Pellish, Harry
rawganik@hotmail.com

Supervisor
Isendahl, Christian
christian.isendahl@humecol.lu.se

Agricultural Change: A Grass-Roots Case Study (Kenya)

Abstract

Between the influence of multinational organizations and grass-roots culture, is agriculture as a reality. A case study of grass-roots agriculture (the developing world smallholder), through survey, interview, and participatory research, is developed to include the major external influence as indicated by rural, smallholding farmers of Kenya – the market. Multiple methods are utilized in the case study to discuss global agriculture reform within the context of development.

This paper has three primary aims:

(1) Examine and evaluate the most significant external forces on small scale farming in developing countries using Kenya as a case study.
(2) Identify the needs of grassroots from several points of view: students, farmers, farm organizations, and local development NGOs.
(3) Examine the opportunities and constraints of small these farmers, in the framework of WB and WTO policy, to meet the needs of sustainable agriculture.

In this paper, several areas of agricultural practice in Kenya are compared and contrasted to identify the constraints and opportunities of the case and to draw some general conclusions of how these pertain to developing world smallholders. Comparing agriculture in various settings of Kenya and, further, comparing the goals of that culture with that of international policy is the focus of the paper. The methods of this investigation include:

(1) Qualitative case study of Kenya as a grassroots agricultural community.
(2) Comparative social science between cases within Kenya and between grassroots needs and international agenda.
(3) Participatory research in a cross-sectional and longitudinal manner.

Informants include students (university and vocational), demonstration farms of varied topology, smallholders in three communities, two local farming organizations, and five local development NGOs. This cross-sectional comparison of perspectives and circumstances represents a multi-scale approach, and allows analysis and prediction of reform through the projection of grass-roots needs and global agriculture, onto the canvas of development. Longitudinal studies, as well, are represented by multiple interviews with single subjects. Through projecting Netting's model of smallholder production (1993) and neo-Boserupian theory of agricultural intensification (Stone, 2001) onto empirical evidence, generalizations are made to describe the opportunities and constraints of global agricultural development.

Table of contents

Acknowledgments

Although this may more technically fall under the auspices of methodology, I would like to give thanks to and emphasize the importance of personal correspondence. With several classmates, under various circumstances, I have discussed my thesis (sometimes reciting entire paragraphs from memory) in order to ascertain logical, empirical, and inclusive credential. The students of LUMES 2003 have certainly been integral in the formation, evaluation and presentation of my thesis.

The Kenya Institute of Organic Farming (KIOF) provided more than I expected on site and provided opportunities outside the organization for, again, much more learning (and perhaps even understanding) than I thought possible in just six weeks. Thanks to everyone at KIOF for an incredible experience.

I also thank Jacky Tyrie, a social science and international development student with the University of Wales in Swansea, for creating and collecting the surveys and help with organizing, as well as lending perspective during, field research.

To all the small farmers who made this possible, you are not forgotten.

Introduction

Between the influence of multinational organizations and grass-roots culture is agriculture as a reality. The factors examined therein are illustrated in Fig. 1. A case study of grass-roots agriculture (the developing world smallholder), through survey, interview, and participatory research, is developed to include the major external influence as indicated by rural, smallholding farmers of Kenya – the market. To consider the internal factors of a case study in isolation would be superficial; thus, international organizations and policies represent the major (if not most) extensive external market influence. Given the divide between international policy and the needs of small farmers presented, Netting's theory of agricultural development (1993) and Boserup's theory of agricultural intensification (1965) is compared with the dominant development practice (based upon economy and technology) in attempt to bridge the rift between theory and action present in agriculture reform. End-of-pipe and technological solutions to environmental problems result from comparative advantage and short-term planning (Van Mansvelt et al, 1998:210). This paper utilizes multiple methods to discuss global agriculture reform within the context of development.

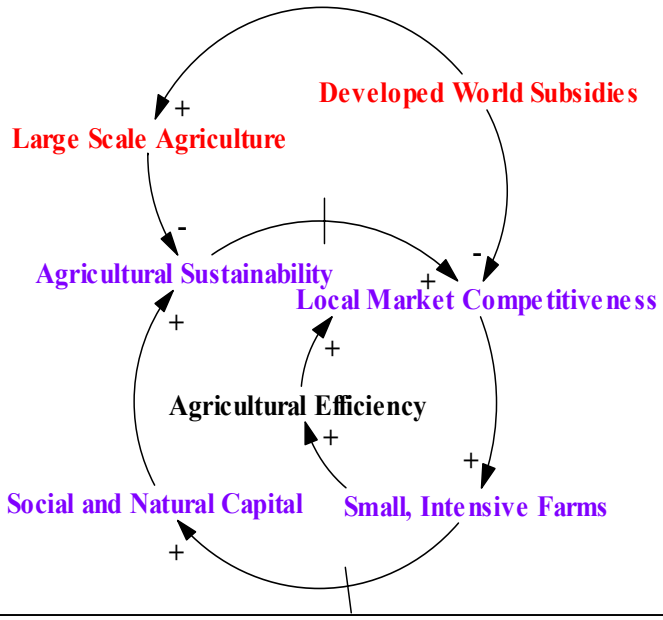

Figure 1: Casual loop diagram depicting factors of global agriculture reform.

> An ecological approach rests firmly on the empirical description of functionally related factors in a particular living community, it places these variables in the context of an inclusive political-economy, and it seeks to achieve valid generalizations through controlled comparison, cross-sectional analysis of groups in a relatively homogeneous area, and longitudinal studies of change through time (Netting, 1986:98).

This paper has three primary aims:

(4) Examine and evaluate the most significant external forces on small scale farming in developing countries using Kenya as a case study.

(5) Identify the needs of grassroots from several points of view: students, farmers, farm organizations, and local development NGOs.

(6) Examine the opportunities and constraints of small these farmers, in the framework of WB and WTO policy, to meet the needs of sustainable agriculture.

International policy does not currently serve the needs of small farmers (particularly in developing countries), as exemplified by this year's WTO conference in Mexico. The World Trade Organization regulates agricultural subsidy to the great advantage of developed countries. The meeting (September 10th to 14th) was a follow up of the Doha Convention regarding subsidy reform and ended without progress. The US (Sumner, 2003) and EU (Poonyth et al, 2000) subsidy reforms have not yet met (and even counteract) the needs of the international community. As such, the failure of this international trade and economic organization to meet the needs of the rural smallholder is a result of the existing expectation of agricultural development based on technological advancement as opposed to internal intensification resulting from land scarcity and population density. The conventional concept and practice of agricultural development (large-scale export production) is a top-down approach to reform. If an alternative concept of development (intensification, or local) were pervading, or even prevalent, the international community might better serve the rural smallholder.

In this paper, several areas of agricultural practice in Kenya are compared and contrasted to identify the constraints and opportunities of the case and to draw some general conclusions of how these pertain to developing world smallholders. Comparing agriculture in various settings of Kenya and, further, comparing the goals of that culture with that of international policy is the focus of the paper. The methods of this investigation include:

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Definitions

Development

This paper refers to development not only in the sense of westernization and industrialization, but regarding an increase in ecological and social living standard. According to smallholder and intensification agricultural theories, instead of expecting farming to evolve in an area according to the available technology, farms can be expected to evolve according to population pressure (Netting, 1993). Whether slash and burn in the rainforest, pasturing or long fallow in semi-arid savannas, or tractors and synthetics in the open plains of the US, sparse population allows large-scale land use. As population densities increase the pressure on the land for production, intensification becomes a necessary means of meeting basic needs. The intensive cultivation of small plots of land is efficiently achieved in a household unit of production, where hands-on and habitat sensitive learning can produce high quality labor. Additionally, personal interest in the work (as being fed directly by it) provides motivation not present in wage labor. Thus, Netting argues that intensive family farms, interacting with the local (and even international) markets, are the most developed form of agriculture in a population driven evolution. Even where technology is available; it is sometimes inappropriate due to the circumstances of production requiring highly skilled labor as opposed to monoculture machinery (Netting, 1993). Of course, there are those who would argue that technology is the primary factor in farm evolution, but social and ecologic factors must play into any dynamic system analysis of agriculture. Agriculture should not be part of the developed and developing paradigm due to the lack of a clear and long-term superior, or developed, method of production. Nonetheless, international generalizations and comparisons require the use of this, and other, archaic terms.

Sustainable

Within the context of this paper, sustainable is a term used to describe not only a strict interpretation of what is sustainable, but also refers to the various improvements in conventional agriculture that often come piecemeal to an evolving system. Thus, sustainable agriculture, while not always embodying all of the concerns regarding externalities, is a term used to describe healthy, or healthier, agriculture in a rather loose sense.

Organic

The term, as used in this paper, does not only refer to certified farms. When referring to organic agriculture herein, this is to include small private kitchen gardens that are maintained via primarily organic methods. In some of the farm's market production acreage, synthetic nitrogen may be applied. In the subsistence production section of the farm, it may be used in miniscule amounts (generally acquired from a cash monoculture elsewhere on the property), if at all. With one exception (the Mango farmers of Marangua), the small farms observed did not use synthetic biocides (due to economic costs being prohibitive). Organic agriculture is an extensive toolbox towards sustainability, and most farmers employed some of the techniques. To define it strictly is not the object of this paper. To do so would be to ignore uncertified land that does not contribute to Kenya's .002% of land that is that is considered organic by the UN (FAO, 2003). Farms that are converting to organic production or are awaiting certification are referred to as transitional. A system that integrates conventional and organic practices is referred to as integrated pest management (IPM).

Limitations

Perspective

A noteworthy limitation of this paper is the perspective of the author. Being from the US and receiving an undergraduate degree at Florida International University, the author must rely on a largely US-focused base of pre-thesis knowledge. This results in focusing on international institutions largely dominated by US trade policy (the WB and WTO), as opposed using the United Nations (UN). This choice of organizations to represent international policy bears heavily on the paper, as choosing to UN to represent policy would certainly have resulted in a conclusion that policy is in accord with the needs and constraints of smallholders.

Experience

Despite a previous lack of such experience, the majority of field research was rural. In preparation I read Chambers' "Rural Development: Putting the Last First" (and parts of other methodology texts) prior to beginning field work.

Communication

English was not the mother tongue of my informants; interviews, the survey, participatory conversation, and visits with local farmers were restricted by language. Whether this was specific adjectives, or general confusion, it has limited the clarity of information gathered.

Methodology

The using of case study methodology results in limiting the empirical considerations and producing data that is useful in making generalizations (Ragin, 1992:220). Thus, the data is reduced to most relevant factors. This has resulted in the limiting of ecologic data presentation in the paper. Although such data was gathered, it was not vitally relevant to the study. The anthropologic focus is also partly due to time considerations as "some data must be long term in order to be meaningful: for example, the frequency and severity of drought and its affect on flora and fauna are of crucial importance in determining the risks and advantages of hunting, herding, or farming in a particular area" (Netting, 1986:86). Thus, the anthropologic data, as opposed to the ecologic data, was most useful to this short-term study.

Case-oriented research is also subject to criticism because of the use of small groups of people to make broad generalizations (Ragin, 1987:ix). I have attempted to reduce this risk through careful review and implementation of various pre and post analysis methodology. The various methods provide a more inclusive base of data.

Methodology, Methods, and Materials

Netting lists four factors which have limited the impact of ecological research by anthropologists:

> (1) Distant past and remote locations of study, (2) studies are treated as isolated from powerful outside forces, (3) an emphasis on socio-cultural forms, and (4) time length of study. (1986:92)

The first and last limitations are set by the investigation, current developing world agriculture, and time was limited. The third limitation was unavoidable due to the real world applicability of ecology, specific to eastern equatorial Africa, vs. that of anthropology, specific to ecological/social movement in agriculture. The second limitation, however, must be addressed directly. To treat the case in isolation would be insufficient, and there is both time and space to reduce this bias. This is possible by looking at the most significant outside forces acting on the case: international trade and agriculture organizations.

Literature review provided data regarding the WTO, WB and basic agriculture. Chambers' book "Rural Development: Putting the Last First" provided guidance for field research. Field research provided a case and recognition of external causation. A theory (smallholder intensification) for projection onto the empirical evidence gathered is provided by Netting (1993). The resulting analysis provides generalizations, made in discussion.

In the interest of providing a most varied, and thus stable (or robust) account of agriculture in Kenya, various methods are utilized in this investigation. Through the use of these multiple methodologies, some of the "black box" inherent to a case study might be perceived. Within the case study, several research methods are utilized, including: comparative social science, participatory, survey, and literature review. This has prevented the dogmatic pursuit of a single pre-established regime of data collection, analysis, and presentation and allowed a less discretely structured and more holistic view of the topics investigated. The comparative method was explored to describe the variability of agricultural methods appropriate through the central highlands of Kenya. This method also serves to describe the more general properties of agricultural options being utilized in the country. Although narrowing the case study (geographically) might have been possible, a regional study was both narrow and broad enough to comprehend and appreciate agricultural considerations of the developing world. So that the paper may not fall into obscurity, lack relevance to the average reader, and fail to be inclusive, a global perspective is presented with regard to the impacts of multinational policy on small farmers in Kenya. As the smallholding farmer of the developing world represents grass-roots efforts, the paper integrates global context and grass-roots participatory research.

The research conducted is arranged from top to bottom and from theoretical to practical. International organizations and local NGOs are considered first (for top to bottom structure) as they bear considerable outside influence over the actions and opportunities of smallholders. Structure from theory to application is achieved through first presenting perspectives from students, then demonstration farms, and moving eventually to actual farms and farmers' organizations.

Why field research?

Previous field work in this area of Kenya includes social data such as Hamilton's "Goodbye to Hunger!: The Adoption, Diffusion and Impact of Conservation Farming Practices in Rural Kenya" (1997) and ecological data such as Diop's (et al) "On-Farm Agro-Economic Comparison of Organic and Conventional Techniques in High and Medium Potential Areas of Kenya" (1998). These works

set foundational considerations for agriculture development and compared organic and conventional techniques from a very technical level, respectively. However, gathering current information on sustainable farming in Kenya is not a simple task. While journals and books are capable of providing information, that data is likely not entirely up to date. After research has been gathered and analyzed, it may be months before publishing, resulting in logistical lag. Organic and intensive farming (as modern techniques) include a continually evolving set of tools, appropriate to climate, topology, and other conditions. Thus, information direct from smallholding Kenyans seemed most applicable to the questions at hand regarding current opportunities and constraints of grass roots agriculture. Interviews were conducted; the informants were asked specific questions as well as open-ended questions so as to present facts, opportunities, constraints, concerns and opinions. Specific questions regarded: agro-techniques, labor components, community interaction, conventional and organic techniques used, marketing, species and product distribution (ecologically, on the farm, and economically, through the market), and the economics of sustainable production. People were interviewed from several groups, so as to provide a more complete representation of agricultural possibilities. The groups include: agricultural students, farmers, farming and community organizations, and non-government officials. Through discussions and empirical observation, a grass-roots perspective of agricultural change was established. Further, participatory research provided many opportunities for informal conversation, interaction, and mutual learning. This direct gathering of information served to supplement literature in providing a *current* assessment of opportunities and constraints. Field research (July 27th through September 15th) was conducted from and at the Kenya Institute of Organic Farming (KIOF).[1]

Global Influence

The extensive global interaction of agricultural production bears considerably on the state of agriculture within the case study of Kenya. While a global, geographic multi-sited analysis (to include a developed country) is too space consuming for consideration in this study, the multi-sitedness of agricultural reform cannot be ignored. This paper is multi-sited geographically from the perspective of agricultural data collected from various locations within Kenya. It is multi-sited ethnographically as Kenyans are not experiencing agricultural trends alone. In the developed world, communities are turning to local sustainable food, produced via intensive means (Stagl, 2002). Although Kenya represents a case within the developing country label, to assume that simple locality is inclusive enough for data examination is naïve (Brosius, 2002; 168). Thus, international policy is included within the case. "Indeed, political and economic forces not under local control, such as homesteading laws and the price of wheat, may be more important factors in the ecology of modern, specialized cash farming than the vagaries of rainfall" (Netting, 1986:90). Smallholders interact with the market to some extent, producing cash crops on a portion of the farm (Netting, 1993). By community, local and global markets, farmers experience off-farm influence despite attempting to remain materially (in the case of sustainable farming) on-farm. Examining the respective agendas, through literature review and first hand observation, as they coincide and differ, serves to illustrate the current opportunity for agricultural change.

[1] Information regarding the KIOF grassroots effort to educate smallholding farmers is available from the UN at (http://www.un.org/esa/sustdev/mgroups/success/SARD-24.htm).

Kenyan Smallholders

Social Inquiry

It was important to consider, before research began, the difficulties with observation selection, bias (incorrect estimates and uncertainty), and inefficiency (King et al, 1994:150). Other aspects to consider included the omission of variables (an inevitable outcome), influence of semantics, elimination of variables through the use of categories, and subjectivity (King, 1994:152-3). These risks were reduced through the use of various method tools and subject groups.

Several areas of Kenya are compared and contrasted in establishing the constraints and opportunities of developing world smallholders. Comparing agriculture in various settings of Kenya and (further) comparing goals of that culture with the international agenda is the focus of the paper. This social investigation, however, does not result in a purely statistical analysis. "Comparison in the qualitative tradition thus involves comparing configurations – as combinations of characteristics. This holism contradicts the radically analytic approach of most quantitative work" (Ragin, 1987:3). Thus, the results of social inquiry are often presented in qualitative, text form. Additionally, quantitative empirical evidence, statistically analyzed, allows for greater certainty in the deductions arrived at.

Participatory research

Participatory research allowed for a more direct understanding of the subjects examined and provided opportunity to contribute to local efforts. "Anthropology engages environmental justice in crucial ways: in the production and distribution of information and in the creation and facilitation of arenas where information is disseminated, ideas exchanged, problems defined, decisions, and solutions achieved" (Johnston, 2002; 147). This "arena", as described by Johnston, can exist beyond the classroom, university, and internet. Participatory research places the anthropologist into a local arena, where opportunities and constraints are readily apparent.

This research method contributed to an understanding of the perspectives of vocational students, landless laborers, farmers, and non-governmental organizations. In building a case with in-depth interviews and participatory research, time restrictions lead to small-*N* research (Harper, 1992). Participatory research of note includes a lecture given to vocational students, preparing vegetable beds, digging a trench for a water line, constructing shade for a water storage reservoir, cooking at the institute, and discussions with the director

Multi-disciplinary Approach

Ecology and anthropology are often (and certainly in the case of agriculture) inseparable. This is because of the dynamic nature of humans and the environment. As such, a multidisciplinary approach is necessary in this investigation. "To do this, anthropologists must learn some new skills and call on other sciences for expert help. We must share an endeavor that radically transcends disciplinary boundaries" (Netting, 1986:103). The interdisiplinary nature of this study arises from a desire to research, analyze, and report on agriculture, which cannot possibly be addressed via a single science. Netting describes this quest: Ecology in anthropology has only begun to realize its potential, and already presents opportunities to avoid dogmas and widen the perspectives of modern science (Netting, 1986:102). For instance, the complicated interaction of ecology and local

economic participation results in the necessity for a greater understanding regarding the interaction of ecology, anthropology, economics, and politics (Dove, 2002: 92). This understanding may be reached at the expense of more refined and specific knowledge of a particular discipline; however, overall field research efficiency can be increased through the inclusion of various disciplines and methodologies. It seems improbable that a modern study could be satisfactorily logical without the inclusion of multiple disciplines and the transdisiplinary interactions therein.

NGO Perspectives

The information gathered from various organizations was vital to a comprehensive understanding of the state of agriculture in Kenya. Conventional units of research (individuals) often lead to assumptions that these individuals can provide an understanding of larger, aggregate groups (Ragin, 1992:219). To avoid allowing purely individual accounts to stand for a group's properties, data was gathered from groups as well, of various perspectives. By interviewing farm and non-governmental organizations, the perspective of Kenyan smallholders is built not only on individual accounts, but also upon the properties of larger, aggregate groups.

KIOF is a grassroots education initiative. Other NGOs investigated are local offices of regional and international organizations. KIOF served as the primary NGO in the investigation, as it provided a home-base at and from which to conduct field research. Two NGOs, the Sustainable Agriculture Community Development Programme (SACDEP), in Thika, and the Association of Better Land Husbandry[2] (ABLH), in Nairobi, were interviewed in a formal manner, with an hour or more of discussion with the director regarding information about various concerns of the organization. Questions were asked from a prepared format, and supplemented with ad-hoc questions. Immediately after the interviews, data was recorded and notes taken during the interview provided additional information.

The goal of SACDEP is empowerment through education and raising awareness of the possibilities. This is accomplished through alternative production, reduce external inputs, and encourage diversification, conservation, and packaging (e.g. mango juice). It employs extension workers in seven districts of the central region. In the central region, according to SACDEP, fifty percent of the population has adequate food and struggles with the market while the other half lacks food during some portion of the year. Each of the organization's projects has thirty core farmers. Extension workers do preliminary research in their areas to determine the cases that will benefit most and avoid a 'train and visit' approach. Instead, the workers spend six months to three years on location. it is sponsored by donors but also has income generating activities: workshops, conferences, and the hiring out of staff. It, therefore, would not collapse completely if donor funding was lost.

ABLH does not deal solely with smallholders. Further, this organization is not centered on organic production, though it assists with certification. The institute promotes integrated pest management (IPM). When community organization was not profitable due to the consolidated (or large-scale) state of the farm, certification for the global market is made available.

SACDEP and KIOF[3] are members of The PELUM (Participatory Ecological Land-Use Management) Association.[4] Additionally, KIOF is a member of IFOAM (International Federation of Organic Agriculture Movements).[5]

[2] www.landhusbandry.cwc.net/abkenya.htm
[3] A brief account KIOF is available on the net at http://www.idrc.ca/adventure/organic.html

An NGO agent with Mellemfolkeligt Samvirke[6] (MS), a Danish NGO, was attached to KIOF and active in coordinating and gathering information with demonstration farms. Research included various farm visits, and there was considerable interview time.

On several occasions, an extension agent working with the International Centre of Insect Physiology and Ecology[7] (ICIPE) and integrated pest management (IPM) was interviewed. This provided a base of information that was not entirely focused on organic production.

Kenyan Perspectives

Student Perspectives

Vocational Student Interviews

These students undergo a course consisting of one year of lectures and five months of attachment (or internship) with a farm. There were several students (22 of which were interviewed) that had recently returned from the five month attachment to farms throughout central and western Kenya. These interviews covered a range of concerns. Specific questions asked were: name and location of the farm, which crops are grown for the market and which for subsistence, did the farm provide training, was it organic or otherwise, what the strengths of the farm were, and what the weaknesses were. The type of farm (conventional, IPM, transition, and organic), variety of production, and subsistence vs. export market production was compiled with the opportunities and constraints, as observed by a student. The students were interviewed individually for the most part, to allow the presentation of personal opinions without too much prompting by other students. This provided a broad base of comments and concerns. These interviews provided perspective from various farm income levels, cultures, and locations and developed a more complete representation of vocational student knowledge and concern. Additionally, the geographic variability (see Fig. 2, below) provided more diverse data regarding the state of Kenyan agriculture.

Vocational and University Student Survey

This survey was conducted on several occasions. The survey was first given to vocational students. A couple of weeks later, an opportunity came to give this questionnaire to a class of university students (at Jomo Kenyatta University of Agriculture and Technology[8], Juja Town). Through comparison and contrast, these two surveys (of 21 and 10 people, respectively) provided some insight to the concerns of students with regard to agriculture. Specific questions were quantified statistically. Quantifying the open ended questions was difficult, but most concerns were repeated by a few students and could be aggregated via categories. While the representation of the survey is incomplete due to the inability to include all comments and factors mentioned by students, it is comprehensive enough to provide a basis for understanding the perspectives of two slightly varying groups of students.

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[4] www.pelum.org
[5] www.ifoam.org
[6] www.kenya.ms.dk
[7] www.icipe.org
[8] www.jkuat.ac.ke

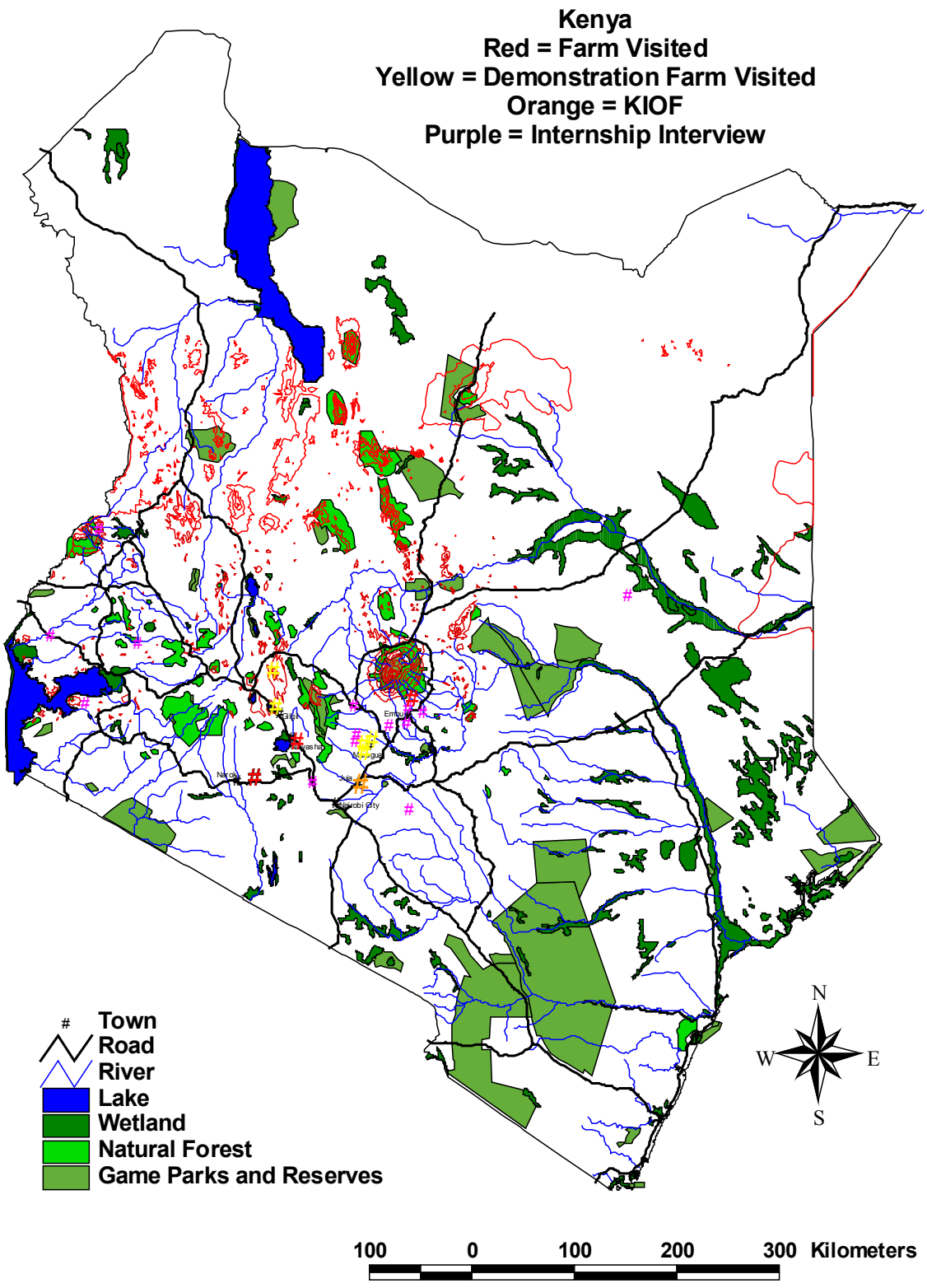


Figure 2: **Map of Kenya illustrating the location and method of data gathering.**

University Student Interview

After over twenty interviews with vocational students, it seemed proper to diversify techniques and do a single, in-depth interview to supplement the university student perspective. Fortunately, a student from Jomo Kenyatta University of Agriculture and Technology was available for several interviews. The student is graduating from Jomo Kenyatta University this year, and has extensively studied agriculture. Because the University was near to KIOF, we were able to have considerable dialogue regarding the future of agriculture in Kenya. It was interesting to note the change in his critique of genetically modified (GM) crops as our interviews continued. In our first interview, the informant was certain that GM crop production would answer Kenya's agricultural woes. In later interviews, the informant had begun investigating the possible risks of GM crop production. The informant's early bias regarding biotechnology and subsequent interest in risks was representative of the formal education of students from the local agricultural technology university.

Farming Perspectives

Figure 3, below, illustrates a regional view of the demonstration and actual farms visited in field research. This research was conducted through interviews, discussions, and participatory methods. Rainfall distribution is included so as to illustrate this variation between sites of interest.

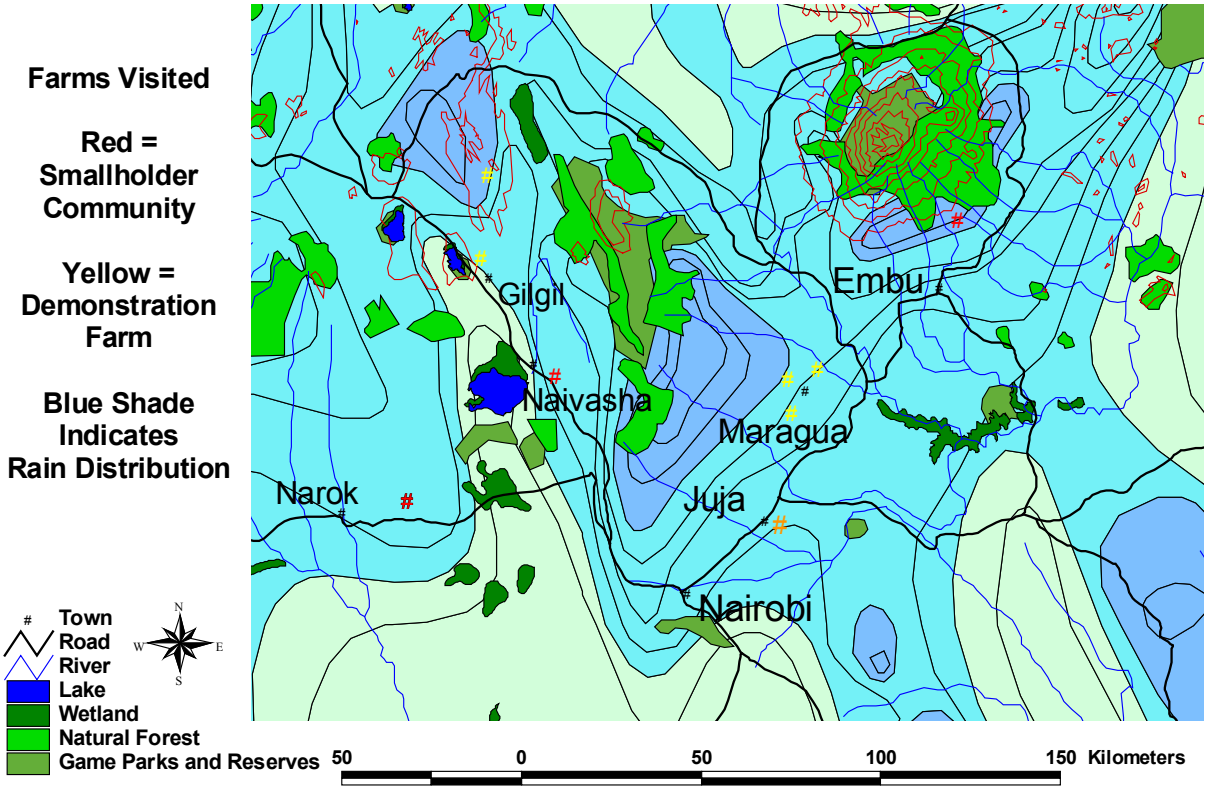


Figure 3: Regional (Central and Rift Valley Provinces) illustration of demonstration and actual farms visited.

Visits to Demonstration Farms

Six visits to five farms provided varied data about small farms in Kenya. Although these farms do no participate in the market as a means of survival, the technicalities of intensification could be observed. This provided an understanding of the variety and methods of crop production and opportunities therein. The farms varied in habitat as well as topology and provided a bridge between theoretical (student) observations and practical (actual farmer) observations.

Marangua

Three farms were visited in the Marangua area. These varied considerably in labor input and availability, topography, and habitat. The variation provided a more complete picture of the possibilities and constraints of small farmers in the area.

Gilgil

This farm was located on flat, semi-arid ground a few kilometers from a lake. The lake did not seem to provide the tap-water irrigation present. Most of the land around the farm was used as pasture land (and considerably overgrazed).

Endemi

Northeast of Gilgil, in the mountains, this farm possessed the most fertile soil observed. The soil was high-altitude udalfs (nutrient and texture rich) soil and received rainfall more consistently than any other location investigated. The soil was level over large areas. It was cold on the mountain, but rain was plentiful (having a long rainy season as opposed to the short, two rainy seasons in most of Kenya). The wet side of the mountain shifted according to changing winds, but the farm was on the wet side a majority of the time. There were four farmers assigned to this farm, and it produced carrots, potatoes, and maize of quality not seen elsewhere. There was a relatively low population density in the area, allowing for some large-scale techniques (plowing with animals and pasturing).

Visits to Actual Farms

These visits were made possible by invitations from students that had recently graduated from KIOF (among those interviewed). Data collection took place at three rather different locations, near the large towns of Narok, Embu, and Naivasha. Differences other than geography served to further vary the investigation. Though traditionally agriculturalists (unlike the farmers near Narok), the farmers of Embu and Naivasha differed in the amount of cash crops produced. The visits and interviews were conducted over 2 to 4 days, during which the host family as well as surrounding farms served as subjects of inquiry. Geographic, historical, market and climate differences provided variation within the data gathered regarding small farm communities.

Norak

Outside of Narok is a semi-permanent settlement of Maasai. They are traditionally pastoralists, though the elderly and children now tend some permanent homes. The minimal use of agriculture served as an example of the needs of small farmers from such a culture. These farms were located in the Rift Valley Province, Narok District, Mau Division and Ntulele area. Interviewing Maasai

farmers gave some perspective of rural agriculture made necessary by recent restriction of land access (the Maasai have lost much of the traditional pastureland to national parks). Organic production was a matter of necessity, not market, as near Narok there is no current market for organics.

Embu

In the Central province, Embu District, and Runyenjes Division, Kagaari North area, seven farms were inspected in particular and many casually during a four day stay in Kiathari. All farms (or subdivisions of farms) directly inspected were 1-2 hectares.

Naivasha

The Naivasha farms are located in the Rift Valley Province, Naivasha Division, and area of Naivasha East. Five farms were inspected in this area (and the owners interviewed) in particular, and several were examined casually. Most farmers here began converting to organic techniques within the last year.

Farm Organizations

Murgetho Organic Farmers Group (MOFG), near Maragua

This research was conducted via participatory methods. I attended a meeting of the organization and discussed the issues with several representatives of the organization. This group worked in association with ICIPE and practiced integrated pest management (IPM). There were fifteen representatives present, who disseminate information in a five kilometer radius. They represented larger farms than the Embo group due to less fertile land and irrigation (and thus population pressure). Their meeting regime was rather impressive, training every Tuesday from 10am to 2pm.

Kagaari North Organic Farmers' Group (KNOF), near Embu

This research was conducted in an interview format. This organization, of 36 people, managed for ten representatives to be available for interview (including the chairman), on short notice. Obviously, the coordination between them was quite effective. Over an hour was spent discussing the issues most pertinent to the organization. Acreage owned ranged from .5 to 5 hectares, though most were one hectare or less. They had begun organic techniques two to three years ago, and some practice intensive techniques.

Theoretical Framework

Introduction

Basic needs include food and shelter. Currently, the world's production of these commodities lies essentially between two extremes. At one extreme, each person, family, or community provides for their own needs (local self-sufficiency). At the other, a concentrated urban population is fed and housed by mechanized, genetically modified, synthetic monocultures (The Green Revolution).

> From a sociological point of view, it is important to find out how much decisions, regarding land-use and landscape development are based on those living and working in the landscape at stake (bottom up), or mainly based on abstract ruling and scientific expert consultation (top down). In both cases the composition of deciding groups, users or experts, and the conceptual approaches they have in common are crucial. (Van Mansvelt et al, 1998:211)

Within these extremes exists a culture that transcends geography, ideology, and other social focal points. Smallholders, as described by Netting (1993), represent culture shaped not only by society, but also through interaction with nature. Nearly as decimated as biodiversity by the Green Revolution, this culture still exists throughout the world. A majority of smallholder needs are satisfied through personal or communal land and the surrounding community. The market also satisfies various needs, which are more efficiently addressed through sources outside the community and even continent. They are not slaves, peasants, or rural proletariats; they are small farmers with some form of land tenure, interacting with the market (Netting, 1993). Agriculture, specifically grass-roots (developing world) agriculture, and significant forces both outside and therein, as a means of development, is the focus of empirical study. International context serves as theoretical framework.

International Agricultural Overview

Agriculture might first be divided into two categories by time considerations. Long term and short term factors do not always coincide in cost or benefits. In long term policy, considerations such as soil fertility, crop diversity and stable tenure provide benefits. With short term policy, long term benefits are forgone in the stress of immediate needs. In the short term, synthetic inputs and large scale production provide opportunity for capital investment (through credit) and economic returns (Citation, must remember article that talks about this). It is possible to have short term goals under long term policy, but not vice versa. Short term policies are often market and technology oriented, as exemplified by WB and WTO development policies. For long term (sustainable) policy to facilitate short term (development) goals, markets must be available and fair (with regard to government subsidy).

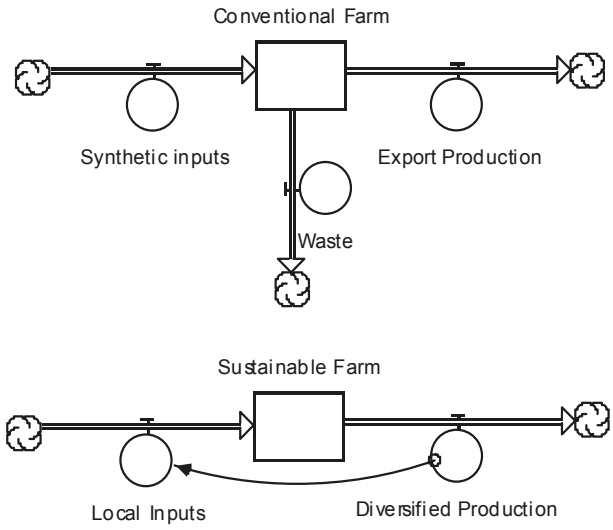
The dominant systems of the agricultural sector (economic, social, and ecologic) require a varied approach to capital assessment. Economics is an important aspect of food security, because very few (if any) farmers derive all of their sustenance from personally tended land. Through the sale of excess production, the farmer is able to acquire items from the market, which could represent shelter, nutrition, and other basic needs. Although generally outside the consideration of economics, the externalities of farming fall mainly into two categories: social and natural capital. These issues come together in concerns regarding pollution, nutrition, and food security.

Similarities between the developed and developing world provide the opportunity for universal goals in agricultural reform. This is because “however different the developments in those two parts of the world, they both include the degradation of environment (soil, water, air), loss of nature (fauna, flora), depletion of natural resources (in particular fossil energy and fertile soils) and degradation of landscapes and rural communities (livelihood)” (Van Mansvelt et al, 1998:209). In these concerns for agriculture development, the North and South face common obstacles.

Urban and Rural Dichotomy

The line between urban and rural agriculture has blurred in recent years, as the interaction of markets and problems common to all agriculture exist in each setting (Bryld, 2003). Urban environments serve to illustrate, due to population pressure, some of the difficulties faced by agriculture. Conventional means of monitoring agriculture are not sufficient in an urban environment due to high (human) population density. Urban policy is often focused to address issues such as land tenure, pollution, and recycling (Anikwe and Nwobodo, 2001; Bryld, 2003). Additionally, in an urban environment, water must be carefully tended (Niemczynowicz, 1999). In more natural habitats, lack of population pressure hides some problems that are strikingly apparent in an urban environment. In a rural setting, large scale agriculture results in extensive use of groundwater in the name of production efficiency (something not reasonable in the urban environment). Treating urban and rural agriculture differently perpetuates the unregulated large-scale agriculture present in rural areas. Thus, seeing urban agriculture as requiring different considerations for production (extra attention to biocides, waste use, and water pollution) than rural (or large-scale production) agriculture fails to address the causes (as opposed to the symptoms, whether urban or rural) of agriculture reform. Whether producing in a rural or urban environment, agriculture must abide by basic tenants of clean, efficient production and the precautionary principle if yields are to be considered sustainable.

The urban vs. rural dichotomy of agriculture need not divide agricultural policy and technique. It does, however, illustrate the need for change. Urban agricultural problems are largely concentrations of more general conventional results. Urban agriculture presents a clear case of the need for intensive, highly skilled techniques. Although population dispersion may reduce the apparent impact of rural farming, ground and surface water quality commonly demonstrates the impacts of large-scale, inefficient techniques. The geographical (and population) dependent divide of concerns (between urban and rural agriculture), and the resulting focus on urban farming might also serve as a distraction tactic by industry, for the purpose of the continued exploitation of rural land (and the underemployment of rural labor that results in proletariat urban conditions). A more legitimate dichotomy of agriculture is that of *conventional vs. sustainable* systems.



Model 1: Conventional and sustainable farming systems can be simplified via a matter and energy flow diagram.

As a general overview of conventional and organic systems of agriculture, basic energy and matter flows are illustrated in Model 1.

Conventional Agriculture

Concerns regarding conventional agriculture include what Wells and Gradwell (2001) describe as agriculturally and locally "not genuine care-practices":

> The poisoning of water through excessive use of pesticides, warehousing animals in mega-livestock confinements, exploiting immigrant workers in meat processing plants, soil loss resulting from standard tillage practices, and losing wildlife habitat by tiling wetlands and removing fencerows (Wells and Gradwell, 2001:112).

GM crops are sold by the same companies (some would say company) that produce biocides and synthetic fertilizers (Madsen and Sandoe, 2000:164). These crops proliferate on a bubble of promises: higher yields, less biocide use, and greater nutrition. However, current uses include merely *bacillus thurengenius* (Bt) production (a microbial, broad-range insecticide), glyphosate (also known as Round-Up©, a herbicide) resistance, and legume activity. "The introduction of herbicide resistant crops is based on the use of chemicals and is therefore automatically seen as a non-sustainable path for the future" (Madsen and Sandoe, 2000:164). The risks include loss of biodiversity, native relative contamination, pest evolution, horizontal transfer of transgenic DNA via bacteria/virus, and allergies to novel proteins (Blackburn and Boutin, 2003; Madsen and Sandoe, 2000; Kwon et al, 2001).

Additionally, bio-safety procedures have proven inadequate in both plant and animal production. Pharmaceutical production in plants has not been contained as per government standards and concern over production has reached the mainstream (Neil, 2003). GM pig production has also suffered a lapse in bio-safety regarding distribution. Corn not approved for human consumption (due to the possibility of allergic reactions) was (and remains) in US supermarkets (Sowinski, 2002). This demonstrates that even if bio-safety standards were sufficient to prevent contamination of surrounding habitats and human food supplies, the end use must be addressed more effectively.

Ecologic Considerations

Conventional techniques cultivate crops that are less tolerant to drought and disease due to a build up of plant diseases and pests in the monoculture environment (Netting, 1986:94). This is further complicated by the resistance to biocides developed by pests in conventional monocultures (O'Hara and Stagl, 2001). Resistance studies are required by the US and EU regarding biocides; however, such assessments are short term, at best, and lack consideration for public concerns (Jutsum et al, 1998). Beyond the *prescribed* impacts of synthetic biocides, management of biocide use and monitoring of ecosystem impacts are objectives that fall largely outside the concern of the companies who produce the chemicals. In reality, "there has been widespread disregard of resistance management by end-users in many markets" (Jutsum et al, 1998). This resistance buildup in pests is not solved by GMO crops (Madsen and Sandoe, 2000:162). The inability to enforce (or even understand) product safety measures between producer and user exemplifies the disconnect between farmers, people, and food common to conventional agriculture.

Long developed, native crop species could be altered to unknown extents. However, "risky decisions made by corporate and governmental decision makers often endanger the safety and integrity of the natural environment and human populations" (Zsolnai, 2000). Transgenic traits have already been shown to transfer to wild (Madsen and Sandoe, 2000:162) and native relative species and synthetic chemicals have affects long after the intended habitat alteration; thereby, conventional agriculture alters entire habitats and ecosystems in yet unknown ways. Additionally, the problem of biocide resistance is not overcome by GM crop production. Despite this, Kenya is currently testing GM sweet potato production (Kenya Institute of Agricultural Research, Embu Office). If testing moves forward to production, it will inevitably change the local, and global,

ecosystem via synthetic and biocide use, and, through avoidance of composting, lack of care for soil and local sustainability.

Socio-Economic Considerations

The already apparent costs of conventional agriculture go beyond poisoning of the land. Aside from problems with conventional agriculture with respect to synthetics and monoculture, a recent development posses perhaps the greatest threat yet to be unleashed by the Green Revolution – GM crops. "The self-centered orientation of modern organizations produces environmental and social "ills" of various kinds" (Zsolnai, 2000). Synthetic inputs distance the farmer from the means of production and narrow market access (via production of few species in monocultures supported by these inputs). In the resulting circumstance, "the farmer thus became dependant on manufactured goods he could not produce and ultimately on fossil fuels available only at ever higher world market prices" (Netting, 1986:95). Local food self-sufficiency is a major casualty of GM crop production. This is true not only economically, but socially and ecologically because seeds must be purchased from outside the farm each season. The "Terminator Gene" (creating sterile plants) is supposedly in development to avert contamination and product stealing (the use of seeds from a previous year's harvest) (Anon, 1999). As the land cannot grow natural crops for a few harvests (of compost) due to soil and habitat conditions resulting from conventional methods, through contract or product design, the farmer must buy or starve.

It should be noted that it is not biotechnology, itself, that acts to disempower smallholders: "it is hardly the process of genetic engineering by itself that creates this antagonism [towards GM crop production] but merely the application to modern food production" (Madsen and Sandoe, 2000:163). Additionally, it is possible to consider organic and conventional agriculture in terms of gender. Organic and small-scale production lies largely in the hands of women. "Conventional agriculture is indeed a system coded as masculine. A more holistic system, one coded as feminine, would place value on cooperation, social relationships and connection, making a difference, future generations, non-human nature, and community" (Wells and Gradwell, 2001:118).

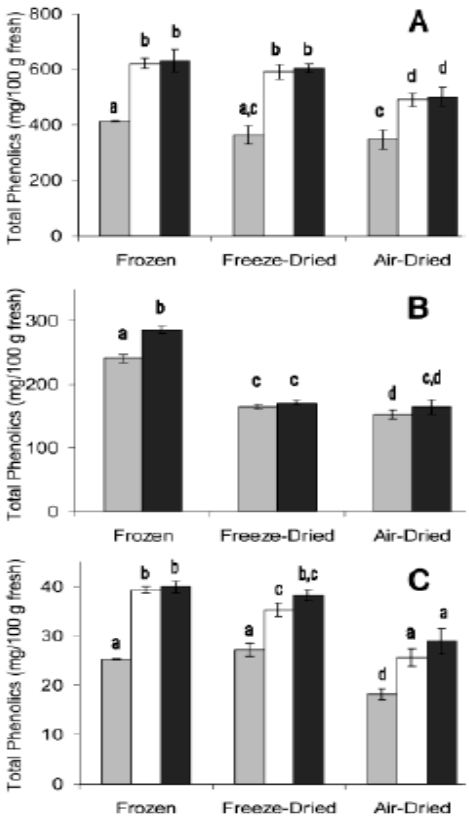


Figure 4: Total phenolics in frozen, freeze-dried, and air-dried (A) marionberries, (B) strawberries, and (C) corn grown by conventional (gray bars), organic (white bars), and sustainable (black bars) agricultural practices. Source: Asami et al, 2003.

Organic Agriculture

Organic agriculture addresses several issues, not the least of which includes: animal cruelty, biocides, synthetic fertilizers, bio-diversity, and nutrition. Issues sometimes considered "beyond organic" extend the natural concept of production to areas such as: water harvesting, agro-forestry, inter-cropping, permaculture landscaping, and multicropping. On the issue of landscaping, one cannot ignore the obvious tendency of increased

biodiversity through species and habitats on organic farms (Van Mansvelt et al, 1998:224). Smallholders (grass-roots farmers) use various organic, and 'beyond organic' techniques employed to provide local self-sufficiency. This local stability can only be achieved if both means of production and distribution are within the farmers grasp.

Organic techniques produce more nutritional food. Although this has been a hotly contested aspect of organic farming benefits, secondary plant metabolites may play an important role in nutrition (Asami et al, 2003). Unlike smallholder organic farming, large-scale, export market considerations have focused plant breeding efforts to characteristics such as shelf life, skin thickness, and uniform appearance (O'Hara and Stagl, 2001:537; Stagl, 2002). This forgoes cultivation for nutritional characteristics. Additionally, "conventional agricultural practices utilize levels of pesticides and fertilizers that can result in a disruption of the natural production of phenolic metabolites in the plant" (Asami et al, 2003). Organic production promotes the natural production of these chemicals (see Fig. 4, above). The results of Asami's study "demonstrate a statistically relevant trend of higher levels of TPs [total phenolics] in organically and sustainably produced crops" (Asami et al, 2003). This study represents scientific evidence as a basis for accepting the nutritional benefits of organic production.

Appropriate technology

Having reviewed environmental, social, and institutional aspects of agriculture, technology (appropriate, in particular) is an undeniable factor as well. "Environment and technology viewed apart from cultural ideology and social structural prescriptions are obviously insufficient to account for the different directions taken by change" (Netting, 1986:99). This includes composting, natural biocides, and locally producible technology such as the 'rope and washer' method of well water extraction (pictured in Figure 5). For instance, a foot pump and a sunflower press purchased by KIOF after being demonstrated at the institute, were expensive by smallholder standards but within the realm of possibilities via community ownership. Some technology, such as drying fruits, might be cheap and preserve harvests, but were inappropriate due to market conditions. With fresh fruit of considerable variety available year-round, there was little need for dried fruit.

Figure 5: This well, at KIOF, demonstrates how appropriate technology can result in increased efficiency on the farm. This well system is built with recycled wood, a tire, a bucket, and a length of rope. Called the "rope and washer", it provides the ability to draw water from a well without inputs from outside the farm.

"Problems related to the degradation of the landscape are not seen as an isolated issue but as part of positivist-technological approach of society towards agriculture and land use in general" (Van Mansvelt et al, 1998:210). Technology, however, is certainly an integral part of food production. The practices of

smallholders depend on appropriate technology, not an idyllic sense of being one with nature (Netting, 1993:321). Improved seeds are generally not as disruptive to smallholder techniques (local habitat genetic alteration notwithstanding) as the use, say, of a tractor in a biointensive multiple canopy configuration. Further, if the farmer is allowed to harvest seeds (although this is not currently the case), then some of the reliance on outside inputs is reduced; leaving only environmental and seed failure concerns for food security.

International agricultural policy is based on the world system of economics. "Economic influence may also influence individual behavior. This can happen in two ways: directly through incentives and constraints associated with specific institutional conditions and indirectly through changes in consumer preferences affected by institutional conditions" (O'Hara and Stagl, 2002).

The International Agenda and Trend

Introduction

Agriculture in developing and developed countries is undergoing changes in supply and demand. These changes result from factors including education, economics, social norms, environmental considerations, spiritual concerns, government policies, and non-government-organized intervention (NGOs and private corporations). These factors are more or less the same in either hemisphere. How similar these factors are, and specific differences, provide an understanding of the current global position regarding agriculture change. While similarities may provide paths of least resistance towards a unified set of goals and policies, the differences denote obstacles in the path to shared agendas. If globalization is to be a success, the North must end the policy of "do as I say and not as I do" with the South. This situation is perpetuated by the ability to use money, as a symbol, to conceal the actual costs and benefits of production. "Prices transmitted in markets simply render the unpredictable and hard to account for environmental and social effects of economic efficiency gains invisible." (O'Hara and Stagl, 2001:540). Thus, international influence is examined as it affects the case study.

Agenda

Agricultural development, in the mainstream sense, entails conventional production for export markets, resulting in economies of scale within a country's agricultural sector in accordance with comparative advantage. Although these economies of scale were deemed inefficient in both Russia and China (Netting, 1993), they continue to be pursued in the US and Europe. This theory of agriculture development, having failed the world's communist nations, is pursued doggedly by nations despite evidence that the system is harmful in yet unknown ways. Assuming that open markets will provide long-term sustainability and with disregard for the precautionary principle, the developed world refers to agricultural intensification as a term most often used to describe an increase of external technologic and economic inputs per acre. This concept of development is highlighted by World Bank policy (Gylfason, 1999) and by the policies enforced (or, in the case of developed countries, not enforced) by the World Trade Organization (Schiff and Valdes, 1995).

There is an inherent loss of options resulting from such policies. Conventional agriculture fails to maintain a range of possibilities (especially with regard to future generations). It is the aim of evolutionary theories (which reject the existence of a static system) to reduce the chances of

irreversible disturbances within socio-ecological interaction (Stagl, 2002). By degrading the soil and community, conventional agriculture provides a narrow path of development, the end of which may be ecologic destruction.

Trend

Although the organic and local markets remain on the fringe of agricultural trade, attention to these markets has increased in recent years. The US and Europe are enjoying a boom in the locally produced organic food market (O'Hara and Stagl, 2001; Stagl, 2002). The organic market has increased 30 percent each year for the past decade. Further, in the US, there were only a few organic, local distribution farms with guaranteed, private income in 1995, today there are over 1000 (Wells and Gradwell, 2001; Stagl, 2002). This system of agriculture is commonly referred to as community supported agriculture (CSA). The farm is funded like a magazine subscription; the members buy shares of the harvest, like investing in companies. The farmer then uses this capital to produce and harvest, and production is divided to shareholders. Generally, not all of the farm acreage is devoted to this form of production. Shareholders (community members) take part in the production risks, and a bad harvest means less return on the cash investment. Additional benefits of community interactive farming, as in a farmer's organization, include ecologic, community based learning and social interaction. The risk sharing and local distribution would seem to induce increased community involvement, but this has not always occurred in the US. To some extent, this is due to other social activities being available to community members in the US (Allen, 1999).

Globalization has not, however, resulted in an extension of this trend to the developing world. "Globalization has come at the price of undermining some of these characteristics [of sustainable farming] like diversity, adaptability and resilience in exchange for the overreaching goal of efficiency" (O'Hara and Stagl, 2001:539). The large private export farms that result from international pressure for cash income do not result in added community value, aside from the farm's ability to employ labor under exploitative wages and hazardous conditions, in the name of "creating job opportunities". In Kenya seven million people are employed by agriculture, representing two thirds of the workforce and producing 23% of the GDP (Todaro and Smith, 2003:135). Further, the lack of a gym, movie theater, gun club, sporting event, television, or other social option may result in increased community interaction through actual involvement with farming development (as exemplified by community farming organizations of Kenya highlighted herein).

Historical Background

The International Monetary Fund (IMF) (part of the World Bank) rescinded funding from Kenya under Moi's presidency in the amount of 292 million dollars in the summer of 1997 due to an unstable and corrupt government (Todaro and Smith, 2003:137). Funding was briefly resumed when Moi appointed Leakey (an anti-corruption advocate) to a high government position. However, after a couple of months, Leakey was sacked for not supporting Moi in a personnel appointment, and funds were again rescinded. Despite the regime change (January 2003), funding has not yet been reinstituted. Two major historical institutions bear influence on Kenyan agriculture. First, the World Bank's development policy of "open international markets" results in cheap imported staple food dominating the national market. Secondly, the WTO regulation of

subsidy agreements associated with the Doha Conference results in the uneven trade of agricultural products.

This year, Kenya Institute of Agricultural Research (a government organization) began GM sweet potato testing at the Embu Office (there is one in each main town). The WB Development Report (2001) demonstrates a propensity for reforms to lead to GM adoption. The call for open international markets rings from the battle between the US and EU over GM crop issues. It seems that if the developed world cannot implement (and test) GM production on the so called developed soil, other markets are available via international trade and agriculture policy.

Kenya has historically been pressured to adopt temperate and "developed" systems of agriculture development (SACDEP interview). This carries inconsistencies with regard to local economic and natural conditions. In fact, the structural adjustment policies of the West, such as the IMF and WB, are responsible for most of the deforestation in the tropics (Schmidt, 1994:99). "Rather than advocating blanket substitution of temperate zone methods, high-energy technology, and factory-farm or plantation organization… [policy must include] creative and practical solutions embodying the proven responses of generations of tropical agriculturalists as furthered by the insights of modern science" (Netting, 1896:94).

Conclusion

The technologic, imperialist mandate of international agricultural development disempowers developing world smallholders and nations, and has its roots in colonialism. Through this concept of development, techniques and resources of the south are devalued, resulting in such terms as "developing" and "third world". An increase in living standards is hinged on the production of cheap food and non-food agricultural products, for global market competition at the expense of social and ecologic characteristics. "Globalization has come at the price of undermining some of these characteristics like diversity, adaptability, and resilience in exchange for the overreaching goal of efficiency" (O'Hara and Stagl, 2001). Meanwhile, citizens of these externally dominated nations starve as tons of flowers are delivered to other countries from their soil (the case in Kenya). Unless one adopts a coldly Malthusian (survival of the fittest) perspective, the situation is worthy of examination and further study.

Aside from the degradation of human life imposed by economic agricultural development policy, there are informational costs. The loss of diversity, biotic and cultural, further degrades the quality and quantity of information available regarding natural farming techniques. As indigenous farming knowledge gives way to chemical sprays and imported seeds, not only the perceived, but actual value of that knowledge is diminished.

On-farm recycling (of materials and knowledge) is necessary for locally sustainable farming and contradicts the conventional high-external input approach (Van Mansvelt et al, 1998:221). Local food markets provide a means to confine inputs and outputs in the current context of needs and sustainability of the community (Stagl, 2002). In order for these outside forces to work in balance with the farm, there must be shared goals. The conflict between the state and the individual arising within the modern agricultural paradigm is the result of conflicting agendas between the top (international policy) and the bottom (smallholders).

Results

Non-governmental Organizations

The NGOs examined shared some common philosophy and goals. First was to empower the farmer via education and labor efficiency. Secondly, a produce market needed to be found so that the farmers could acquire non-farm products. Finally, the organizations stressed interaction between the trained farmers and the surrounding community. Unfortunately, these goals take a periphery, if at all, consideration in international agricultural policy.

KIOF

I began the lecture with a question as to how many student were familiar with GM crops, few were. After the lecture the students asked questions, allowing a mutual learning process as I ascertained the student's perspective of GM crops. It would be nice to report that everyone left with a greater appreciation of the issues surrounding genetically modified (GM) crop production, and that enlightenment was experienced by all. However, given the time frame, that was not the case. Instead, the promises of GM production were mentioned prior to a discussion of the risks involved. Most of the students were rather unaware of GM crop production prior to the lecture. Most of them left with a healthy fear of them (though personal risk from consumption was not presented as a legitimate concern). The lecture outline (used in presenting the lecture) is presented in Appendix D.

SACDEP

SACDEP aims at food security and nutrition through production, conservation of products, and market creation. It seeks to develop savings to visible finances and empowerment. Food security often suffers a narrow definition by organizations. This organization looks at food security from several angles – food, health, market, economic income, and diversification. Production alone does not equal food security. For instance, SACDEP deals with AIDS as a development issue and food security concern. As this organization is concerned largely with subsistence production, organic certification is not a major issue.

The organization works to strengthen weaknesses with an approach that is resource related. Attention is given to consumer needs, which is why dry fruit is not appropriate, since there is plenty of fresh fruit available all year. Further, extension agents "start with blank mind", to allow for established local agendas to bear fruit without undue, uninformed influence. Some families or individuals are "keen" on certain crops, and this must also play into the feasibility of a development plan. When current resources and expectations are assessed, the organization moves to increase diversification. To promote product diversification, SACDEP suggests the marketing of nuts, cereals, and dry foods instead of only vegetables. The director noted that organic farming is cutting costs economically and environmentally and that it saves money in production, making the produce more valuable (through efficiency), regardless of organic market. This is because of the lower costs of inputs and reduced environmental damage.

When the current and future plan basics have been established, participatory research is used to prepare a training program. Facilitation is the main aim of this training. Extension workers deal

with all aspects of farming, not just organic (such as IPM), because the farmers' means of livelihood vary. A most important aspect is to start from the main weaknesses. For example, if there was a market for coffee, farmers could manage to increase production as per demand. However, production alone does not satisfy food security.

ABLM

ABLM represents a varied application of development theory than SACDEP (which specializes in community based management) and MS (which specializes in local institution support). Smallholders were addressed by the organization through community interaction and organization. This organization demonstrated the need to include all methods of agricultural production in the development agenda.

MS

Concerns of this organization ranged from local issues, such as idle men, to global issues, regarding economics. In between, at the regional and national level, obstacles to ecologic development included those mentioned above as well as democracy and transparency in government and non-government organizations. Through conversation with this informant and occasional discussion of the local newsprint, corruption appeared to be a main deterrent to development. However, this is being addressed from the top-down, with a wealth declaration paperwork being required to rectify previous "land-grabbing" due to a regime change (January 2003). Thus, still consolidated land, idle men, government and management transparency, and the economics of unsubsidized agriculture were the primary concerns of efficient development policy expressed by this NGO.

ICIPE

On the first occasion, various methods for pest control, for mangoes at the Marangua farmer organization meeting, were discussed. There was success when applying biologic methods of pest control and organic approved biocides together in ecologically based pest management. This was illustrated by the case of mites on mango leaves. The mites live on fungus, which grows because of ants traveling on the trees. Addressing the pest system post-ant only temporarily fixed the infestation. In another interview, work regarding the production of a natural (from a flower), systemic biocide, which seemed to degrade quickly was discussed. Fighting the fruit tree insect infestations was made more difficult recently due to the recent arrival of an Asian fruit fly. The ICIPE informant provided a less organically oriented opinion of pest control options and considerations that appeared to be making progress in smallholder communities.

Student Surveys

In comparing the two groups of students, some responses could not be reduced to quantitative data due to the small-*N* (or observations) of data collected. Some comments made by the students, as written in response to open questions, may not have been quantifiable even with considerably more observations due to the individual concerns presented. Thus, data more easily illustrated in text format is presented as well as graphics. The pie charts illustrate university and vocational student perception of organics as benefiting primarily economics, nutrition, or sustainability (Figures 6 and 7, respectively). The charts for each group show a considerable difference between perceptions.

The bar graph illustrates a quantification of concerns expressed by the two groups and is totaled so as to present the predominant concerns of students overall (Figure 8). Analysis of the survey data produced a considerable comparison. The primary benefits of organic conversion were different between vocational and university students. Additionally, there were different concerns expressed by those who intended to live an urban life (university students) and those who intended to return to farming (vocational students). For specifics regarding the survey, see Appendix A

University Students

The range of environmental awareness was large in the group of university students. Some saw IPM as organic and many saw organic as a cheap alternative to "real" farming. To the contrary, one student considered the use of indigenous species to be part of organic techniques. Large scale agriculture was considered to be too expensive with organic techniques. There was some concern over the food quality of conventional production, but few considered organic food more personally healthy. Several of these students believed that biotechnology would answer many agricultural problems.

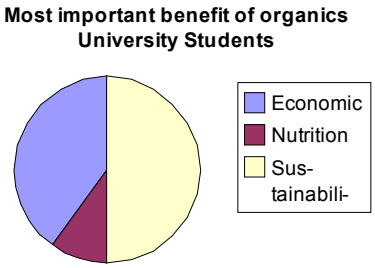


Figure 6: This chart illustrates the university student perception of the benefits of organic farming.

KIOF Students

Eleven of the 21 vocational students did not answer a question regarding the primary benefit of organic farming due to instructions in a previous question that were confusing ("If no, go to question 7" – regardless of their answer, most skipped the next question). The 10 answers to this question are represented in the graphics comparing the two groups of students.

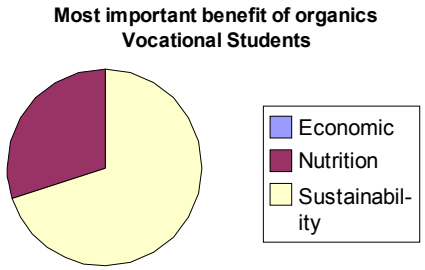


Figure 7: This chart illustrates the vocational student perception of the benefits of organic farming.

Comparison of student groups

Most notable among the obstacles to organic development among both groups of students was the labor intensity required for organic farming. While some university students specifically refer to food quality in an aggregate sense, most vocational students remarked specifically on nutrition and toxin reduction through personal consumption. Vocational students more often mentioned animal welfare and competition from conventional markets as obstacles to organic production. An unexpected variable in the survey was that, as opposed to university students, vocational students consider a couple of years to be very little farming experience.

Vocational students saw organics as an opportunity to increase yields, while university students saw organics as a yield reducing endeavor. This is likely the result of different land size considerations. Students attending a university as opposed to vocational school are likely to have more resources (not just money for school, but in general) and thus larger farms or urban homes. Additionally, the

university students were not as concerned with improving their families' private land, as they likely intended to move to the urban environment. See appendix A for further details.

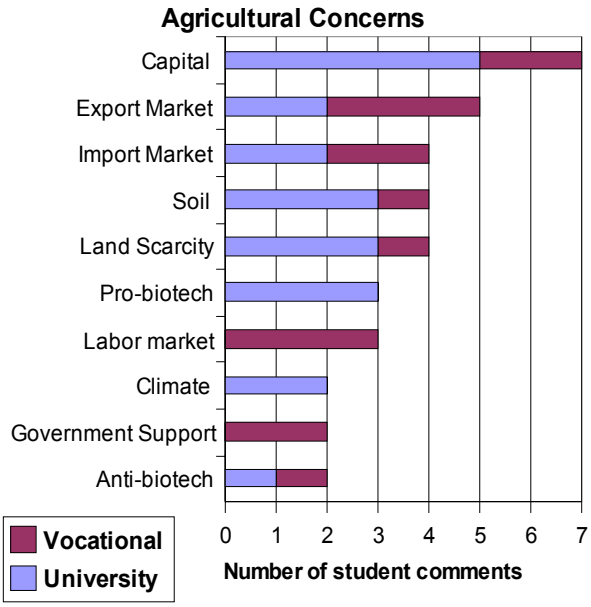


Figure 8: University and vocational student concerns illustrated according to frequency of comments in the open-ended section of the survey.

Vocational Student Interviews

Vocational students considered the limiting factor on most farms to be labor. Where market was a concern for small farms, the farmers needed additional local market access to meet food security needs. Generally, at farms where training was available, the production was more efficient, coordinated with community members, and varied (so as to provide greater nutrition). Regarding larger farms, market was a concern as well. Of the few large farms represented, labor was not the limiting factor, as it could be employed (via tractor, animal, or human) if a market was available either locally or internationally (in the case of large exporters and processor suppliers). As these markets are nearly non-existent in Kenya, the benefit of improved soil and nutrition was too much of a long term consideration to balance the increased costs of labor for intensive techniques, and thus some farms were in a state of stagnation. For further details, see Appendix B.

University Student Interview

On the first occasion, the subject was sure that GM crops were the answer to Kenya's agricultural problems (food scarcity in particular). Discussion ensued for a couple of hours about current and possible benefits and risks of GM crops. He was previously unaware of risk considerations, despite having completed a bachelor's degree in agriculture. Some weeks later the informant expressed concern that such issues had not been raised in formal education. The subject has since investigated the issue and may continue to study GM production formally, so as to pursue both sides of the paradigm in attempt to fully understand the implications. Just as his colleagues (See University Survey) had perceived organic farming as an economic issue (as opposed to a nutrition, social, or ecology issue), he had perceived GM production as a yield increasing, and thus economic recovery, mechanism for conventional 'economies of scale' agriculture.

Demonstration Farms

Through the examination of varied farm landscapes, it was apparent that the limiting factor to production on these (sometimes marginal) farms was labor. Not only the amount of labor, but the quality of labor limited production. In each case, whether riverside, flat land or the steep slope of a

clay hill, production could have been dramatically increased if a market supported additional labor input. Without a reliable market, production stagnates and remains at a subsistence level. Due to the ability to utilize excess produce for consumption at KIOF, however, most of the demonstration farms produced in excess of the average private farm. For additional data regarding demonstration farms, see Appendix D.

Marangua

The first farm visited was tended by a female, with one male employee. Despite this employee, the farm's main limiting factor was labor. This was due to a lack of composting (partially because of the absence of animals) and a great need for terracing. The farm was on an incredible slope, and had been flooded at the bottom 1/8 of an acre recently (of the acre cultivated). The terracing required will only be possible through extensive labor with hand tools, as large machines can not access the farm.

The second farm visited was also on a slope, but not nearly as steep. The lower 1/4 of the two acres was nearly level ground adjacent to a river. Many crops grew well here, although the only method of collecting water was to gather it, by hand, from the river. The old well (situated only a few meters from the river's edge anyway) was not working. Significant terracing was necessary and there was only one person tending this farm. The terracing could not be completed alone, despite the high labor input apparent by land condition and production levels.

The third farm visited in Marangua was the wealthiest in terms of natural resources. Situated on reasonably flat (due to a terrace) ground, a considerable river bordered the land. Near the river's edge, crops (including maize) grew with incredible vigor. Additionally, intercropping of trees allowed production on this farm to exceed the other two. The limiting factor here was not merely labor (which was supplied without apparent deficiency), but planning and implementation of intercropping, crop rotation, and additional compost production.

Gilgil

The farmer succeeded in producing a large variety of crops with the help of tap water irrigation. In a display of soil health and perma-culture design, despite the absence of the farmer for a week, the farm was producing well and the crops were out-competing the weeds. It seems considerable infrastructure (created through labor) was invested prior to the farmer's absence, and it was sustaining the farm well.

Endemi

It was a long way to a market for the goods produced by animals especially because most local farmers had animals of their own, and soil, to produce sufficient food for household residents. If a market were available, additional labor would be able to meet the demands most likely through relatively large-scale techniques of plowing and grazing. Thus, the limiting factor on this farm was market access.

Farms

Unlike previous research, these subjects rely almost entirely on farming for subsistence. A perturbation in market or production affects these informants much more acutely than previous informants. In direct contact with small farmers several concerns were apparent regardless of geography or production specifics.

Narok

Maasai rainwater collection was directed to concrete wells, the only such material used on the homestead visited. There was little or no use of biocides, as inspection of the corn showed healthy ears despite considerable insect population; beans appeared pest free. Mexican marigold was grown in plots as a natural biocide. The use of anti-tick biocide on cows was as gruesome as the veal cow in the corner of the yard. Milk was preserved in gourds.

Participatory research with the Maasai included cooking in a traditional kitchen. Despite strong traditions regarding the roles of men and women, I was allowed to cook in a small, unventilated hut generally used by an older girl on the homestead. Although others, including my helper (a boy who seemed unsure if such an activity was proper), may not have seen the gesture (outside of my enjoying cooking) as a gender statement (only women are expected to cook in the Maasai), perhaps respect was gained for the work done by females in the village. Though fanning smoke from the hut was fun, we managed only six meager (undercooked) ears of maize with charcoal the mother could have cooked with for twenty people. I was unaware that the Maasai practice female genital mutilation (FGM) at the time I visited.

Embu

Most farmers had recently adopted organic techniques (1-2 years ago). In discussion regarding the difficulties of conversion from conventional to organic production with the Kaagari North Farmer's Organization (KNFO), a farmer noted that those without the cash to make it through the first harvest or two, one cannot convert easily. The most striking information gained through farmer interaction was the ease with which food was produced. Through a local irrigation micro-dam, tap water was available most of the year. The soil was very fertile. The greatest difficulty was, especially when it rained, getting to and from the village with marketable goods. Thus, the local tea processing plant absorbed nearly all the excess (cash) produce of the area.

Naivasha

They most suffered for a market. Although there was some local market, it was the main reason given for a lack of incentive to intensify techniques. Despite this, a couple of the farmers were very advanced, intensively. One farmer was extensively testing the use of various techniques and crop species. Additionally, he was using a new variety of nutritious animal fodder developed by the Kenya Institute of Agricultural Research (a government organization).

Overview of Demonstration Farms

The most significant concern of the farmers was a stable market. They felt that labor could be provided if a market existed. The current market position was so poor, it was more important to the

farmers to establish a market than to conserve resources in some of the situations examined. Whether a local or organic market was sought, it was far more elusive than healthy crop production. In addition to market concerns, farmers wanted sustainable techniques. The most common techniques desired included organic, biointensive, integrated pest management, and agroforestry. The size of most farms limited agroforestry, however, communities countered high population density (and land scarcity) with communal forests. Despite the lack of a market or the ability to influence it (due to imported produce), farms pursued sustainable agriculture at a slow rate. The development was most limited by the disconnect between farmers and the local community and and by cheap, imported products.

For further details about specific farms in these communities, see Appendix C.

Farm Organizations

The farmers of Marangua had sizable plots and mangos were produced for market, which was the primary concern for this organization. The organization in Embu (while also having a cash crop, tea) was mainly concerned with improving kitchen gardens. The tea crops were an excellent monoculture (if such a thing can be said) because it is permaculture. Other than trimming the top of the tea bushes (which stand three feet high) a foot every 4 years, harvest is almost year-round. Another observation that may explain the different focus between the two groups is that there was little or no evidence of pest problems in the tea farms of Embu, while the mangos of Marangua showed considerable damage.

Murgetho Organic Farmers Group (MOFG), near Maragua

They were testing various methods of controlling mango pest infestations. Integrated pest management was being used in regard to scale, white powder fungus, wet fungus, black fungus, the mango weevil, and ants (which amazingly work together as sort of a pest-consortium). The greatest threat to food security, however, was the mango market. The farmers wanted to produce juice and jam, but lack a local market (due to the availability of fresh fruit year round). For individual farmers, the limiting factor of production outside market availability was the farm's proximity to the river.

Kagaari North Organic Farmers' Group (KNOF), near Embu

Only 3 of these farmers employed casual labor. The most discussed aspect of organic agriculture was the benefits of composting. Yield drop resulting from conversion only lasted one harvest according to consensus of the group; however, this seems a bit optimistic. Crops that have benefited the most from organic techniques are kale and carrots (the staple food). These farmers saw improved health and nutrition (as opposed to economic or ecologic) as the main benefits of intensive techniques. This was noted especially in relation to sore throats and the conversion to organic techniques of kale (powdery mildew and the associated synthetic pest control were implicated by farmers in causing sore throat cases). Though the sore through scandal is certainly not scientific evidence of the benefits of organic techniques, the farmers also cited better food quality and yield as health factors. They were diversifying production through bee keeping and had interest in producing organic fertilizer (dry, not compost).

Supplemental food purchased at the market included sugar, fat, and flour. Market participation included the kitchen garden, with people coming to buy food and an unstable local market. The group wants a market (local and/or organic). They felt extension workers needed to increase community interaction. The farms were unhappy with a lack of tap water for two months during the year, but this could likely be remedied by water collection from rooftops, as was done everywhere else investigated.

Discussion

Through market interaction, there is opportunity for farmers to diversify and intensify production. A market could be established via government subsidy or fair competition in trade. Due to the lack of government subsidy, and inability to compete internationally (because of foreign subsidies), there is no market mechanism to overproduce in resource rich areas and, further, to distribute those goods to people in marginal areas. Unfortunately, people in high potential areas are not driven to produce a surplus for those they do not know, in other parts of the country, out of the kindness in their hearts, and malnutrition continues to pervade agricultural development.

Netting's theory of smallholder intensification as a development pattern exists in contrast with international policy and the empirical evidence of needs gathered. As such, the failure of international trade and economic organizations to meet the needs of the rural smallholder is a result of the existing expectation of agricultural development based on technological advancement (Van Mansvelt et al, 1998) as opposed to intensification resulting from population density (Netting, 1993). This constraint pervaded all of the farming communities investigated.

International vs. Local Agendas

The disempowerment of rural people is the result of force at the international and national level. Nationally, the Kenyan government and export policy, regional concentration of population to urban area, and subjugation of the village (whereby the local leader is a politician who does what the party and urban people want). Farmer disempowerment goes back to colonial times, and continues now in market liberalization (open-access international markets) (SACDEP interview).

The WB and WTO development concept is founded in economic and technological advancement. This development theory brings with it the Green Revolution, where the many are supplied food by the few. This theory of development is, however, only a phase in the proven evolution of agriculture, known as agricultural intensification (Netting, 1993). Farming does not always develop from low per worker labor output to high through technology.

Agricultural intensification theory holds that regardless of technology and economy, land is treated in ways most dependant on population density. When density is low and land is plentiful, whether slash and burn, long fallow, pasturing, plowing, or tractoring, means are employed that increase physical labor output per worker without regard for long-term, year-round cultivation. The ability to increase the output of labor in this manner is dependant upon farm size. As farms decrease in size, other means are necessary. When population pressure demands, agriculture develops from a physical to a mental limiting factor regarding labor output. This is because as skilled labor and long term experience is required for intensive techniques (Netting, 1993). Thus, additional output per

worker is no longer primarily an issue of physical capabilities. The constraint lies in mental investment that is dependent on education, tenure rights, and a stable market. Labor output becomes a factor of skill, knowledge, and care, as opposed to physical work provided by technology in a conventional (or masculine-coded) system.

Large-scale agricultural development practice leads to a loss of social capital (such as community education through interaction) as well as a growing dependence on the market for basic survival (O'Hara and Stagl, 2001:542). Intensification theory more readily addresses local Agenda 21 intentions. It can provide understanding to bridge the current divide between international development and local needs. Education, as opposed to large conventional farms, may be the way for the developing world to feed itself. The small farms of Kenya need minimal organic encouragement, skilled labor, and local market organization. This, not international trade, is the agricultural agenda as presented by grassroots smallholders.

Economics and Market

For smallholders, the expectation of market influence is limited. "Disembedded markets make the effective communication across different systems levels sheer impossible since the high-frequency signals of local markets (reflecting their small scale) are filtered out by the larger frequency at which global markets operate" (O'Hara and Stagl, 2001:540). Some, such as the Mango farmers of Marangua, interacted with the market more than others, but this market was unstable in any case.

The status of roads is an often unaccounted-for cost to rural agriculture illustrated by the farming communities examined. Using these so-called roads certainly causes damage to transport vehicles, furthering the rural community's costs and widening the urban / rural trade imbalance. Rural farmers take most of the transportation cost for urban goods, as well, because they gather such things to the local markets as a primary off-farm occupation. Due to a near absent local market and transportation costs, semi (or peri-) urban organic agriculture (KIOF, for instance) shows more promise for local certified organic market development than very rural areas. According to locals in many locations, road repairs and building had resumed shortly after January 2003 and progress in this aspect of "development" is expected in the near future.

The lack of an organic market was often discussed. The almost non-existent local organic market, high cost tourist consumption, does not promise to alleviate the difficulties of day to day life in rural Kenya with regard to economics. It seems more appropriate, however, to address the lack of a stable local market than a possible niche market (that is certainly years away from being local for Kenyans). A local market is important because "community economy is based on the idea of self-reliance that is closely linked to ecological sustainability" (Zsolnai, 2000). This market must precede the existence of an international or local market for certified goods due to the needs of smallholders (the majority of the Kenya's population).

If there was a stable local market, through subsidy reform, intensive agriculture could continue to develop, even towards interaction with global markets. From fair trade, to organic, to shade labeling, the limiting factor to development is community empowerment and government support of food production in an efficient and sustainable manner. Perhaps nowhere else is the rift between the UN (Agenda 21) and WTO development theory more apparent than the plight of developing world smallholders. Ecological sustainability requires "de-emphasizing profit maximization and

market systems and introducing small-scale, locally adaptable, culturally diverse modes of substantive economic activities" (Zsolnai, 2000). Until there is another vision of agricultural development in the mind of international agenda setters, smallholders will continue to struggle at the peripherals of the world system market.

Agricultural Development

Kenya is seen as developing because, despite evidence otherwise, conventional and export agriculture are viewed as the future of farming. Markets, however, do not demonstrate this to be the world trend. As agriculture continues a local sustainability trend, focus shifts back to ecologic and social factors that global markets tend to externalize (O'Hara and Stagl, 2001:535). If the goal of sustainable agricultural development is to be supported by local, intensive, organic, small farmers, then Kenya is a developed nation. Much of the developed world has less organic and small held agricultural land (certainly the US). Thus Kenya, agriculturally, might not be seen as the developing nation. The US has 0.2% of its cropland organic and the EU averages 3.5% (FAO, 2003). In Kenya, due to kitchen and public land gardens, organic production represents a major percentage of cultivated land. Although cash crops are produced conventionally in Kenya, there were countless small farms providing subsistence to rural families and these farms rarely, if ever, used biocides. If nations are to be evaluated by the sustainability of farming, all nations are merely developing. Smallholders may prove to be the resource of tomorrow's agricultural development. "If, as Vandana Shiva (1993:7) posits, monocultures first inhabit the mind, and are then transferred to the ground, perhaps these growers may reverse that pattern, changing minds through their examples and practices" (Wells and Gradwell, 2001:116).

Education should be addressed at levels above local by the international agenda. Unfortunately, the concept of small, intensive farms as a solution to food security seems to have escaped the Kenyan university academic curriculum (the US has only begun to include environmental issues at major universities as well). As exemplified by the university survey and interview, these students may see organic agriculture from a mono-crop production perspective, for export. Although they may take food from family farms, they have little intention of returning there (or anywhere rural) with university degrees, and thus demonstrate the separation from local food concerns less apparent in vocational post-secondary students.

A refining and expanding of organic techniques at the demonstration and other farms could be achieved with a small amount of additional labor and the returns (on such fertile and level land) would certainly be worth the expense through local education alone, if funding was available.

To avoid a patchwork of incoherent small farms, communities must organize to increase the efficiency with which communal resources are utilized (Van Mansvelt et al, 1998:224). If many organizations worked together (and unpacked terminology), then this could work throughout Kenya (SACDEP interview). Development must be appropriate, such as a focus on animal welfare or agriculture as dictated by community and individual context. The KNFO wanted the local tea processor to go organic for export. Government policy inhibited organic tea production because the local processing plant would not accept tea produced outside of the company's production standards of fertilizer use. The Marangua Farmer's Organization found that a regional market (supplying urban areas) would allow the sale of juice and jam. ABLM would be most appropriately utilized by

the KNFO, where tea production is of a high enough level to enter the international market and organic production would be welcomed by the people.

Conclusion

Despite slow progress (in the WTO) thus far, opportunity exists in the changing of international policies. If clean development mechanisms are to be exploited by the Southern Hemisphere (in any context), stress should be placed upon clean, as opposed to mechanism (western technology) or development (following in the technological and thus ecological footsteps of developed countries). Reforestation, diversification of crop production, efficient use of water, and the preservation and propagation of biodiversity are globally common goals. While economic and technologic values pervade the international agenda, others considerations are gaining influence. Through the incorporation of social, natural, and environmental capital, economics may yet prove to be a sustainable model for world development.

Whereas the developed countries, WTO, and World Bank are generally in agreement regarding conventional export agricultural policy, they are nonetheless experiencing a trend towards organic and fresh produce. Local distribution of food has shown the potential to improve human health and alleviate considerable pollution in both the North and South. Yet, developed countries promote the south to produce conventionally and for export, to the constraint of smallholders.

> It is not possible to achieve ecologically sustainable consumption by large-scale companies, which aim to maintain their international competitiveness, and to speed economic growth. It can be achieved by small-scale communities that, rather than trading across the globe, run their own economic affairs in a substantive way to meet or make the most of their requirements from their local resources (Zsolnai, 2000).

A particular opportunity for smallholding agriculture to help in development lies in places where urbanization is extreme (slums) and even communal land is not available to alleviate some of the economic depression through food production. People should be shown that it is possible to grow food and shelter on small plots of land; that agriculture is not only a means of market participation, but of survival. This might reduce the current rapid rate of urbanization by the poor in developing countries. Of course, such action is constrained by top-down policy aimed at conventional development.

Recommendations

International organizations have the ability (as demonstrated by UN Agenda 21 programs) to serve the smallholder community. Farmers want labor from international aid agencies where it must be substituted for land as an input. There are several ways for labor to be provided to small farmers. Seeds, chemicals, and machinery enslave farmers. "Since seeds constitute the first link in the industrial food chain, agricultural producers are increasingly dependant on global input producers" (O'Hara and Stagl, 2001:536). Funds to hire labor, however, could empower the farm to produce high yields organically while serving as a training source. Unfortunately, the IMF has not yet resumed funding to Kenya, despite President Moi's defeat in January 2003.

It is also possible to address agriculture from the demand side. Consumption patterns in both the developing and developed world can increase efficiency via a more vegetarian diet. "If it is the goal of sustainable policies to limit the (physical) scale of economic activity relative to ecosystems, limiting consumption levels may be an essential part of reducing the ecological footprint of economic activity" (O'Hara and Stagl, 2002). The restaurants in Kenya rarely have beans (without meat) available, because that is poor people food, and poor people do not eat at restaurants.

Remarks

Perhaps I should not have finished Smallholders before the paper's end (I did not begin until after I returned from field research). Although it is nice to find what I thought were my conclusions written by others (especially in significant works), it was one of those times where you find out that someone has already done it. In the epilogue, Netting articulates that there is a problem with the mainstream theory of development as it is narrowly (technologically) based. It was fun to think that I had gone beyond Smallholders (1993). After all, it is quite an old book, from the perspective of someone who has not published.

> In short, I question the exclusive application of an industrial model to agriculture because of its technical ridgity, its capital costs and labor savings, its energy inefficiency, its tendency to degrade natural resources, and its separation of ownership, management, and labor. (Netting, 1993:320)

To summarize the smallholder ethic, a quote from a US CSA farmer in a study conducted by Wells and Gradwell:

> I am in charge of this piece of land for the time I have it, and I have to take care of it. I am also guided by the idea of sustainability. I'm going to improve what I have inherited, enhance it, and give something better to the next generation. I have grand-children so I see the 21st century. For both communities, the producers, and the consumers, the idea is to rejuvenate farming. Agriculture is very important. It could be just agribusiness and with the wrong decisions destroy the land. I think that every little drop counts. All life adds up (2001:114).

References

Author (Year) Title Journal Volume (Number) Page

Allen, P. (1999) "Reweaving the food security safety net: Mediating entitlement and entrepreneurship". The Journal of Agriculture and Human Values. 16. 117.

Anikwe, M. and K. Nwobodo. (2002) "Long term effect of municipal waste disposal on soil properties and productivity of sites used for urban agriculture in Abakaliki, Nigeria". Journal of Bioresource Technology. 83. 241.

Anonymous. (1999) "Science and technology: Fertility rights". The Economist. 353 (8140). 104.

Asami, D., Y. Hong, D. Barrett, and A. Mitchell. (2003) "Comparison of the Total Phenolic and Ascorbic Acid Content of Freeze-Dried and Air-Dried Marionberry, Strawberry, and Corn Grown Using Conventional, Organic, and Sustainable Agricultural Practices". Journal of Agricultural and Food Chemistry. 51. 1237.

Binns, T. and K. Lynch. (1998) "Feeding Africa's Growing Cities into the 21st Century: The Potential of Urban Agriculture". Journal of International Development. 10. 777.

Blackburn, L. and C. Boutin. (2003) "Subtle Effects of Herbicide Use in the Context of Genetically Modified Crops: A Case Study with Glyphosate (Roundupregistered)". Journal of Ecotoxicology. 12 (1-4). 271.

Brosius, J. (2001) "The Politics of Ethnographic Presence: Sites and Topologies". *In* New Directions in Anthropology and Environment: Intersections. Crumley, C. (ed.) Pp. 150-176. Walnut Creek: Altamira Press.

Bryld, E. (2003) "Potentials, problems, and policy implications for urban agriculture in developing countries". Journal of Agriculture and Human Values. 20. 79.

Chambers, R. (1983) "Rural Development: Putting the Last First". New York: John Wiley and Sons, Inc.

DeLind, L. (1999) "Close encounters with a CSA: The reflections of a bruised and somewhat wiser anthropologist". Journal of Agriculture and Human Values. 16. 3.

Diop, J., E. van der Werf, D. Onduru, and J. Kariuki. (1998) "On-Farm Agro-Economic Comparison of Organic and Conventional Techniques in High and Medium Potential Areas of Kenya". ETC Netherlands and Kenya Institute of Organic Farming: Leusden/Nairobi.

Dove, M. (2001) "Interdisciplinary Borrowing in Environmental Anthropology". *In* New Directions in Anthropology and Environment: Intersections. Crumley, C. (ed.) Pp. 90-110. Wallnut Creek: Altamira Press.

Gylfason, T. (1999) "Exports, inflation and growth". World Development. Proquest. 27(6) 1031.

Hamilton, P. "Goodbye to Hunger!: The Adoption, Diffusion and Impact of Conservation Farming Practices in Rural Kenya". Association for Better Land Husbandry: Nairobi.

Harper, D. (1992) "Small *N*'s and community case study". *In* What is a Case? : Exploring the Foundations of Social Inquiry. Charles C. Ragin and Howard S. Becker, eds. Pp. 139-158. UK: Cambridge University Press.

Johnston, B. (2001) "Anthropology and Environmental Justice: Analysts, Advocates, Mediators, and Troublemakers". *In* Historical Ecology: Cultural Knowledge and Changing Landscapes. Carole Crumley, ed. Pp. 132-149. California: Altamira Press.

Jutsum, A., S. Heaney, B. Perrin, and P. Wege. (1998) "Pesticide Resistance: Assessment of Risk and the Development and Implementation of Effective Management Strategies". Pesticide Science. Society of Chemical Industry. 54. 435.

King, G., R. Keohane, and S. Verba (1994) Designing Social Inquiry: Scientific Inference in Qualitative Research. NJ. Princeton University Press.

Kwon, Y. Kim, D. Yim, K. (2001) "Herbicide-resistant genetically modified crop: assessment and management of gene flow". Journal of Weed Biology and Management. 1(2) 96.

Madsen, K. and P. Sandoe. (2001) "Herbicide Resistant Sugar Beet – What is the Problem?". Journal of Agricultural and Environmental Ethics. 14. 161.

Neil, F. (2003) "Food groups seek moratorium on pharma crops". Chemical Week. 165(7) 83.

Netting, Robert. (1986) "Cultural Ecology". US: Waveland Press, Inc.

Netting, Robert. (1993) "Smallholders, Householders: Farm Families and the Ecology of Intensive, Sustainable Agriculture". Stanford: Stanford University Press.

Niemczynowicz, J. (1999) "Urban hydrology and water management – present and future challenges". Urban Water. Elsevier. 1(1)

O'Hara, S. and S. Stagl. (2002) "Endogenous preferences and sustainable development". Journal of Socio-Economics. Elsevier. 31. 511.

O'Hara, S. and S. Stagl. (2001) "Global Food Markets and Their Local Alternatives: A Socio-Ecological Economic Perspective". Population and Environment: A Journal of Interdisciplinary Studies. Human Sciences Press, Inc. 22. 6.

Poonyth, D., P. Westhoff, A. Womack, and G. Adams. (2000) "Impacts of WTO restrictions on subsidized EU sugar exports." Journal of Agricultural Economics. 22.

Ragin, C. (1987) "The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies". Berkley: University of California Press.

Schiff, M. and A. Valdes. (1995) "The plundering of agriculture in developing countries". Finance and Development. 32(1) 44.

Schmidt, Peter. (1994) "Historical Ecology and Landscape Transformation in Eastern Equatorial Africa". *In* Historical Ecology: Cultural Knowledge and Changing Landscapes. Crumley, C (ed.) Pp. 99-126. Santa Fe: School of American Research Press.

Sowinski, L. (2002) "Looking for a kernel of truth in the GM corn debate". Journal of World Trade. 15(11) 70.

Stagl, Sigrid. (2002) "Local Organic Food Markets: Potentials and Limitations for Contributing to Sustainable Development". Empirica. 29. 145.

Stone, Glenn Davis. (2001) "Theory of the square chicken: Advances in agricultural intensification theory". Asia Pacific Viewpoint. 42(2/3) 163.

Sumner, D. (2003) "Implications of the US Farm Bill of 2002 for agricultural trade and trade negotiations". The Australian Journal of Agricultural and Resource Economics. 47(1) 99.

Todaro, M. and S. Smith. (2003) "Economic Development". London: Addison Wesley.
Van Mansvelt, J., D. Stobbelaar, and K. Hendriks. (1998) "Comparison of landscape features in organic and conventional farming systems". Journal of Landscape and Urban Planning. Elsevier. 41. 209.

Wells, B. and S. Gradwell. (2001) "Gender and resource management: Community supported agriculture as caring-practice". Journal of Agriculture and Human Values. 18. 107.

Yin, Robert. (1981) "The Case Study Crisis: Some Answers". Administrative Science Quarterly. 26. 58.

Zsolnai, Laszlo. (2002) "Green business or community economy?". International Journal of Social Economics. 29(8) 652.

FAO: Food and Agriculture Organization, United Nations
http://www.soel.de/inhalte/publikationen/s/74/7_6_northamerica_tab.pdf
http://www.organic-europe.net/europe_eu/statistics.asp

Appendixes

Appendix A – Student Survey Datasheet

University Students – Compilation of survey

Male:	6
Female:	4
Age 20-24:	9
Age 24-29:	1
Family owns farm:	8
Farm is organic:	4
Has experience farming:	3

Reason for organic, economic/nutrition/sustainability: 4/1/5

Comments about organics: Some students saw IPM as organic and many saw it as cheap. One considered the use of indigenous species to be part of organic.

Comments on differences between techniques: Large scale is too expensive for organic, food quality.

Challenges:

Land scarcity:	3	Soil:	3	Capital:	5	Export market:	2
Biotech:	1	Climate:	2	Pro-biotech:	3	Import Market:	2

Use pie chart for challenges and mention pro-biotech in text.

KIOF Students – Compilation of survey

Male:	10	
Female:	11	
Under20:	2	
20-24:	13	
25-29:	5	
Over 35:	1	
Family owns farm:	19	
Farm is organic:	9	
Has farming experience:	7	(Note that these students consider a couple years little experience)

Reason for organic, economic/nutrition/sustainability/other: 0/3/7/11
Other is the result of confusion regarding the questionnaire (a limitation).

Comments about organics:

Animal care:	3	It will provide employment:	2	Food security:	2
Biodiversity:	1	Health:	9	Yield:	6

Comments on differences between techniques: Labor intensive (7)

Challenges:

Government support:	2	Capital:	2	Land scarcity:	1
Market (export):	3	Employment:	3	Biotech:	1
Conversion time:	1	Conventional market:	2		

Note: Mostly KIOF students mentioned animal welfare, personal health/nutrition, and competition. While some university students specifically refer to food quality, most KIOF students remark on nutrition and toxin reduction through personal intake.

Appendix B – Vocational Student Interview Datasheet

Location	Name/Organization	Status/Training		Market	Subsistence	Comments
Nyandarua District	Endemi, KIOF Demo Farm	O	Y	3,4,5,11,12	5,21	Despite a shallow hardpan and cold climate, varied techniques produced healthy crops.
Tanzania	4H	O	Y	1,16,23,26	19, 26	Student reestablished crop rotation. Natural biocides were used as mixes due to uncertainty about application. The student and others there would like to perform chemical analysis to determine specific uses of the various plants.
Embu district. Runyenjes Division. Kagaari South	Macuno Integrated Community Development Program	I / T	YY Y	6, 13, 18, 24, 25, 28, 29	30,3 1	The farm had a very high level of collaboration between GOs and NGOs. As a community based project it also included a clinic.
Nyandarua district	Endemi, KIOF Demo Farm	O	Y	4,5,11,21	12, 23	As large scale organic production, the farm needed machinery to improve labor output. Good NGO coordination.
Nyanza province	ICIPE	I	Y	11,26,22,30	3,12, 30(i)	High temp., one rain per year, and rocky ground was difficult. High level of collaboration between farm manager, organization, and community. Natural biocides worked well. Farm needs wind breaks / wind borne insect control via trees.
Mwea. Kirinyaga District	Christian Community Services	O	YY	8,11,12,13, 14(*), 30(i), 31(i)	Sam e	A lot of compost was used. Great variety of crops, including indigenous. Excellent training and demonstration farms. * Did not do well.
Karagwe District, Tanzania	FADECO	O	YY	3,11,12,17,2 6,28	Littl e	Employment available for bananas. Computer classes available. No animals.
Machakos District	Mwala Integrated	C	N	None	30,3 3	Tools were not sufficient. Student improved compost and introduced other organic techniques
Karagwe District, Tanzania	FADECO	O	YY	3,11,12,17,2 6,28	Littl e	Needed appropriate technology: shade, irrigation, ‘rope and washer’, and leg vice.
Kahawa Sukari,	Penta Venture Farm	O	Y	None	30,	Techniques could use refining, including composting

Estate.					32	and double digging. Animals were treated well.
Embu	Plan International	T/ C	Y	11,12,23,26, 30	11,1 2,23, 30	Composting was very interesting to the farmers. There were little organic techniques before the student visit.
Nandi District	Rift Kenya Kobujoi Development Institute	T	N	30	30	Composting was advanced (using indigenous plants to enhance the process). Farm was able to find a local organic market.
Limuru District. Jerusha Nyambura	A touch of velvet	O	N	5, 11	10,1 2,17, 26	Ridges worked well, but raised beds lost soil to water erosion.
Muranga	Wangu Investment Company	O	N	2,14,18,28	Littl e	Good compost. Needs soil techniques, multi-cropping, and herbal medicine.
Tranzoia District	VI, Agroforestry Project	I	N	Little	30	Watermelon and cow peas did not do well. The student introduced appropriate technology: milking salve, to improve animal welfare, to prevent mastitis. Biogas collection had begun.
Nyeri District	Private food farm	I	N	20 (large scale)	2,18 (min or)	Natural pesticides worked well. Their techniques were lacking. The student recommends that they at least double dig.
Machako District	Mwala Integrated Child and Family Program (Organization).	N/ A	N/A	N/A	N/A	Mobilizing people through extension to learn how to generate income through organic farming, treat animals, and prevent diseases. The land was very dry and organic methods improved water cons. and fertility. Burning instead of composting.
Mt. Kenya Region	J K Ndathi Farm (Private)	C	N	14,30,33 (Mostly)	14,3 0,33	Not enough machinery for the size of the land. Farmers were impressed by organic techniques, especially as the student had to see a crop to harvest
Nyanza Province	Ugunja Community Resource Center	C	N	None	7,9, 30	Flooding was a problem. Terraces were built using a a-frame. Farmers worked only 2-3 hours per day, limiting the implantation of organic techniques.
Nakuru District	Baraka Agricultural College	I / T	YY	30	30	They employed alternative organic techniques, variations on the standard procedures (though serving the same purpose). Management was integrated with

						student activities. Bees were used in the 'bee development unit'. The students come from different places and even countries. Food processing was part of the project.
Embu	IRDP Integrated rural development Program. Diocese of Embu. NGO (Catholic organization)	I	Y	30	30	A well coordinated, community based program. Because poverty restricted access to water, the student felt that the organization should have targeted youth, especially for the construct of water storage tanks. Very small farms (plots). The student recommended to them that they increase biodiversity in order to increase sustainability. The farmers reacted very positively to information about organics. Financing for students and farmers was a problem, as the org. did not provide student travel expenses, and farmers had to register with extension agents for consultation.
Mbita field station (MPFS)	ICIPE	I	Y	None	30(i)	The settlement migrates and uses indigenous plants. After rains, the river lasts 1 month and vegetation survives only a couple weeks. Dairy cows do not survive the tse tse fly. Indigenous cows are able to survive. The soil is not permeable. Little water via water pans. There is a Lake Victoria less than 2km away, but irrigation does not take place due to a treaty with Egypt. Water scarcity results in many diseases.

Coding

1. Aborigine	6. Cassavas	11. Kale	16. Okra	21. Potato	26. Tomato	31. Cow peas
2. Avocado	7. Collars	12. Maize	17. Onions	22. Pumpkin	27. Watermelon	32(i). Fruits (indigenous)
3. Beans	8. Coriander	13. Millet	18. Papaya	23. Spinach	28. Bananas	33. Cereals
4. Carrot	9. Peanuts	14. Mangoes	19. Paprika	24. Sunflower	29 Sorghum	
5. Cabbage	10. Hot pep.	15. Biocide	20. Passion	25. S. potatoes	30(i). Vegetables (indigenous)	

C (Conventional), T (in Transition), I (Integrated), O (Organic) Y – YYY = Amount of training available at the farm

Appendix C – Farm Datasheet (Narok, Embu, and Naivasha)

Hectares Gender Comments

Narok

4	M	Had TV, from solar panel
2	?	Beans and maize intercropped
2	F	Collected water and grew some vegetables. Preserved milk.

Embu

5	M	Seasonal workers for tea and coffee harvesting / maintenance
5	M	Had creek as well as community irrigation
1	M	Terracing, ridging, and bananas for water conservation
1	M	Did not see animal facility, grew peas (rare)
1	F	Animals fed with road grass. Ridge system and bananas for water conservation
.5	F	Livestock on raised floor. Produced compost and teas.
.5	M	Advanced composting and natural biocide production and use

Naivasha

2	F	Livestock pasturing, crop rotation, extensive water storage
1	M	Extensive water storage and agro-forestry. Had just begun composting.
1	M	Intensive production, farmer was also a teacher
1	M	Intensive production with Pyrethrum for cash. Extensive testing of techniques and plant varieties.
.5	F	Multi-cropping with beans. She promoted it, but few listened much.

Hectares are estimated as such: over 2 acres = 1 Ha, under 2 acres = 1 Ha, under 1 acre = .5 Ha.

Appendix D - Demonstration Farms Datasheet

Location	Steward	Topography	Crops Produced	Comments
Marangua	F	Steep slope, floods	Bananas	The land required extensive labor. Needed community interaction for resource distribution (manure for composting) and flood control (additional labor).
Marangua	M	Slope and river	Vegetables	With additional labor, the land could be vastly improved. Appropriate technology required for irrigation efficiency (a well system to draw water from the river.
Marangua	M	Flat and river	Maize, Vegetables	The water table from the river provided natural irrigation. The farm was located near a main road. Production was limited by labor.
Gilgil	M	Flat, Semi-Arid	Vegetables	Had irrigation via tap water. Managed significant production on semi-arid land.
Endemi	M/F	Flat, Mountainous	Maize, Vegetables	Due to mountain rains, fertile soil, and 4 (instead of only 1 or 2) stewards provided extensive production. It is the greatest contribution to KIOF food production outside the main farm.

Key: M/F = Male/Female

Appendix E – Lecture Notes for Participatory Research

Introduction

The key to high, locally sustained yields: biodiversity building the soil and resulting from biodiversity in the soil

Crop trials – should decrease the farmers risk while producing food.

Agroforestry – biodiversity, edge zone, biomass production

Wetland preservation – pollution filter (human waste), water conservation, biodiversity, some production possible

Indigenous species – low maintenance, ecosystem compatible

Barriers to local self sufficiency

Conventional: I think we know most of these: Smallholders left mostly out of the market (Naivasha, note forest though). Embu has good cash crop. Damage to ecology and human health

Gm: (from the company who brings you biocides and synthetic fertilizers)

Promises: more production, less biocide use

Uses: bt, gly resis, legume

Risks: loss of biodiversity, native relative contamination, pest evolution, horizontal transfer of transgenic DNA via bacteria/virus, pharmaceutical production in plants not contained, and animal production not contained (pigs), corn not approved was in stores, corn not for planting ruined our most diverse collection of corn, in Mexico.

Local food self-sufficiency (largely the case with conventional as well)

Seed purchase required – supposedly to avert 'contamination and stealing'

Ecosystem changed by biocide use and lack of care for soil.

Farmer must buy or starve, as his land cannot grow real crops for a few harvests (of compost).

The areas' long developed, native crop could be altered (how long depends on how much, but the genes have already been shown to transfer to wild, native relative species and synthetic chemicals have affects long after the intended habitat alteration); thereby altering entire habitats and ecosystems in yet unknown ways.

The **US** is enjoying a boom (no pun intended), in the market of locally produced organic food (and thus local self sufficiency). There were only a few farms with guaranteed, private income in 1995, today there are over 1000. The system of agriculture is called CSA – community supported agriculture. The farm is run like a magazine subscription. The members buy shares of the harvest, like investing in companies. The farmer then uses this capital to produce a harvest and it is divided to shareholders. Generally, a large portion of the farm goes towards this production. Other portions are used previously mentioned farming activities. Additional benefits of CSA – (like a farmer's organization) Ecology based community learning and social interaction (this not being realized entirely in the US).

Kenya:

Local production predominant: marketplaces (urban areas).	Farmer's markets are significant portion of
Lack of 'organic' market:	Perhaps this is not what is necessary, as a 'guaranteed' market seems more the limiting factor to increasing voluntary labor input for the purpose of high health and production cultivation.

This cultivation would additionally build soil for future generations.

Why no CSA in Kenya?

Focus on organic market as opposed to a new system of agricultural production. Market risk - CSA can be a risk to food security. If there is a bad harvest, this risk sharing could extend malnutrition from one farm into the surrounding community. Assuming, however, that individuals continue to farm for personal sustenance on smallholdings, family efforts can reduce impacts. In the US, a bad harvest means having to buy food that is not fresh (from a market). In Kenya, it could mean less food. Where is the land for this community health center in places like Embu and Naivasha? And the irrigation in areas like Narok.

Conclusion

By the way, why doesn't Kanja collect rainwater? Can someone fix that? Naivasha had extensive water collection and suffered due to shortage of rain.

Precautionary principle, locally appropriate measures (UN, earth summit Rio 92, Agenda 21) vs. WB IMF

India thinks it can contain GMOs (cotton after WB Dev Rep 2001). Kenya is testing (potatoes, beets? …)

Organic is not the end of the journey, it is a stepping stone to human sustainability.