottoms or who marketed their valley bottom produce solely for reasons of subsistence but not otherwise. Valley bottom production for food security was predominant prior to and between 1950s to the 1980s whereby the majority of farmers produced the same crops in the valley bottoms as they did in the dry land (that is maize, beans, potatoes and traditional vegetables). From the 1990s onwards, the trend began to change gradually whereby the dry land became the main source of subsistence and the valley bottoms took up the role of market production. Although this did not take place homogeneously and neither was it a complete process, the *new generation farmers* some of whom had completely neglected dry land production and gone into complete valley bottom market production, provided a clear indication of food production becoming secondary in the valley bottoms. Earning money was the priority among the *new generation farmers.* Money not only ensured their subsistence needs but also could serve other purposes such as obtaining capital for reinvestment a goal sought after by the majority of the new generation farmers.

The transformations undergone by the traditional vinyungu farming system and the farmers, who are the main agents of these transformations, prove significant. The study opines that such transformations can by no means occur in isolation without implications on the immediate surrounding in which they have occurred. The following chapter (chapter six) will assess some of the socio- economic and environmental implications that may have resulted from these transformations.

CHAPTER FIVE
SOCIO-ECONOMIC AND ENVIRONMENTAL IMPLICATIONS OF CHANGES IN VINYUNGU FARMING

5.1 Introduction

> Agriculture affects such a large part of the population and is such a dominant component of economic activity in the tropical African countries that changes in it are bound to affect the wider process of economic development and social modernization (Anthony et. al., 1979:18).

The preceding chapters have provided a description of the significant changes that have taken place in traditional vinyungu farming from the 1950s to 2005 together with some of the major factors that have contributed to these changes. In Chapter four it has been revealed that changes both in the individual farmers' perceptions, goals and preferences over time and across generations and in the social and economic conditions undergone by the country over time, had contributed to changes in the traditional vinyungu farming. These changes had in turn produced a ripple effect on the general rural lifestyle as well as the rural landscape. This chapter assesses some of the socio-economic and environmental implications contributed by the undergone transformations. The discussion is based on the main fieldwork and some insights from a brief follow up visit in Kitwiru and Igumbilo villages in 2009.

5.2 Socio- economic Implications of changes in vinyungu farming

By the year 2005, a significant number of farmers practised valley bottom farming within the study area. However, the researcher found considerable disparities in vinyungu land sizes among the respondents. While some possessed up to five or six acres, others were only able to secure less than a quarter of an acre with the rest of the respondents lying between the two extremes. Moreover, not all who engaged in valley bottom production owned land within the valley bottoms or flood plains. Some producers acquired land on a temporary basis through renting (see section 4.2.1), an option which favoured the financially able. Those with the financial capacity (in most cases *completely market oriented* farmers) were more likely, to rent larger land holdings as opposed to those with limited financial capacity who rented small portions of land out of necessity for sustenance.

Given the opportunities and benefits attributed to valley bottom production, as examined in section 4.5 (see also Majule and Mwalyosi, 2003; 2004; 2005; Mkavidanda and Kaswamila, 2001; Kyando, 2007), the variations in land size and accessibility were indicative of wealth gaps among the vinyungu farmers. Observations showed that most farmers having less than 0.25 acres of vinyungu area produced primarily for subsistence (with minimum or no market

engagement), hence classified as 'poor' or 'not well-off' (in the absence of other income earning activities). On the other hand, those having more land engaged more in market production and obtained higher income. These were classified as the middle and rich farmers or 'better-off' and 'very well-off' respectively depending on their level of market engagement and success (see box 5.1 for classifications in Kitwiru village as at 2009). In the absence of other off-farm economic activities, we can associate the rich, middle and poor farmers with the *completely market oriented*, *partially market oriented* (with clear divisions) and *partially market oriented* (no clear divisions) respectively. The respondents were conscious of the socio-economic differences among them as they compared themselves to others in their production activities as well as achievements. It was noted that the criteria commonly used to identify the poor, better off, or rich included, among others, production technology and/or the ability to hire casual labour (an indicator of greater financial ability). For example, on asking a respondent from Bumilayinga village whether she used an ox-plough, she responded:

> *...use of ox-plough depends, because here we are divided in classes, those who are 'masikini' (poor) and those who are 'hali ya unafuu' (better off and /or rich). For example, I personally do not have oxen. Therefore, in order to cultivate a large portion of land I have to work through the 'mgowe*[1]*' system using the hand hoe. Otherwise, I and my husband alone cannot manage to cultivate the area* (Between 32 and 34 years old female - Bumilayinga Village).

It was further established that those possessing ox-ploughs also used them as a source of acquiring additional income through hire. Therefore, the respondent's resolve to apply the communal *'mgowe'* system may suggest her insufficient resources to hire such services or her opting for a cheaper alternative so as to put her limited resources to other productive uses. Although a large land holding is commonly considered as one of the criteria for identifying the rich (Ngailo et al., 2003), in this case it was only considered if the person owning the land had

[1] The *'mgowe'* system involves inviting relatives, friends and/or neighbours into one's farm to help supplement household labour in tilling the land (more common), sowing or weeding. The system is usually applied when the family or household labour is insufficient (and would therefore require more time) to accomplish a task given the large area which needs to be covered usually within a limited time. However, social capital (or social networking) is very important in order for one to adopt such a system. This includes being prepared and willing to offer such assistance to all those who have contributed their labour to one's farm. A small token of local brew or food is usually offered as a sign of appreciation (but some may willingly participate in order to acquire this token) otherwise, further payment would be for each to contribute their labour to the others whenever the need arise. Although this was the method commonly used in the past for cultivating large tracts of land, it has been gradually replaced by either hired labour or improved technology such as the ox-plough. Nevertheless, for those not having the financial means to access such means, the 'mgowe' system remains to be the only practical means (URT, 2002).

the means to put it into profitable productive use (including leasing out) as expressed below by a *completely market oriented* farmer in Kitwiru village.

> *I decided to have two acres because that is what is within my capacity to manage in terms of production costs. I would not want to find myself in a position where I have land that I am unable to manage. This is because I need to apply fertiliser two times. Therefore, if you produce in a large area and fail to manage it properly, you'll be surprised that even your colleagues will laugh at you. Hence, it is better to have a small area but well managed rather than a big area.*

Box 5.1 Number of garden plots, scale of production and level of marketing as criteria for classifying valley bottom producers in Kitwiru village

Yes, one can now discern the classes vividly; there are three major classes here at Kitwiru:

1) *Upper class / very well-off – These are those who produce vegetables at large scale and are in a position to hire a vehicle to carry their vegetables on daily basis. These have large garden areas. They have from 10 garden plots (usually large). They make sure that every day (except Sunday) they have vegetables, sometimes worth as much as 40,000/-, to sell everyday in the city market.*
2) *Middle class / better-off – these are also somehow trying their best. They have at least five garden plots. They sell their vegetable produce at least 3 times a week*
3) *Lower class / not well-off – These have two to three garden plots. They may stay one week or even up to three weeks before sending vegetables to the city.*

(Group discussion conducted in Kitwiru during second visit in 2009)

Farmers producing on 'large' land holdings who had acquired through renting were also classified as rich. This criterion had become more pronounced in 2009 when the group discussants reported that for some, the number of *vinyungu* was becoming smaller because of increased price per *kinyungu* in the valley bottoms. When questioned whether the size of land holding had been increasing of decreasing since 2005, one discussant revealed:

> *For some, land size is decreasing because the price of one kinyungu has increased, it is now 10,000/-* [compared to 3,000/- in 2005] *so some of us are giving up some plots for others to rent because we can not pay. As we give them up, those having money continue to increase there land size.*

Other criteria associated with the middle and rich farmers categories included possession of a modern house (constructed of bricks and corrugated iron sheets) and livestock such as cattle (hybrid) for milk production and pigs which had a good income earning potential together with the ability to educate children to secondary school or beyond. On the other hand, some of the poor farmers sold their labour to the richer farmers[2] through a form of wage or casual labour commonly referred to as *'vibarua'* (singular: '*kibarua'*) in order to meet household financial needs and/or in order to assist them in their production (see explanation in section 4.3.6). It was reported that farmers from nearby villages that did not have the potential for valley bottom production, due to their semi-arid nature or lack of river valleys, served as *'vibarua'* for the farmers in villages which were better endowed, hence implying the possible development of economic disparities among the respective villages. A respondent (village leader) from Magulilwa explained:

> *We usually engage our neighbours from Kilolo village to assist us in production since their area is somewhat dry* (47 years old male – Magulilwa village).

These findings not only suggest increasing socio-economic differentiation among farmers as a result of changes in vinyungu farming but also the consequences of such trends to social relations within the study area . The existence of socio-economic differentiation among small holder farmers has been noted by studies conducted in other parts of Iringa region and Tanzania in general (see for example Madulu, 1998; Ponte, 1998; Sokoni and Shechambo, 2005; Mkavidanda and Kaswamila, 2001, Sugimura, 2006; Mueller, 2009). Mkavidanda and Kaswamila (2001) had likewise observed the phenomenon of wealth differentiation among vinyungu farmers in their study (involving three divisions in Iringa rural district). They note that those with no vinyungu or very small areas (less than 0.25 acres) were categorised as poor, usually resorting to selling their labour for income. While those producing on one acre or more, in the valley bottoms were categorised among the medium and high income or rich farmers. Some studies that have observed socio-economic differentiation and casual labour markets in rural Africa and Tanzania in particular have also revealed the employer - labourer relationship between the well-to-do and the poor farmers. Nevertheless, the interpretations behind the phenomenon have sparked debates among scholars, with part of the debate revolving around whether or not the emergence of such socio-economic differentiation is

[2] Though this practice was also common in the dry-land production during the rain season, it was increasingly adopted in valley bottom production (especially by completely market oriented farmers) due to the intensive nature of production. The year round valley bottom production in some areas (where there is no flooding) guaranteed year round employment of wage labour.

indicative of the infiltration of capitalist tendencies within the respective rural communities. In reference to his study in Morogoro region among the Sagara community, Sugimura (2006) refers to such claims as being too simplistic and misleading. He argues (from a somewhat cultural perspective) that the casual labour of '*kibarua*' is not initiated by the employer rather by poor farmers searching for temporary work with the employers or rich farmers seeing it as obligatory to offer employment to the poor. He hence suggests a kind of 'moral economy' as the rich support the poor by providing them with employment. In so doing Sugimura advances what Hyden (1980) refers to as "the economy of affection[3]" concluding that:

> What we are witnessing in African societies is not the decline of the economy of affection and its replacement by a capitalist economy. Rather what takes place is a modernization of the economy of affection according to which cash is distributed to the poor through various structural relationships (Sugimura, 2006: online).

However, Sugimura's claim of poor farmers being the initiators of employment (implying lacking demand for labour), may suggest a localised rather than a general tendency. This study found that *'vibarua'* were an integral part of the well-to-do farmers' production costs both in the valley bottoms and in the dry-land farms. Some farmers revealed having to set aside a given amount each season to cover costs for *'vibarua'*. When questioned concerning labour, respondents repeatedly used the expressions *'unatafuta vibarua'* (meaning you search for casual labour) or *'tunaweka vibarua'* (we engage casual labour). However, they all tended to complete these phrases with the word *'wakutusaidia'* (meaning to help us). Various interpretations can be drawn form this, firstly it could be as a result of culture whereby one considers being assisted or helped even where costs have been incurred. Secondly, the deliberate decline from assuming the status of an employer could be to avoid the possibility of it being translated as belittling or humiliating the employee or reducing him or her to the status of a servant. Such an attitude could also be a result of the origin of the term *'kibarua'* which Mueller (2009) found to carry a negative connotation among the farmers in the West Usambara Mountains due to its colonial origins. The term was associated with men who worked for the colonial masters and was hence perceived as humiliating. While these explanations may seem to support Sugimura's 'moral economy' or Hyden's 'economy of affection', the fact that casual labour in valley bottoms is engaged predominantly by *completely market oriented* and *partial market oriented* farmers for the purpose of market production, would suggest otherwise.

[3] Hyden defines 'economy of affection' as the peasant mode of production which "gives rise to an economy in which the effective ties based on common descent, common residence, etc., prevail." He differentiates this with the capitalist mode of production which he argues leads to the predominance of a market economy which in turn produces a system of class stratification based on conflict between capital and labour.

Moreover, an earlier study conducted in West Usambara mountains in 1986 by Sender and Smith (1990) likewise seems to contradict Sugimura's generalised claims as they found employers[4] complaining of labour scarcity, an indication that capitalist relations of production were already in existence (Mueller, 2009).

Some scholars (see for example Kasfir,1986; Sender and Smith, 1990; Mueller, 2009) have considered the increase of wage labour (*kibarua*) market and socio-economic differentiation in the wake of market liberalisation as indicative of the development of capitalist relations in rural communities and have criticised those who seem to take less notice. An example is Mueller (2009) who accuses among others, government, donor and NGO documentation in Tanzania for perpetuating the populist position "that African rural societies primarily consist of (small-scale) farming, self-relying households." Which according to him attest "that this image of Africa still constitutes dominant conventional wisdom both in the public and among 'development experts'[5]." (Mueller, 2009: 9 online). In reaction to such claims and those of Sugimura (2006) in particular, Mueller states:

> This argument reaches its ultimate level of oddity, when scholars observe the common practice of hiring casual labourers in agricultural production, but construct the circuitous argument that such practice should be interpreted as an attempt of rural societies to 'reproduce an egalitarian world' (Mueller, 2009: online page -9).

While the populist position on peasantry is commonly associated to the Chayanovian model of peasant behaviour, those linking socio-economic differentiation, in rural Africa and Tanzania, to the emergence of capitalist tendencies seem to apply a Leninist[6] orientation in their argumentation[7]. Applied to this study, the existence of wealth differentiation (or 'peasant differentiation' as coined by Lenin) among vinyungu or valley bottom producers would in Lenin's view be an indication of early 'capitalist' development immerging within these rural settings. Explained within the context of the Russian peasantry, Lenin viewed class formation as both expression and driver of the development of capitalism in the countryside (Bernstein, 2010). With the assumption that the richer peasants were acting in response to the growth of commercial agriculture, Lenin described them as being profit-orientated, accumulating capital

[4] Referring to large tea plantation farmers

[5] Mueller cites for example, LO/FTF Council 2003 and United Republic of Tanzania 2003, 2009.

[6] These tend to fall somewhat in line with Lenin's model of development of capitalism (in Russia) which also suggests the emergence of three basic peasant classes namely rich, middle and poor peasants. Which Lenin, in Bernstein's words: "Anticipated their (eventual) transformation into classes of agrarian capital (rich peasants) and proletarian labour (poor peasants) (Bernstein, 2010: 53).

[7] It is not the intention of this study to embark on a Chayanov – Lenin debate (or the agrarian question) these are found elsewhere (see for example Bernstein, 2010; Akram-Lodhi and Kay, 2009). Their reference in this section is only meant for elaboration.

by exploiting paid non-family labour namely poor peasants (or 'rural proletarians'). Moreover, he observed that these richer peasants (as expressed in the farmer's narrative - see pg 149) owned the bulk of farm implements and other means of production and were buying or renting the land of poor peasants.

Lenin's description of the rich and poor classes partly echoes the descriptions provided earlier in this chapter in connection to the study area. However, while the wealth differences among the farmers were somewhat obvious, the exploitative nature attached to such trends as suggested by Lenin, were not so easily observed. This is probably due to the differences in the social, economic and political conditions in which the African peasantry and the Tanzanian peasantry in particular have evolved. Hyden, reflected this back in 1980 as he writes:

> The African peasantry is only beginning to play their historical role at a time when peasantries elsewhere in the world are being pushed off the historical stage…our conception of peasantry has been shaped by writings from other parts of the world, in recent years mostly from Asia and Latin America... While it is true that peasants in most parts of the world have been forced to trade their dependence on nature for a dependence on other social classes and that this process is taking shape in Africa today, it is wrong to assume … that it is already complete. In Africa, the process is only at its incipient stage…In fact, the rural producers in most parts of Africa are still in the process of becoming peasants: they are transcending the boundary between primitive cultivator and peasant. *There are, of course those who are turning into capitalist farmers or, as a result of the same process, into labourers.* Still, the number involved is very small. The principal feature of rural Africa is therefore… 'peasantization', the process of becoming a peasant, and not …proletarianization of rural producers (Hyden, 1980: 11 the emphasis in the quote is mine).

Even though not fully developed, Hyden acknowledges that the process of capitalist development was already taking shape even at that time (see emphasis in quotation) and as Lenin, he closely links this process to the labour relations between the different socio-economic classes. The fact that the process has been gradually taking shape in Africa and in Tanzania for over three decades and has been noted to increase its pace within recent years, as evidenced by this study and others conducted in Tanzania, is worth taking note. Especially when we take into consideration the economic developments which have been taking shape in Tanzania from the mid 1980s. These economic reforms, market liberalisation in particular, have created an *enabling environment* for the farmers' increased exposure to the market economy. However, as evidenced in this study, these reforms have provided *opportunities* to only those who are either financially capable, are strong willed or both. While simultaneously, inversely affecting those unable to savour the opportunities provided. This could with time, serve as a catalyst for capital accumulation by the few, hence intensifying the capitalist

relations of production between the rich and poor. Nonetheless, the findings in this study are but traces of observed trends and cannot without further investigations, be treated as tangible evidence of the development of capitalist relations within the study area.

Notwithstanding, the bulk of the empirical data presented in the study shows that the majority of peasants engaged in market production to meet household needs or goals, with only an exceptional minority aiming at accumulating the acquired income as capital for further investments. This outcome would therefore seem to be more in support of Chayanov's model of peasant economic behaviour. Chayanov assumed that providing a minimum standard of livelihood or meeting family needs is the primary objective of production in peasant societies (Bernstein, 2010). He observed that the existence of market exchange could be compatible with production for subsistence and does not necessarily mean that the producers seek to maximise or are profit-oriented as in the contemporary capitalist sense. The engagement in market exchange is that of use values (CSAC, undated)[8]. That is to say, the money acquired from sales of surplus is in most cases used to acquire other household necessities and services that the farmers are unable to produce. Hence, this system of exchange is intended to meet needs rather than to acquire money as an end in itself.

However, as the farmers in the study area increasingly sought to meet their needs and goals (which seemed to be growing with time) through increased market production, it was observed that apart from the socio-economic differences, social relations within these rural settings were also being gradually altered. The sense of *'undugu'* among village members had diminished. The investment one put into production (particularly those producing for the market) had reduced free hand-outs of farm produce to neighbours. This is to say that the farmers began to attach monetary value to whatever they produced. While in the past it was considered a noble gesture to assist a neighbour, the same assistance was referred to, at this point, as '*kumlemaza*' (this means to spoil someone- by not encouraging him or her to work for oneself). A farmer in Bumilayinga village revealed this change in relations during a group discussion held in the valley as he illustrated:

> *Let us take an example from this area where Mr. J has cultivated; in the past, he would grow vegetables for his household consumption as well as offer some to others. However, nowadays if I come and ask Mr. J for vegetables even if I came personally and met him working in the garden, offering me even one cob of maize will be very difficult. In those days if*

[8] Centre for Social Anthropology and Computing (CSAC) - University of Kent at Canterbury. http://lowie.kent.ac.uk/

neighbours asked, they are given free, but not now. Everyone must learn life's hardships that 'for me to have anything of my own I need to work hard for it'. Mr. J can offer me a garden for free to produce on, but to say the truth if I fail to do so, it will be very difficult for him to give me free vegetables. This is because doing so would be 'kunilemaza' (spoiling me) (Group discussion in Bumilayinga village – held in the valley bottom).

A grandmother from Magulilwa village somehow clarifies why it would be difficult for anyone (as in the case of Mr. J above) to give anything for free. She explains the hardships of production that would not only restrain someone from giving free handouts, but would demand a price that would balance costs and benefits.

In the past things were cheaper, I only applied the hand hoe to produce… I did not have much to buy that required me to use so much money. Therefore, it was not a problem selling one 'debe' [20 kg tin can] for 200/- or 300/- shillings, but nowadays crop production is a difficult and expensive task. If you get one 'debe' of maize, you know you have really put in a lot of effort…when you consider the costs for cultivating, sowing, weeding, inputs and transporting the produce from the farm to the house, this is not the kind of work that would allow me to sell one 'debe' for 1,500/- let alone 300/- shillings. I don't think so. The cheapest I would sell is 2,500/- shillings. This month [November 2005] for example, one 'debe' is sold for 3,000/- shillings (between 65-70 years old female- Magulilwa village).

In addition, whereby stuff such as maize-flour were once asked for and freely given by a neighbour, when one had not had the chance to go to the milling machine, they were at this time (2005) being borrowed and returned once the borrower had milled her own maize. This change in attitude towards the notion of *'undugu'*[9] (family-hood) may suggest the breaking down of some cultural foundations and beliefs as well as the '*ujamaa*' (that is, the Tanzanian socialism or family-hood) ideology as advocated by Mwalimu Julias Kambarage Nyerere. One could say that the increasing need and search for money and the hardships thereof, resulting from what the farmers referred to as *kupanda kwa maisha* (rise in the cost of living), a somewhat egocentric culture (that is, everyone for himself or herself) was gradually replacing

[9] The term *'undugu'* was an ideological expression commonly used to express nationalism and the policy of ujamaa (or familyhood) after the adoption of the socialism and self-reliance policy (by first president Mwalimu Julius Nyerere). However, the third Tanzanian president Benjamin Mkapa refuted the fact that *'undugu'* was an Ideological term asserting that it is in fact 'embedded in our African culture' (Mkapa, 2005 quoted in Kashaija, 2007:79-80)

that of '*undugu*' or reciprocity. This had become even more evident by 2009 particularly in Kitwiru village. As the act of freely offering a neighbour something or even lending was no longer an act of '*kumlemaza'* [spoiling him/her], as was the case in 2005 above, rather it was considered a shameful act on the part of the one asking or borrowing. On asking a group of female discussants whether it was still possible to give their neighbours vegetables from their gardens on request, one of the discussants (accompanied with the nodding and verbal support of others) vehemently responded:

> *Frankly speaking, that system is dead [Another interrupts exclaiming, "People have now woken up"- meaning people are now aware] every body knows that agriculture is the backbone of development why should somebody sit and wait to beg? It doesn't look good. It is a shameful act. Today you'll say "please can I have a little vegetable?" and you see your colleague carry her hand hoe everyday going down to the valley to farm? How do you see yourself?*

Question: How about borrowing, for example, your neighbour says I have not yet milled please lend me some flour and I will give it back (with the same measurement) do you lend her.

Answer: *Even that is dead. There is no such thing as lending. Now we have shops where they sell flour so if you have not milled your maize you can go to the shop, buy and cook that's it. Maybe in very rare cases I can go to my relative and ask but even this is less than 0.25 %...What I know for now is that life has changed you need to know how to organise your life on your own. You have to budget for yourself it is not that you will go and seek help from someone. Maybe at most you can think of helping an elderly [meaning parents] but even they have become smart, they know how to find money on their own.*

The repeated use of the term "dead" by the discussant signifies the complete abandonment of the practices (at least in Kitwiru village). The availability of shops stocked with all household necessities (facilitated by market liberalisation) provides an individual with no excuse for begging or borrowing. This would in turn, require every individual household to engage in some form of income earning activity in order to satisfy its needs. The exclaimed interruption *"people have now woken up / now aware"* would suggest that people had become more cautious in their production, ensuring that they benefit from their investments.

Furthermore, with the rising living standards and costs of production, the past tendency of depending almost solely on agriculture seemed no longer applicable. Most farmers confessed to having taken part in other off-farm activities such as brick-making (see photo 7.6) in the dry season, part time or seasonal engagement as middlemen for farm produce, as well as seasonal extraction of bamboo wine in order to earn extra income. On the part of women, activities such as baking and frying foods for sell, selling of firewood and local brew also provided them with some amount of cash income. Nonetheless, most of the respondents who engaged in such activities confessed that the initial capital for these off-farm activities was either partly or fully realised from valley bottom production, hence stating yet another economic implication resulting from changes in valley bottom production.

Such developments would seem to imply a busier lifestyle among the farmers, which could in turn translate to less socialisation and cooperation among family and community members as a whole (Mung'ong'o, 1998). Evidence of such trends was revealed by a respondent who had previously participated with others in the 'mgowe' system but said she was no longer able to do so. The reason being that she was busy trying to manage her farms (dry land inclusive) together with a part time employment that she had received which, one could assume, would eventually enable her to hire labour where necessary. This situation was evidently already beginning to unfold in other regions. Mwamfupe's (1998) study on 'Changing village land, labour and livelihoods' in two districts of Mbeya region (also a southern highland region), observes a breakdown in the traditional value relative to working parties. He explains that in one of the villages, labour was among the missing factor of production (others being land and financial capital) because of lack of cooperation among relatives as "Everybody is busy with his/her own work" (ibid: 15).

Another aspect that was observed is that some customary practices such as polygamy were no longer considered practical. This was especially so among the new generation famers. One major explanation for this may be the rampant spread of HIV-AIDS (TDHS[3], 2004 and 2005). Another is that with the incessant rising of cost of living and need for money, people were avoiding large families which translated to more responsibilities and higher expenses. For instance, some young couples who already had two children, at the time of this study (2005), considered themselves as having had a big family. This was also expressed by a young mother in Igumbilo village as she said:

[3] Tanzania Demographic and Health Survey

> *I have two children. That is a big family. I have to consider the fact that I am renting a house and the children are in school that is why I am producing…* (30 years old female – Igumbilo Village).

The respondent makes it clear that the cost of living would not allow additional mouths to feed. Given the social economic environment in which the young couples found themselves, whereby almost their entire survival required money, the likelihood of having large families as in the time of their fathers was very small. Some of the couples related a small family to the possibility of a better life. Such attitudes could in turn signal a future with lower population growth rates. However, another explanation behind such attitudes of which its contribution cannot be taken for granted especially among the younger generation, is the increased effort by government and non-government organisations on the dissemination of information on birth control.

An additional point from the quotation that is worth noting is that it depicts a different trend in rural life. In the past, with building material being readily available (that is clay, wooden poles and grass), a young man who was about to marry could easily construct a mud house for his family (with the help of family and friends) within his inherited land. The account given by the respondent speaks of living in a rented house. This could suggest on the one hand, that she and her husband had no land on which to construct their own house. On the other hand, a more plausible explanation would be that of the change in the acceptable mode of house construction. It was observed that most of the younger generation farmers, who were yet to construct their own houses, opted to rent brick houses while they gathered the required finances for their own construction projects. In response to this demand, the construction of houses for leasing was becoming a lucrative investment attracting the attention of the *new generation farmers*.

It can also be argued that child education is taking the place of land inheritance as a means of survival. Provision of higher levels of education seemed to be as important for the children's future as was land ownership (or inheritance) in earlier years. As observed in chapter four (section 4.5.2.1), parents were increasingly educating their children to secondary level (with valley bottom income playing a significant role). They saw no future in agriculture for their children. This was especially so for those farmers who had small land holdings or had migrated into the area and were therefore forced to buy or rent land. Education was therefore perceived as a tool capable of empowering their children to seek employment or to be self-employed. For instance, the following farmer from Nyololo village (who at the time had four sons) pointed out:

> *My sons will have to understand, because I did not receive my land from anyone, I had to find it on my own. Therefore, if they get at least one acre*

> *each, they will have to obtain the rest through their own means. I have taken them to school so what else will they be expecting from me?* (65 years old male – Mtitu village).

Increasing education provision may in turn lead to a generation of 'educated farmers' (that is, with at least secondary education). The study observed that almost all the *new generation farmers* (reportedly responsible for some of the major changes in valley bottom production) who were interviewed had at least primary school education. The few that had secondary school education demonstrated major differences in their production decisions as compared to their standard seven counterparts. It would therefore be correct to anticipate greater changes with a larger number of secondary school leavers (assuming they will engage in agriculture after completing school). This may in turn lead to a more specialised production system in the near future especially given the fact that the *younger generation* or *new generation farmers* are highly ambitious for development and/or a modern lifestyle. Having encountered a somewhat similar situation among the Machuguenga Indians of the Peruvian Amazon, Henrich (1997) observes:

> …young people are searching for new ways to live in a world that has changed so rapidly during their lifetime. Old ways and traditional culture no longer seem as relevant, and often fail to provide answers to new questions and new desires (Henrich, 1997: 328).

5.2.1 Implications of changes in vinyungu farming on migration

Valley bottom production has to some extent also acted as a buffer for reducing the rate of rural-urban migration. Whereas in the past the majority of young men tended to rush to urban centres (for instance Dar es Salaam) after completion of primary education (that is1970-1990s), this tendency began changing from the year 2000 onwards. A significant number remained in their respective villages. As described by the following respondent:

> *I think the time for the young generation to seek development has come. In the past they used to go to the city in search of opportunities for a better life and although this is still the case for some, it is a matter of chance. One may succeed or not. Therefore, they have decided to improve their lives within their surroundings, concentrating their efforts on agriculture. I see this as the major reason for the changes that we are seeing. The young people have sought a means of raising their living standard through self employment in agriculture* (55 years old male - Magulilwa village).

An elderly man from Kitwiru village likewise confirmed:

> *Right now a lot of young people are producing in the valleys in order to meet their needs... The past tendency of young people running to the cities in search of work, is reduced since they have realised there are no jobs in the cities* (group dicussion participant – Kitwiru village).

The tendency of young people remaining in the villages after they had completed their primary (and for a few, secondary) education was evidenced more in those areas with the potential for valley bottom production and access to land (obtained either through inheritance, rent or purchased). Where the possibility to obtain land in the respective villages was limited, there was a tendency for young farmers to migrate to other villages that had potential for valley bottom production, where land could still be accessed. This could be within or outside their respective districts. This suggests a tendency of *rural-rural migration* rather than the earlier predominating tendency of rural-urban migration which was, however, still dominant in areas lacking vinyungu production opportunities (Mwamfupe, 1997). Moreover, some of those who had migrated to urban areas and encountered limited success opted to return to their respective villages (*returning migrants*) after having heard of the success stories of those whom they left behind.

> *When I came from the city I saw there were changes in my peers. They had advanced. They had built houses etc. while I had nothing. Therefore, I decided to come back to the village and began production. In the first year I built a house, the second year I married and I am still progressing… we all love money so that we can be like those who are developed* (43 years old male- Magulilwa Village).

Such a trend is likely to lead to population concentration in areas with the potential for valley bottom production, resulting to further fragmentation of land and further intensification of production in the respective valley bottoms and flood plains. If such a condition would continue unchecked, and given the level of technology and capital, it would most likely lead to diminishing returns in production in the short- or long-run. The continual production on small plots of land would lead to soil exhaustion which would require increased input use over time, translating to higher production costs and hence diminishing returns. Nonetheless, the existence of valley bottoms at any given location is not the only factor that determined population concentrations in such areas; rather a combination of factors seemed to play a role. These included infrastructural developments such as accessible roads, telecommunication and market accessibility. As narrated by the respondents below.

I moved into Kitwiru village in 2002 from Makambako in Njombe District. I began production activities immediately after arriving (that is in that very year). This is because I came with that specific goal in mind… there is plenty of land in the valley bottoms from where I came from, but what made me move to this place is the ease of transporting the produce since this place is located along the road… (35 years old male – Kitwiru Village).

I moved to Nyololo due to essential services such as transportation. Where I come from conditions are very difficult. Igowole is a division my village is Kisasi, this is about eight kilometres from Igowole town. When you are sick, they carry you on a stretcher to a hospital. I thought it better to move nearer to the essential services. I moved here because of the new hospital and small scale businesses. I have a kiosk where I sell essentials such as sugar, salt, soda etc. and because I have a garden in the valley I also use the kiosk to sell my farm produce" (39 years old male – Nyololo village).

Furthermore in Ihimbo transportation was very difficult, where we produce is very far from the road therefore the costs of production are very high compared to the returns (54 years old male – Nyololo village).

The accounts above suggest that some areas have the potential for valley bottom production but are still more or less still producing for subsistence with minimum involvement in market production due to underdeveloped infrastructure. For instance, some farmers in Bumilayinga (being a remote village) expressed that although some crops such as tomatoes were very profitable they are also perishables. Therefore, many avoided them because they lacked the means of transporting them to the nearby town of Nyololo. Most of the farmers therefore opted to produce beans for the market since they can preserve them for a long time while awaiting traders to come and buy.

The tomatoes end up rotting in the farms for most of those who produce. The people producing tomatoes here have to personally carry the produce to Nyololo by bicycle which is a waste of time given the distance and the fact that one is obliged to travel every day taking small amounts until the harvest is finished. That is a lot of work and much of the crop ends up rotting. However, we produce beans and after harvest, we keep them in bags until the traders come in April which is usually the time to earn good money (46 year old male – Bumilayinga village).

The farmer implies that due to poor infrastructure, there is limited frequency of traders' visits into the village. Traders seem to be more willing to venture into the village during the beans-season, as it proves more profitable and there is an assurance of acquiring substantial quantities that would guarantee profitable returns relative to transport costs. This situation is contrary to that which could be observed in road side villages where traders ventured more frequently in search of a variety of produce. This in turn attracted those farmers who were seriously into market production to relocate from their remote locations as evidenced from the respondents above. Such differences in location would likewise translate into developmental differences among the villages in question.

5.3 Implications of changes in vinyungu farming on rural landscape

The *vinyungu* farming system has to some extent contributed to the modification of the rural landscape within the study area. On the one hand, we have seen in the previous chapters (three and four) how the valley bottom environments had undergone gradual transformations over time through the replacement of natural vegetation by vinyungu and (subsequently) garden plots (compare for example photos 3.3a pp.35 to photos 4.1a.and 4.1b pp.62). On the other hand, the farmers' accounts on increased 'modern' house construction observed in chapter four (see section 4.5.2.2) is an indication of further rural landscape transformation. Most of the interviewed farmers who were constructing or had already constructed their houses in the study area, expressed that income from valley bottom production contributed significantly to their house construction. However, they did not say with certainty what proportion of the total income was from valley bottom production. Some gave the impression that valley bottom income was the sole contributor. Nevertheless, this could only apply to the very few who had large tracks of land in the valley and/or produced highly profitable crops for the market. This is because dry land production as well as off–farm activities also contributed to cash earnings. As revealed by these farmers from Kitwiru and Nyololo villages respectively:

> *...I have been able to achieve a lot through the garden and the subsequent improvements made in my dry land farm. I have made some advancement in that I have built my house and have installed electricity. I have realised that if I produce in this small garden together with a little money from my dry land farm, my life is transformed* (36 years old male – Kitwiru village).

> *We are currently building our house. However, a greater portion of the money comes form my husband's tailoring business with some contribution from the dry land farm*...(34 years old female – Nyololo village).

With the increase of 'modern' house construction, brick houses and corrugated roofs were gradually replacing thatched mud-huts. With such a trend, one could predict a future with villages composed of brick houses with no or very few mud huts. Such a scenario was already taking shape in Kitwiru village when the researcher revisited the village in 2009 (see photo photos 5.1a, 5.1b and 5.2a, 5.2b) hence modifying, if not transforming, the traditional village landscapes. Confirming this, a group discussant in Kitwiru village expressed, "*Thatched houses were many but they are reducing day by day".*

Moreover, with electricity supply, as revealed by the respondent above, one can foresee a 'modern' settlement under construction. This is supported by Kihedu et al. (2006) who's study suggests a relationship between energy and type of building materials used in the building environment. The study suggests very little chance of connecting a house built of indigenous building materials to the national power grid. With electricity, items such as televisions and other electronics will begin to flood into the villages leading to further need for money for their acquisition (Godoy et al., 2005). Such developments were already underway by 2009 (see photo 5. 3).

Photo 5.1a: An example of a brick house built in the study area (note the thatched mud house to the right)

Source: Author's fieldwork 2009

Photo 5.1b: An example of a brick house and corrugated roof houses built in the study area (note the thatched mud house in the midst).

Source: Author's fieldwork 2009

Photo 5.2a: An example of 'modern' houses built in the study area by vinyungu farmers

Source: Author's fieldwork 2009

Photo 5.2b: Shows the increase in brick and corrugated roof houses built in the study area (notice there is no mud house in sight)

Source: Author's fieldwork 2009

Photo 5. 3: Shows an example of a house built in the study area with electricity connection and a satellite dish in view

Source: Author's fieldwork 2009

Furthermore, the engagement of *new generation farmers* in valley bottom production for the acquisition of capital for commencing non-farm activities such as shops, kiosks, pubs, guest houses and houses for rent not only contributes to the economy of respective villages, but also to the change in the village landscape (see photos 5.4). It should be noted though, that this trend

was more pronounced in villages located near urban centres and along main road areas, as evidenced in Kitwiru, Igumbilo and Nyololo villages in comparison to more remote villages such as Bumilayinga or Maguliwa (although there was also evidence of such trends in the later locations). For example, in 2009, the researcher observed a number of constructions which took place simultaneously in Kitwiru and Igumbilo villages (see photos 5.5a and 5.5b). She also noticed some completed house constructions that did not exist three and a half years earlier which were reported to be products of valley bottom production.

However, it was observed that although a significant proportion of the developments were from the farmers within these locations, they were not the sole contributors. Located in the vicinity of Iringa town, the nearness of these locations, particularly the villages of Kitwiru (10km) and Igumbilo (7km) to Iringa town (and their being part of the Municipality) seemed to attract some town dwellers to these locations. Avoiding congestion in the town centre, some town dwellers were beginning to buy land and were constructing relatively 'sophisticated' houses in these areas (observed in Igumbilo village). Apart from further contributing to the village landscape modification, they also attracted those well-to-do farmers who had not yet constructed their own houses to follow their lead by constructing houses with better designs compared to those constructed earlier by their peers (compare for example houses in photos 5.1a, 5.1b and 5.3 with 5.2a and 5.2b belonging to farmers). This phenomenon provided further evidence of the growing differentiation among the farmers.

Photo 5. 4: Showing some non-farm businesses of which some are a result of vinyungu farming

Source: Author's fieldwork 2009

Photo 5.5a: A line of shops under construction in Igumbilo village along the Dar es Salaam Mbeya road

Source: Author's fieldwork 2009

Photo 5.5b: A line of shops in last stages of construction in Kitwiru village (a product of vinyungu farming) along the Dar es Salaam – Mbeya road.

Source: Author's fieldwork 2009

Of more significance however, is that the construction of houses and other business buildings, whether by the successful farmers (comprising the majority) or town dwellers, came with the creation of off-farm activities (related to construction work). Hence, providing job

opportunities to those who were either unable to secure land in valley bottoms, given its increasing scarcity, or lacked the capital for meaningful production. It also translated to the increased demand for building materials such as bricks which, in turn, resulted in increased production leading. This in turn led to the creation of employment opportunities. More people (particularly *the young generation*) began to engage in brick making, with the majority having acquired their capital from valley bottom farming. However, as in the case of house construction, it would be erroneous to suggest that valley bottom production was the sole contributor in the development of these new businesses. Notwithstanding, its contribution can by no means be considered negligible. For example, all the shop owners in Kitwiru village were also successful valley bottom producers (*completely market oriented* farmers and *partially market oriented* farmers) purportedly owing their capital to valley bottom production. This was made known in a group discussion during the researcher's visit in 2009.

Question: If I were to go around and meet all the people having kiosks and shops, will I find that they all produce in the valleys?

Answer: *Yes, all of them are engaged in valley bottom production. It would appear that their businesses are a result of valley bottom farming because they were all valley bottom producers then they opened shops, although they are still producing in the valley.*

Question: So these businesses are because of valley bottom farming.

Answer: *Yes, a confirming example is a very current one, it is just recently, about a few months ago, that Mr. M has opened a shop. After he produced in the valley for some time, he now opened a shop. Likewise, Mama S. and Mama W., all of them are successful valley bottom producers and they now have shops.*

5.4 Environmental implications of changes in vinyungu farming

The study's use of the traditional name 'vinyungu' from the outset (and later interchangeably with 'valley bottom production') is for the sake of disambiguation. Valley bottom farming or cultivation in Tanzania is not unique to Iringa region. Various traditional irrigation systems exist within the numerous valley bottoms, flood plains and marshlands of Tanzania and Africa as a whole (see for example Adams et al., 1994; Dixon and Wood, 2003; Mulugeta, 2004; Ngatunga, 2008; Vaishnav, 1994). Their uniqueness is mainly in the production methods, including water utilization, relative to the physical environment and the indigenous knowledge applied. A general concept commonly used by researchers to identify such systems or practices is 'wetland cultivation/agriculture'. With this conception, most researchers' interests for such practices have transcended those of the farmers' well-being to include the utilized resource bases (Mkuula, 1993). This is because wetlands have, in the past four decades, received special

attention from the international community due to their social, economic and ecological importance. However, Tanzania officially ratified the wetland convention[4] as late as August 2000 after having endorsed the country's accession to the Ramsar Convention on Wetlands of International Importance in February 1999. This had attracted many scholars from Tanzania and non-Tanzanians thereafter. At the commencement of its membership much emphasis was on identifying Tanzania's wetlands of national and international importance (URT and DANIDA, 1999; IRA, 2003). However, it was not long before some researchers realised that equal attention was required of the smaller systems (some of which had significant influence on the larger systems) which were daily impacting and being impacted by the rapidly expanding human activities (see for example Palela, 2000; Sabai, 1999).

For this reason researchers have reported the vinyungu farming system, as is the case with many other traditional irrigation farming systems in Tanzania, from two major perspectives and at times the two have been reported concurrently (Yanda et. al., 2004; Kaswamila and Masuruli, 2004; Sokoni and Shechambo, 2005; Mpayo, 2005; Soini, 2005). On the one hand, the vinyungu farming system has been commended for its role in contributing to food security and poverty alleviation. As evidenced in chapter four (section 4.5) of this study (see also box 5.2), other studies on vinyungu farming (Ngatunga, 2008; Majule and Mwalyosi, 2003; 2005; Mkavidanda and Kaswamila, 2001; Kyando, 2007) including some local district reports in Iringa, have attested to the role of vinyungu farming in improving the livelihoods of those who were engaged. For instance, information from the district agriculture and livestock office (DALDO) in Mufindi revealed that vinyungu contributed an estimated 20 percent to food security. Whereby acquiring the ability to construct better houses, paying school fees, and gaining purchasing power for items such as bicycles, radios and other house hold requirements have been used as evidence.

Notwithstanding, the system has been blamed for major environmental impacts. Among these include drying up of water sources through drainage; reduced stream water flow; siltation; water pollution resulting from increased use of fertilisers and pesticides; erosion of river banks as a result of cultivating in close proximity to the banks (see photos 5.6a and 5.6b); soil degradation (SMUWC, 2001; Sosovele, 2003; Majule and Mwalyosi 2003; 2004 and 2005). As a result, various intervention measures had been put in place through environmental policies, NGOs as well as village bylaws to restrict practices or mitigate what is perceived to be a detrimental effect. Regulations imposed included among others restrictions on clearing water

[4] This is namely ' the Ramsar convention' which was developed and adopted by participating nations at a meeting in Ramsar on February 2, 1971and later came into force on December 21, 1975. It is an international treaty for the conservation and sustainable utilisation of wetlands.

retaining vegetation and use of bush fires (for land clearing). In addition, limits were set for the allowable distance for producton from the river banks and water sources. Farmers were advised to produce in varying proximities from the water sources depending on the terrain and size of these water sources. This ranged from 200 meters (for wide banks) to five meters (narrow banks) from the water source, river channel or stream. The researcher found that agricultural officials did not generally agree upon the stipulated distances. They argued that some distance measures were not realistic given that most valleys are characteristically narrow. Such arguments seem to suggest conflicting interests between the water and agricultural sectors. The farmers were of the same opinion as the agricultural officers as evidenced through these two farmers from Igumbilo and Kitwiru who report:

> *...there are no more areas available. The government has instructed that cultivation should begin 100 meters form the river bank. However, some people begin to cultivate before the 100 meter mark... they see 100 meters as being too far hence making it difficult to irrigate, but when they are closer to the river it is easier* (52 year old male – Igumbilo village).
>
> *We were removed from cultivating along the little Ruaha River for environmental reasons. This was in 1998 however, we were allowed to continue with production some hundred meters from the river but at this point, the area was too dry so people decided to leave the area, even though a few people still sneak into the restricted area* (65 year old Kitwiru).

Because of the stipulated distances from river banks, the researcher encountered farmers who were forced to part with either all or a significant portion of their land particularly in locations such as Igumbilo and Kitwiru villages where these regulations had been strictly applied. Being part of the Iringa municipality, land belongs to and is distributed by the village government and hence the government was under no obligation to compensate the farmers. This in turn denied the affected farmers of an important income earner. Alternatively, some of these farmers rented land from others or sought off – farm employment for an income. Though the second respondent (above) from Kitwiru village mentioned 1998 as the year they received directives, most farmers in Igumbilo seemed to still benefit from the practice in 2005 (at the time of field research) as they continued to produce along the Little Ruaha River. However, the researcher's second visit in 2009 revealed a significant change, as most farmers especially the *young* or *new generation farmers* were reportedly no longer as active as they were in 2005.

Photo 5. 6a: Showing cultivation within on the river bed (during dry season).

Source: Majule and Mwalyosi, 2004:6 (as figure: 5a)

Photo 5. 6b: Showing cultivation on collapsed river bank

Source: Majule and Mwalyosi, 2004:6 (as figure: 5b)

The key informants disclosed that it was after the December presidential elections in 2005 and early 2006 that the government tightened the implementation of the law. Consequently, many farmers lost their land in the valley and the majority of the *young generation* farmers were reported to have diverted their attention and capital (some having acquired it through valley bottom farming) to brick making. The crippling loss of land was likewise reported in Kitwiru

village. However, an alternative source for irrigation had been adopted by tapping the Kitambuka spring and channelling the water to the now drier fringes of the valley (see photo 4.2f pg. 79). Those who had lost land, yet financially well-off, were renting land from their fellow farmers. Farmers in Igumbilo village were however, unfortunate as they were totally dependent on the Little Ruaha River for valley bottom farming and had no other alternative. The implications of the environmental regulations were echoed in a group discussion in Kitwiru village as an elderly woman explained:

> *We are keeping to the law ...In the past people had vinyungu near the Little Ruaha but with the enforcement of environmental laws, they were restricted from producing and now they have to rent land. They were not compensated; they complained but to no avail, the government can not pay when it has to do with the environment... Where they have restricted is where there is moisture ...I would suggest that these environmentalists should reduce the limit at least to 50m. This is because some people are really affected. People here are using vinyungu to pay for education of their children so those without, are facing problems. Children are being sent home from school every now and then because the parents can not pay school fees* [referring to secondary school] *the father and mother are not employed, they have no other job they are just farmers.*

The discussant reveals the unfortunate state of those having no land in the valley bottoms. When considering the advantages of valley bottom farming mentioned earlier in the study (see also box 5.2), the discussant's account and plea further reflects on the existing inequalities or socio-economic differentiation between those with access to land in valley bottoms and those without access caused among other things, by stipulated environmental laws and regulations. Mkavidanda and Kaswamila (2001) had earlier predicted the negative implications of restricting vinyungu farming and had cautioned against such interventions expressing that they would lead to more negative than positive impacts. They mentioned among other things, food shortages, and increased poverty among small scale farmers resulting from low income earnings and malnutrition due to lack of vitamins and proteins acquired from vegetables and beans commonly produced in the valleys.

Box 5.2: Implications of transformations in vinyungu farming on farmers' well-being (poverty alleviation) – Kitwiru village

You know that vinyungu has brought about significant changes in the lives of the people in Kitwiru. Just by looking at them, you will see that their lives are much better than that of farmers in some of the villages for example:

- *If in the past, people were taking tea without sugar and now, before the children go to school, they take tea with sugar, then you know there is change.*
- *If children used to go to school without wearing shoes and now you see school children putting on shoes, that is change* [another discussant added: *right now it is perfect, a school child goes to school wearing shoes one sees that truly it's a child of a farmer*]
- *In the past one would put patches on clothes or shoes when they were worn-out, today one can replace it with a new one. That is change – one can see that at least there is some improvement.*
- *Another good example is that in the past here at Kitwiru we did not have even one person having dairy cow but now we do.*
- *We did not have people with power tillers (mini tractors) today people have power tillers.*
- *We did not have people using motor cycles today we have people riding motor cycles in Kitwiru.*
- *Thatched houses were many but they are reducing day by day.*
- *Even in the shops, in the past you would probably find only cooking oil and soap but today, you even find clothes. They have advanced to the extent that today if you go to the shop you can find spaghetti. The inhabitants of this village now use these commodities so this is a sign that even those who were having shops in the past have expanded the range of their commodities because there are consumers.*
- *A significant number of people have now opened bank accounts.*

(Group discussion in Kitwiru during second visit in 2009)

This study would add that such measures constrain farmers from meeting their production goals, both those to be maintained and the newly acquired, all of which have proven to require a stable income. Dependence on subsistence rain-fed farming had already proved unsatisfactory (due to a single production season) as far as improving the farmers' economic well-being is concerned. However, as revealed in chapter four (section 4.5.2.3) the success of dry land cultivation was for many tied to gains from valley bottom farming. Given the requirements for fertiliser and pesticides in dry land production, the deprivation of land in valley bottoms would

translate to poor dry land output, for farmers who used valley bottom farming as a means of complementing dry land production, hence compounding the respective farmers' predicament.

Moreover, the government of Tanzania has been advocating for the development of irrigation farming as a means of delivering the farmers from poverty as well as a means of ensuring food security (Mnzava and Kweka, 2005; Sosovele and Maganga, 2005; URT; 2001). Therefore, such interventions seem to somewhat contradict the national agricultural policy which has placed emphasis on irrigation agriculture as a means of revolutionising agriculture and as a measure for rural poverty alleviation. For example among the actions to be implemented under the logical framework for the Tanzania 'Poverty Reduction Strategy Paper' (PRSP) of 2000 was to "Distribute land suitable for irrigation in favour of the poor." Nevertheless, most policy statements have been made with reference to community managed irrigation schemes, which had not yet been initiated in the study area, hence making the improvement of the existing traditional irrigation system the best next alternative. Mkavidanda and Kaswamila (2001) advocate appropriate agricultural technologies, institutional set up and policies as requirements for enabling vinyungu to contribute significantly and sustainably to poverty alleviation among rural farmers.

While most studies have concentrated on the impacts of vinyungu farming on its immediate environment, this study discovered that the transformation of vinyungu farming towards market orientation, not only proved detrimental to the immediate environment resulting from increased production intensity (coupled with unsustainable production techniques), but also had direct or indirect implications on other environments. For instance, the rapid increase in house construction resulting largely from valley bottom income, had led to accelerated production of baked clay bricks (see photo 5.7). This translates to increased rates of clay extraction leading, in turn, to the removal of surface soil (which would accelerate erosion) and development of massive pits in the respective locations. Padmalal, et al. (2004) conducted a study in Chalakudy Basin, Central Kerala among their objectives one was to assess the environmental problems related to tile and brick clay mining. They observe a long list of problems or impacts related to the practice, some of which were peculiar to their study area. However, they also cite problems that are more or less universal, which also apply to this study, hence requiring attention. They state:

> The major impacts of clay mining on land are changes in landscape, land stability and soil loss. Due to continued and unscientific clay mining, pits of different dimensions would be formed in the affected areas. Some of the pits may later be covered with water to form artificial ponds. On many of the occasions, extensive areas are converted into water logged areas…The

> artificial ponds created in random locations due to indiscriminate clay mining may lead to land stability problems in the adjoining areas. The problem of subsidence will be aggravated in areas where the subsurface geology has sand and clay alternations… There will be marked decline in the aesthetics of the area subjected to clay mining. (Padmalal, et al., 2004: 100)

Photo 5.7: A pile of baked-bricks being dismantled ready for construction.

Source: Author's field work 2009

5.5 Conclusion

There are various implications that have come along with the transformations in the vinyungu crop production system and agriculture in general. The effects of globalisation and neo-liberalism seem to be felt at the village level. Market liberalisation, and infrastructural developments have contributed in exposing a once subsistence economy to be integrated into the market economy. The rise in the cost of living, and the farmers' desire for a ' a modern lifestyle' translated as development, acquired through more flexible interactions with people, places and the direct dissemination of information, resulted in the change of the rural structure with socio-economic differentiation emerging among the farmers. The interactions further gave way to the infiltration of values that did not exist in these rural communities. Although the development of markets and market production has brought about significant benefits to those engaged and beyond, it also brought along with it the gradual disintegration of traditional and customary values of the people. A more egocentric tendency in social relations seemed to be replacing that of reciprocity.

Moreover, the developments made in vinyungu farming contributed to some extent to the modification of the village landscapes. These modifications were observed both within the valleys and in the village settlements in general. The capital gained from vinyungu farming had also given rise to other business investments within the villages which had in turn contributed further to the modification of the rural landscape as well as the villages' economic development as a whole. Some farmers had gradually transformed to business minded producers even if just to complement subsistence. This is to say that the vinyungu production system has proved important in the well being of both individual farmers as well as rural development. However, the acquired benefits seem to be achieved at the cost of the environment which in turn is crucial for sustained production and hence benefits. It would therefore seem logical that efforts made ought not to favour environment over human well-being but rather to seek appropriate mechanisms that will allow both to exist harmoniously. This study has provided evidence on the relevance of information dissemination and learning experiences as a significant way through which farmers' perceptions goals and preferences may be altered given the availability of resources. Tanzania has been applying this means (educating farmers) through people's participation and had to a certain extent, proved successful in those areas where farmers had been reached. For example, efforts of educating vinyungu farmers in Mtitu village by WWF through participatory methods, proved fruitful as some farmers revealed that they were well informed and revealed to the researcher some of the practices they had adopted. At the time of this research, it was only in Mtitu, Kitwiru and Igumbilo villages where farmers mentioned having received some type of directive on how they should produce in the valley bottom with consideration to the environment. The reported directives were predominantly related to allowable distances from water sources.

Furthermore, farmers seem more responsive to information that affects their well-being and therefore any effort aimed at reducing detrimental impacts on the environment, would probably be more successful if it were to focus on providing such information. That is, the type of information that would concentrate more on farming methods that will give more benefits to farmers in terms of income (earnings). The farmers may be more responsive once they are made aware that their benefits and goals (what they value most) are being threatened by their practices, rather than emphasising the impact of their practices on the environment. The latter approach has, over the years, proved to attract contempt for rather than compliance with environmental regulations as demonstrated above. This is also evidenced in a recent study conducted by Mwanukuzi (2010) in Uporoto Mountains South West, Tanzania, which found that accepted and adopted land management methods were those that did not control land

degradation but contributed to livelihood needs because they required little labour and increased crop output per unit of land. Contrariwise, effective degradation controlling methods were ignored because they were incapable of satisfying immediate livelihood needs.

CHAPTER SIX
SUMMARY OF MAJOR FINDINGS AND CONCLUSIONS

6.1 Summary of major findings

Changes in traditional irrigation systems in Tanzania are more often, than not, associated with demographic, climatic, technological and economic changes undergone at any particular period. The aim of this study is to provide an in-depth understanding of changes in the traditional vinyungu farming system from the 1950s to 2005. Central to these changes is the transformation of the traditional subsistence vinyungu farming system towards a market oriented farming system. The study provides this understanding primarily from a farmers' perspective.

The findings suggest that the underlying reasons for farmers' engagement in the vinyungu farming system had been changing with time. Having secured land by means of 'first right'; inheritance; borrowing; or as a gift, the majority of farmers engaged in the vinyungu farming system between 1950s and 1980s for purely subsistence reasons. The engagements were mainly prompted by occasional dry spells and severe droughts coupled with government policies (such as villagisation) and interventions of the mid 1970s. Another reason was that of farmers' miscalculations in dry land production, which resulted in food shortages, making vinyungu farming a temporary solution once the need arose. However, it was only during those two occasions, that most men felt obliged to participate in vinyungu farming, as it was otherwise deemed shameful. This is because the system was, for the most part, identified with women, who traditionally practiced vinyungu farming on very small plots (or vinyungu) to meet daily household vegetable and sometimes green maize needs during the dry season.

Nevertheless, things began to change from the 1990s (particularly mid 90s) whereby the majority of farmers engaging in vinyungu farming were men particularly between the ages of 20 and 45 years, here referred to as the *new generation farmers*. The main reason for their engagement within this period was income generation. The physical environment advantage of availability of moisture or water for irrigation that valley bottoms and floodplains possessed over the dry land and the possibility for multiple productions of fast crops were reasons for engaging in valley bottom production (by this time the status of vinyungu was changing to gardens). Moreover, new fast-non-traditional-crops alongside new production methods particularly input use, such as fertilisers and pesticides were introduced into the valleys and floodplains reflecting the need to earn fast cash (Ponte, 1998). Though the earlier use of hand hoe, machetes and sticks for vinyungu production was for a great part still

maintained, ox-ploughs were introduced in the drier areas of the valleys and floodplains. By 2005, a greater part of the valleys and floodplains were occupied by varying sizes of camber beds (vinyungu/gardens) with natural vegetation scarcely in view. Land, in the valley bottoms and flood plains, had become increasingly obtainable through purchase or hire.

The findings in this study suggest that the changes undergone by the traditional vinyungu farming system are an amalgam of three major influences: Firstly, the study found that some farmers engaged in vinyungu farming as a solution to problems that had arose in their dry land production system or within their households, hence indicating a problem-*solving motivation.* The problems included rainfall unreliability whereby farmers engaged in vinyungu farming as a risk aversion strategy. They produced the same traditional food crops as those in the dry land indicating the complementing role of vinyungu for subsistence needs. These farmers represent the majority who engaged in vinyungu farming between the 1950s and 1980s and only a few in 1990s to 2005. Exhausted soils in the dry land coupled with the inability to purchase the required amounts of inputs, was another problem for which farmers sought solution in cultivating the valley bottoms and floodplains. On the one hand, farmers engaged in vinyungu farming to supplement the low crop output in the dry lands, resulting from lack or insufficient inputs. On the other hand, some engaged in vinyungu for market production as a means of complementing production in the dry land through purchase of inputs. Others participated in market production (usually at a low level) only to meet basic household needs not obtainable through dry land income. These are indicative of those farmers whose main concerns were to ensure sufficient subsistence for their household throughout the year hence taking action in order to *maintain* their goals.

Secondly, it was observed that farmers had been constantly improving their existing goals and obtaining new goals and preferences over time (*goal-directional motivation*). Things that did not seem important in the past (partly contributed by ignorance of their existence or importance) began to appeal to the farmers as they became aware (*information and learning experiences*) through formal and informal channels (*physical and social environments).* For instance, most old generation farmers did not receive formal education. This resulted to their indifference in providing their children with education. This was even more so for the female child. In turn, these children formed the bulk of the middle aged and young farmers who only secured primary school education. Bearing in mind their own unsuccessful experiences in life resulting from their parents' unawareness, these young and middle aged farmers came to appreciate and recognised the importance of secondary education for their own children. Valley bottom production seemed a potential contributor for this need. Young valley bottom

farmers having young children spoke of saving for their children's future education as being among the goals for production. The realisation of this goal has been made possible by government efforts in creating an *enabling environment* through the introduction and collaborative construction (between government and wards) of a secondary school for each ward.

Furthermore, the influence of new-comers and farmers' contact with the world outside their immediate villages such as urban centres (enabled by ease of mobility - such as returning migrants), introduced them to a different world view and lifestyle which they desired and preferred to have. Farmers' began to compare themselves to those they assessed to be 'more developed' compared to themselves. This was evidenced (especially through the *new generation farmers*) in farmers' preferences for modern housing over their traditional mud huts. Furthermore, there was evidence of desire among farmers to have a change in lifestyle including increased preference for consumer goods such as clothing and possession of material wealth. However, the farmers' new goals and preferences came with a price tag and some of these goals and preferences required constant cash flows to meet and maintain a certain standard of living (for example, payment of school fees). With dry land only being able to produce once in a year, coupled with uncertainty of rainfall and input availability and/or affordability (resulting from removal of subsidies), other means of production within the farmers' reach and experience were sought. With market liberalisation having *created an opportunity* for farmers to market their produce, vinyungu farming, through its physical environmental advantages over the dry land, proved to be the best source of income in meeting the *new* and *maintaining* the old *goals and preferences*.

Thirdly, the study found that the new generation farmers had significantly contributed to changes in the traditional vinyungu farming. While the progressive change in the farmers' world view is more in association with the older and partly middle age groups, most young farmers (with some middle aged) or *new generation farmers* had an already established world view which was completely different from that of the older generation. With a different world view from that of the older generation and the social economic environment in which they had been brought up, which now included mobile phone communication, television, and other electronics that were able to convey *information and learning experiences*, their understanding of development was interpreted in terms of financial and material possession. They therefore engaged in vinyungu or valley bottom production having the goal of cash and/or capital in mind, hence making them significantly instrumental in the introduction of marketable crops (especially fast crops) and production methods which would ensure

maximum returns. This, in turn, meant the dismantling of old order (that is traditional subsistence farming) and the creation of a new order of production for the market which was in conformity with the existing social and economic environment.

Notwithstanding, the changes undergone both by the vinyungu production system and by the farmers, being the agents of these changes, did not occur in isolation. Noted in the findings, were some direct and indirect implications of these changes on the farmers' social as well as physical environment. Due to the economic importance and profitability of vinyungu or valley bottom farming, farmers became stratified into: farmers with small, medium, and large vinyungu plot holdings. These strata translated in turn into poor, medium and rich classes of farmers respectively (of course with few exceptions). However, accessibility to capital was observed as an important component in categorizing the three classes. Those with large land holdings, combined with sufficient capital were more market oriented forming the rich class while those with small land holdings coupled with little or no sufficient capital fell into the poor category producing primarily for subsistence. The middle class could be characterised as those having medium or large land holdings with capital sufficient to commit only partially to market production and the rest part to subsistence.

Moreover, with the increased necessity for money, social relations among the villagers were gradually being altered. For example free handouts of farm produce at a neighbour's request, a practice that was customary and considered as a noble gesture prior to the 1950s to the 1990s was quite a rare practice by the year 2005. This was especially so for market producers who regarded their produce as money (something not so simply handed out). Therefore, one was compelled to either buy or produce for one's own consumption.

Another implication was that of the modification of the valley, floodplain, and village landscapes. For instance increased vinyungu production resulted in the clearing of the natural vegetation which originally covered these areas replacing it instead with hundreds of vinyungu plots. Furthermore, income realised from vinyungu farming had contributed to increased construction of brick structures with corrugated roofs for residential and business purposes in place of the traditional thatched mud houses and thus modifying the traditional village landscape.

Although vinyungu farming has proved profitable to those engaged and beyond, the practice is considered unsustainable due to poor production methods which threaten the environment, hence having attracted the attention of environmentalists who, in turn, have imposed some restrictive regulations to the practice. Among others, much emphasis has been laid on water

management issues as well as the threat of water pollution due to application of inputs such as fertilisers and pesticides which are often times, as observed in this study, inappropriately applied. Other concerns have included river bank erosion and siltation. Nevertheless, this study found that the farming system did not only pose dangers to its immediate environment, rather beyond. One observation is that the cash income gained from vinyungu had been contributing significantly in 'modern' house construction which requires increased amounts of burnt clay bricks, in turn posing environmental concerns for the areas where this clay mining was being conducted.

6.2 Conclusions

This study's central question in regard to changes in vinyungu farming was 'Why did these changes occur and how did they occur?' To answer this question, an in-depth understanding of this phenomenon was required, of which this study aimed to provide through a farmers' perspective. The farmers' changing goals and preferences over time and across generations were postulated as having a significant role in influencing changes in the traditional vinyungu farming system. The summary above provides evidence on the role of farmers' changing goals and preferences over time and across generations, hence drawing the following conclusions:

The findings have strongly suggested that the farmers' transformations over time and across generations are a significant driver of the land use changes experienced within the valley bottoms in the study area. Apart from assisting in diffusing of innovation, access to information enabled through both formal and informal channels had played a significant role in the farmers' change in perception, goals and preferences.

The farmers' changing goals, both induced and self realised needs, desires and preferences over time and across generations (although not the only components) have proved to be significant contributors in the farmers' decisions to engage in market production. This has subsequently led to the alteration and /or complete change in their agricultural land use practices in the valleys and floodplains within the study area. Although technological change is generally considered to be among the most effective driver of land use change, the findings show that whatsoever new or 'advanced' technologies adopted by the few farmers in the study area, with specific reference to implements, were at a relatively rudimentary level. The hand hoe still seemed to be the dominant production tool in the area. Farmers had instead, demonstrated their ability in organising and utilizing inexpensive alternatives, in place of unaffordable technologies, to realise their goals even though some would require more time

and/or effort. It is for the most part, the awareness (obtained through new *learning experiences*) and the desires of the individual farmers to change their way of life that have worked as motivating forces for change. Hence, affirming a common saying in Swahili 'penye nia pana njia' being translated, 'where there is a will[1], there is a way'.

Moreover, the findings indicate that the farmers are not static over time and across generations. As the social economic and physical environment around them change, their influence are not in dictating a definite robotic, or uniform reaction, as commonly suggested. It is not simply a question of cause and consequence /effect. Rather the socio-economic and physical environmental changes call for the farmers, as rational beings, to absorb and translate how the changes affect them as individuals, households or as a community (where the changes require collective efforts), which in turn guides their actions.

Contrary to Hyden's suggestion of an uncaptured peasant society back in 1980, it would seem that the Tanzanian farmers / peasants are gradually if not rapidly being sucked in, and yielding to the pressures of globalisation and neo-liberalism through the instrument of Structural Adjustment Programs (SAPs). Individualism seems to be taking the place of reciprocity or in Hyden's expression "the economy of affection'.

6.3 Recommendations for further research

This study applied a purely qualitative approach as the aim was to understand changes from the famers' own perspectives and presentations on changes undergone. Although it has produced some significant insights on the farmers' role in agricultural change within the study area, a mixed method approach (including quantitative methods) may provide essential information for generalisation.

The frontier of knowledge on land use and particularly land use changes in Tanzania can be extended by analysing the farmers' decision environments on a broader scale. It may be necessary to establish the variety of different stimuli which induce awareness in farmers (and other resource users) to act as they do at any given period and under different conditions or circumstances. An understanding of resource users from their various decision environments (that is from their own perspective) can inform both intellectuals and managers on the effects and/or effectiveness of specific aspects, within the agricultural and environmental policies, in producing the necessary stimuli to induce desired responses.

[1] The Cambridge dictionary defines '*will*' "as the mental power to control and direct your thoughts and actions or a determination to do something, despite any difficulties or opposition."

6.4 Limitations of the study

While the attempt to explain land use changes (agricultural or environmental) from the perspective of the individual farmers' decision making environment can be generally applied to other cases, the approach restricts some level of generalisations outside the vinyungu production system.

The individualistic approach (though provides some level of insights) does not allow for a deeper understanding of underlying social structures that may have some level of influence on the changes undergone.

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APPENDIXES

Appendix 1: Decision making under market production

An immigrant, partially market oriented farmer's narrative

I moved from Ilula to Nyololo in search of land in valley bottoms where I could Practice valley bottom farming, because where I come from, is dryer than here. When I first moved inn, 12 years ago, I started with 0.25 of an acre. I was growing Tomatoes. Now I have a total of five acres. I bought the land from a native.

In the past, I grew tomatoes, cabbage and other vegetables. Than I realised that these were not of much profit (financially). I am growing green maize and some tomatoes. What I grow depends on the market demand. I get the information from traders who come in search of certain produce. What the traders search for is what I grow, when they change I also change.

First of all the weather conditions are what help us to determine what would grow best in any particular season.

The decision on whether to sell green or dry maize depends on which of them is more profitable in the sense that, it will cover the costs of production and I will remain with a profit that will enable me to pay for such things as school fees etc.

Normally I divide my farm into two, whereby one portion is for subsistence and the other is for cash. For example, I may decide to use two acres for food and three acres for cash. The crop may be of the same type e.g. maize, but with different purposes ***depending on my goal****.* (Between 55 and 60 years old male – Nyololo village)

Appendix 2 : Photo illustrations

The Little Ruaha River

A traditional mud house

Vegetables harvested for market, put inside a tenga (traditional bascket)

A shop with vinyungu produce outside in 2005

Vihenge (Kihenge – singular)

Traditional storage facilities for maize

An ox-cart facilitates the transportation of farm inputs and carrying of farm produce to farmer's residence

Livestock for income earning and manure

Appendix 3: Secondary education in Iringa Region

Transition to secondary education:

A total of 22, 765 pupils in the region were examined for secondary education in 1996. This figure increased to 26,995 in 1999 and further to 33,011 in 2003 but declined to 30,182 in 2005. Between 1996 and 2003 the increase was 6,016 pupils or 22 percent. Between 1996 and 2003 the number of examinees selected in the region to join form I in public secondary schools also increased from 1,260 to 6,661; an increase of some 429 percent. At the same time the proportion of selectees among examinees increased from 5.5 percent in 1996 to 10.5 percent in 1999 to 20.2 percent in 2003 for the region. All districts reflected these trends at varying rates.

Between 2003 and 2005 the number of selectees increased from 6,661 to 14,461, which was an increase of 7,800 pupils or 117 percent. This increase in the number of selectees in 2005 boosted the proportion of selectees among examinees from 20.2 percent to 47.0. See Table 4.77.

Table 4.77: pupils examined and pupils selected for Form I in public secondary schools, by district, Iringa region, 1995,1999, 2003 and 2005.

District	Number examined				Numbers selected			
	1996	1999	2003	2005	1996	1999	2003	2005
Iringa (R)	7, 193	8,089	9,526	7,990	273	333	524	3,830
kilolo	**	**	**	**	**	**	**	**
Makete	2,161	2,530	2,515	2,638	139	334	640	1,004
Mufindi	4,500	5,718	6,482	6,128	266	1,290	1,869	3,136
Njombe	6,789	7,869	8,878	8,346	375	544	2,271	4,218
Ludewa	2,122	2,789	3,265	3,390	207	330	696	1,531
Iringa (U)	2,031	2,022	2,345	2,245	296	374	661	742
Total	**22,765**	**26,995**	**33,011**	**30,737**	**1,260**	**2,831**	**6,661**	**14,461**

Contd.

District	% selected			
	1996	1999	2003	2005
Iringa(R)	3.8	4.1	5.5	48
kilolo	**	**	**	**
Makete	6	13	25	38
Mufindi	6	23	29	51
Njombe	6	7	26	51
Ludewa	10	18	28	45
Iringa(U)	15	18	28	33
Total	**5.5**	**10.5**	**20.2**	**47.0**

** included under Iringa Rural
Source: The Regional Commissioner's Office, Iringa, 2006

Source: Extracted from URT (2007:214-215)

Appendix 4: Goals and values in farming : Gassons' framework

The following list represents dominant values likely to be associated with the farming occupation. For convenience these values are classified under four headings but it is not claimed that either the scheme of classification or the contents of the list are exhaustive.

- *An Instrumental* orientation implies that farming is viewed as a means of obtaining income and security, in pleasant working conditions.
- *Social* orientation are farming is carried out for the sake of interpersonal relationships in work.
- *Expressive* values suggest farming is valued as a means of self-expression or personal fulfilment.
- *Intrinsic orientation* means farming is valued as an activity in its own right.

Intrinsic
Independence
Doing the work you like
Leading a healthy, outdoor life
Purposeful activity, value in hard work
Control in a variety of solutions

Expressive
Meeting a challenge
Being creative
Pride of ownership
Self-respect for doing a worthwhile job
Exercising special abilities and aptitudes

Instrumental
Making maximum income
Making a satisfactory income
Safeguarding income for the future
Expanding the business
Being able to arrange hours of work

Social
Belonging to the farming community
Gaining recognition, prestige as a farmer
Continuing the family tradition
Earning respect of workers
Working close to family and home

Source: Gasson (1973) p.527

Appendix 5: Interviews

Interview guideline

4.1 Themes for preliminary field research

The general group discussions

Vinyungu farming

1. Land ownership in the valley bottoms/ floodplains and the dry land.

- Role of village government in land distribution in the valley bottoms / floodplains.
- Size of plots in valley bottoms / floodplains.

2. Crops types - past and present.
3. Definition of '*vinyungu*'
4. production techniques
5. Dry land production vs. vinyungu farming.

Changes

6. Changes in vinyungu farming.
7. Major reasons causing change in vinyungu farming form 1950s.

Decision making

8. Decision making on agricultural issues in the household.
9. Resources involved in the farmer's decision making.
10. Farmers' access to information about innovations and market conditions

Interviews with individual farmers

(Additional questions asked apart or related to some of the above)

1. Reasons for practicing what one is practicing in terms of:
    - Location
    - Purpose of production
    - Size of plot(s)
    - Type and varieties of crops grown
    - Methods of production
    - Labour etc.
2. What the individual farmer takes into consideration when making choices on the above list (in1st question).
3. Changes made by individual farmers' over time. The period(s) in which changes were made, and the reasons for making the changes.

4.2 In-depth individual interview guide for the main field research

Interview themes

1. Respondent's personal data

- Name
- Age
- Village name
- Residence status (indigenous / immigrant) if immigrant, time and reasons for movement into the respective village.
- Level of education
- Marital status
- Number of Children and/dependants
- Occupation(s) other than agriculture

2. **Farmers' engagement in traditional vinyungu farming system (from 1950s to 2005)**

a) Farmers' production decisions – at the time of engagement.

- Year engaged in vinyungu farming (and in the dry land for comparison) and reasons for engagement
- Land acquisition, ownership and / or accessibility and land size
- Crop type in valley bottom [in comparison to dry land] reason(s) for crop choice.
- Production methods/ techniques
- Scale of production
- Goal of production

3. Changes in the traditional vinyungu farming system and reasons

a) Personal changes made by individual farmers' (respondent) in vinyungu farming over time and reasons for the changes.

b) Changes in vinyungu farming as observed by individual farmers, over time and the farmers' descriptions and their assessments of the changes with regard to:

- Characteristics of producers /farmers
- Transition toward market production
- Land acquisition, ownership and / or accessibility and size
- Crop type in valley bottom
- Production methods/ techniques
- Scale of production
- Goal(s) of production
- The physical environment in valley bottom / flood plain

4. Farmers' decisions under market production

a) **Source of and accessibility to information on**:
[At the time of engagement and at present**]**

- Agricultural inputs
- Agricultural methods / techniques
- Market availability and market prices for agricultural produce and inputs.

b) **Resource accessibility and availability**

c) **Farmers' response towards market conditions.**

5. Implications of changes in the traditional vinyungu farming system.

4.3 Guidelines for follow-up

Progress in vinyungu /Garden production from 2005

- Developments since 2OO5
- Main producers (between male and female)
- Common crops in valley bottoms
- Land issues - land acquisition & accessibility

Evident outcomes of vinyungu production in the village(s).

- Marked differences among vinyungu farmers .
- Difference between vinyungu farmers and non-vinyungu.
- Developments in the villages resulting from vinyungu farming.
- Current trends in migration

Environmental issue

- Directives on conservation
- Implications of the directives to farmers' livelihood, land ownership etc.
- Environmental status of valley bottoms / flood plains

DECLARATION

I hereby certify that I have written this thesis without any unauthorized assistance. No other sources than those stated in the list of references were used. All quotations from and references to other texts are appropriately cited.

Elizabeth B. Palela

Bremen, January 20th 2011