

WE ARE FARMERS: AGRICULTURE, FOOD SECURITY, AND ADAPTIVE CAPACITY
AMONG PERMACULTURE AND CONVENTIONAL FARMERS
IN CENTRAL MALAWI

By

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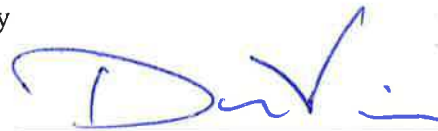
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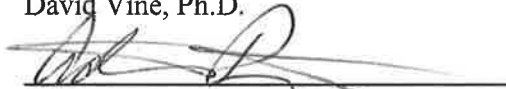
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WE ARE FARMERS: AGRICULTURE, FOOD SECURITY, AND ADAPTIVE CAPACITY

AMONG PERMACULTURE AND CONVENTIONAL FARMERS

IN CENTRAL MALAWI

BY

Abigail Conrad

To my grandmother, M. Elizabeth Terkoski, who first taught me what it means to be an anthropologist and to listen to one's fiddler.

ABSTRACT

Small-scale family farming to meet household food and livelihood needs is a central activity for most households in rural Malawi. Food insecurity and malnutrition are persistent problems for these farmers. Conventional agriculture techniques and maize production are the focus of most household farming, government agriculture policy, and agricultural development programs. However, conventional agriculture and maize production are expensive and unreliable in the short term, and environmentally and financially unsustainable in the long term. As an alternative, some NGOs and farmers in Malawi use permaculture, an agroecology design and low external input agriculture system. Previous research and NGO reports have pointed to benefits and constraints to permaculture adoption in Malawi.

For this dissertation, I investigated the relationships between agriculture practices and food security among smallholder conventional and permaculture farmers in Lilongwe Rural District in Malawi in partnership with two implementing permaculture organizations. Building on political ecology, the anthropology of food, structural violence, and permaculture literatures, I analyzed the impact of permaculture practice on farmers' agricultural practices, diet, and food security. This analysis showed that farmers who used permaculture experienced agricultural, environmental, livelihood, and food and nutrition security benefits in comparison to farmers who solely used conventional agriculture. These benefits were important given the context of structural violence in which farmers face systemic risk to impoverishment, food insecurity, and malnutrition. However, the benefits of permaculture use were constrained by the broader agro-food system, resource entitlements, and other structural constraints. The findings of this study add to our understanding of how smallholder farmers in Malawi can maneuver within the broader agro-food system, while pointing to potential strategies that farmers and organizations can use to try to address existing constraints.

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TABLE OF CONTENTS

ACKNOWLEDGMENTS	iv
TABLE OF CONTENTS.....	v
LIST OF ABBREVIATIONS.....	1
CHAPTER 1 INTRODUCTION: MALAWI’S AGRO-FOOD SYSTEM AND POLITICAL ECOLOGY OF PERMACULTURE IN MALAWI	2
Malawi’s Agro-Food System.....	8
Permaculture as an Alternative	19
Research Methods.....	23
Participant Permaculture Organizations and Farmers.....	30
Dissertation Framework.....	40
Outline of Chapters.....	44
CHAPTER 2 FROM COLONIALISM TO DEVELOPMENT: THE MAKING OF CONVENTIONAL AGRICULTURE IN MALAWI.....	46
Pre-colonial Agriculture (Prior to 1891).....	47
Agricultural Change During Formal British Colonialism (1891-1964)	50
Agricultural Change and Development Since Independence (1964-Present).....	59
Conclusion	74
CHAPTER 3 PERMACULTURE AS DESIGN SYSTEM, SOCIAL MOVEMENT, DEVELOPMENT APPROACH AND ITS APPLICATIONS IN MALAWI	75
Permaculture as a Movement.....	78
Permaculture as a Design System.....	81
Permaculture for Social Change	84
Permaculture in Malawi	85
Permaculture Definitions	88

Permaculture NGOs and Projects	92
Conclusion	101
CHAPTER 4 FOOD PRACTICES, TASTE, AND NUTRITION	103
Taste in Food Security and Malawian Cuisine	105
Food Access and Conceptions of Food Security	110
Food Security	111
Food Sources and Food Access	112
Food Processing and Practices.....	116
Cooking and Serving Food	117
Food Consumption.....	121
Malnutrition	125
Conclusion	133
CHAPTER 5 AGRICULTURAL LEARNING AND PERMACULTURE EDUCATION.....	135
Agricultural Learning and Decision Making	138
Conventional Agricultural Knowledge and Education	139
Permaculture Knowledge and Learning.....	146
Permaculture Organization Education	151
Permaculture Adoption	159
Conclusion	168
CHAPTER 6 FARMING NSIMA: CONVENTIONAL AND PERMACULTURE FARMING PRACTICES	170
Farming Cycle.....	171
Land Access and Use	173
Agricultural Labor	175
Conventional Agriculture versus Permaculture Practices.....	176
Permaculture Practice Levels.....	178

Soil and Water Conservation	181
Agrobiodiversity	188
Input Use and Farm Economics.....	194
Permaculture Farmers’ Use of Design System.....	200
Conclusion	206
CHAPTER 7 VULNERABILITY AND ADAPATIVE CAPACITY IN PERMACULTURE AND CONVENTIONAL FARMING SYSTEMS.....	
Farming Problems and Vulnerability.....	209
Environment.....	213
Livelihoods and Resource Access	219
Crop Health and Diversity	225
Skills and Information.....	229
Social Stigma and Permaculture	235
Limits of Permaculture	239
Building Adaptive Capacity.....	240
Conclusion	244
CHAPTER 8 FOOD SECURITY, DIET, AND HEALTH AMONG CONVENTIONAL VERSUS PERMACULTURE FARMERS	
Food Access and Food Security Changes.....	246
Food Consumption Changes.....	257
Health Impacts	271
Building Adaptive Capacity.....	273
Conclusion	275
CHAPTER 9 PERMACULTURE BENEFITS, LIMITATIONS, AND RECOMMENDATIONS.....	
Limitations and Future Research	282

Policy Recommendations.....	284
Implications for Development Sector	285
Implications for Permaculture Movement	287
Implications for Permaculture Projects.....	289
Conclusion	291
APPENDIX A PERMACULTURE PRACTICE RUBRIC	293
REFERENCES	295

LIST OF TABLES

Table 1. Livelihood Activities, n=41	38
Table 2. Permaculture in Malawi.....	93
Table 3. Foods Consumed by Conventional Farmers by Meal in 24-Hour Diet Recalls, n=95 .	123
Table 4. Sources of Permaculture Education, n=16.....	147
Table 5. Factors Farmers Reported that Encouraged and Discouraged/Constrained Permaculture Adoption	163
Table 6. Agricultural Land, by Ownership Type, n=41	174
Table 7. Permaculture Farmers’ Use of Permaculture and Conventional Techniques by Location, PF=16.....	175
Table 8. Practice Level Average Points per Rubric Category, PF=14, CF=24	178
Table 9. Permaculture Practice Level Factors, PF=14, CF=24	179
Table 10. Core Permaculture Practices Used by Permaculture and Conventional Farmers by Primary Function, PF=14, CF=24.....	186
Table 11. Crops Grown by $\geq 50\%$ Permaculture Farmers vs. Conventional Farmers by Location and Type, PF=14, CF=24.....	191
Table 12. Agricultural Problems Reported by Conventional and Permaculture Farmers in Ranking Exercise	212
Table 13. Agricultural, Environmental, and Livelihood Benefits Reported by Permaculture Farmers in Interviews, PF=15.....	226
Table 14. Constraints to Practicing Permaculture Reported by Permaculture Farmers, PF=15 .	239
Table 15. Food Security Category Criteria	253
Table 16. Food Groups Consumed by $\geq 50\%$ of Farmers by Diet Diversity Category, n=148..	260
Table 17. Impacts of Permaculture and Building Adaptive Capacity	277

LIST OF ILLUSTRATIONS

Figure 1. Map of the Central and Southern Regions of Malawi.....	4
Figure 2. Research Assistants Chisomo and Geoffrey and Me at a Permaculture Training.....	25
Figure 3. Aerial Photo of the Ulimi Centre (left); Ulimi Centre’s Market Garden and Classroom in the Background (right).....	31
Figure 4. Seating Area Next to Food Forest and Fish Pond at Everlasting Harvest (left) and Garden Bed with Bottle Irrigation (right).....	33
Figure 5. Maize Fields Surrounding a Village During the Rainy Season (left) and a Village During the Dry Season (right).....	36
Figure 6. Colonial Map of Nyasaland and the British Central Africa Protectorate from 1908	52
Figure 7 Density of Permaculture Organizations and Projects by District in Malawi.....	94
Figure 8. Permaculture Farmer Household (total of 2 adults and 7 children) with Food for One Day: White Maize Flour, Preserved Pumpkin Greens and Flowers	111
Figure 9. How to Make Nsima and Nsima Patties for Serving with Ndiwo.....	118
Figure 10. How to Make Typical Ndiwo from Greens (clockwise).....	119
Figure 11. Amayi Tembo Served Lunch Portions for Children Coming Home from School in the Afternoon, While Setting the Rest Aside for Family Members Returning Later in the Day	120
Figure 12. Food Group Consumption by Conventional Farmers by Month, CF=95.....	124
Figure 13. Seed Co. Store at Trading Center in Cluster B (upper left); Seeds at Government Feed the Future Event (upper middle); Fertilizer Bags at Government Warehouse (upper right); Pannar Sponsored Gule Wamkulu Performance at Soccer Event in Cluster A and B (lower left); Cow pea and Hybrid Maize Demonstration Plots at Government Research Station Field Day (lower right).....	142

Figure 14. Permaculture Ethics, Characteristics, Design Principles and Methods Taught by Ulimi and Everlasting Harvest	153
Figure 15. Farmer Permaculture Training at the Ulimi Centre Learning About Water (left); Using Beds in Staple Fields (upper right); How to Make a Compost Pile (bottom right)	154
Figure 16. Motivations Reported for Adopting Permaculture, PF=16	160
Figure 17. Permaculture Adoption Process	166
Figure 18. Examples of Permaculture Farmers' Gardens from Initial Stages of Permaculture Adoption to Intensive Implementation	167
Figure 19. Seasonal Calendar for Lilongwe Rural District Based on Participant Responses and Secondary Sources (FEWS NET 2013; GFDRR 2011:3)	171
Figure 20. Field with Maize Growing on Ridges During the Rainy Season with a Few Pumpkins Intercropped (left), and Dry Season Garden Planted with a Few Types of Vegetables in Long Raised Beds (right)	182
Figure 21. Examples of Permaculture Practices Used by Permaculture Farmers in Yards	183
Figure 22. Practices in Permaculture Farmer Yards: Tippy Tap Over Bed Intercropped Bed in Foreground (left); Banana Circle with Compost Pit in the Middle (right)	184
Figure 23. Maize as Far as the Eye Can See Near Cluster A.....	192
Figure 24. Distribution of Average Annual Input Expenses for Permaculture versus Conventional Farmers, PF=14, CF=25.....	199
Figure 25. Design Elements Used, PF=14.....	201
Figure 26. Bed Josephy Constructed Behind Bath Houses (foreground) to Keep Water Out of Open Well (background).....	203

Figure 27. Abambo Phiri, a Permaculture Farmer, Explains a Garden Bed Design to Maximize Land Use	205
Figure 28. Farming Problems and the Causes and Effects Reported by Conventional Farmers	210
Figure 29. Deforestation Shown by the Remaining Tree Clusters Being Graveyards and Smoky Haze from Burning Farmland and Forests During the Dry Season	211
Figure 30. Agrobiodiversity in Conventional Fields and Gardens Compared to Permaculture Gardens by Food Group, PF=14, CF=24	228
Figure 31. Pictures From a Home Economics Textbook Used in Secondary School Showing a Dirty Home (unswept, plants growing around home) vs. a Clean Environment (swept, no plants next to home)	237
Figure 32. Typical Village Home (left) Compared to the Mvulas' Home Who Were High Permaculture Practitioners (right).....	238
Figure 33. Impacts of Permaculture on Food and Nutrition Security, and Livelihoods.....	247
Figure 34. Mean Food Insecurity Score per HH by Sample, CF=28, PF=15	251
Figure 35. Food Security Categories by Sample, CF=28, PF=15.....	254
Figure 36. Diet Diversity Score, Conventional n=75, Permaculture n=51	258
Figure 37. Diet Diversity by Classification, Conventional n=93, Permaculture n=55	260
Figure 38. Food Group Consumption Differences, Conventional n=93, Permaculture n=55	261
Figure 39. A High Practitioner Permaculture Household with Good for One Day	263
Figure 40. Nutrition and Cooking Education with Participants.....	264
Figure 41. Food Practice Changes Reported by Permaculture Farmers, PF=12	265
Figure 42. Mixed Ndiwo that a Permaculture Farmer Started to Make After Starting to Use Permaculture	267

LIST OF ABBREVIATIONS

ADMARC	Agricultural Development and Marketing Corporation
EU	European Union
FAO	UN Food and Agriculture Organization
GDP	Gross Domestic Product
GMO	Genetically Modified Organism
IMF	International Monetary Fund
IPC	International Permaculture Conference and Convergence
MCP	Malawi Congress Party
NGO	Non-governmental Organization
NSCM	National Seed Company of Malawi
ODA	Official Development Assistance
PDC	Permaculture Design Certificate
SAP	Structural Adjustment Program
TA	Traditional Authorities
UDF	United Democratic Front
UK	United Kingdom
US	United States
USAID	United States Agency for International Development
WTO	World Trade Organization

CHAPTER 1

INTRODUCTION: MALAWI'S AGRO-FOOD SYSTEM AND POLITICAL ECOLOGY OF PERMACULTURE IN MALAWI

In the past decade, there has been renewed focus by non-governmental organizations (NGOs), private foundations, Western donor governments, and transnational agribusinesses on promoting the paradigm of conventional monocrop cereal production among smallholder farmers in sub-Saharan Africa. These efforts encompass typical development aid funding, such as agriculture, value chain, and food security programs, more recent public-private partnerships, such as the Alliance for a Green Revolution in Africa and the New Alliance for Food Security and Nutrition,¹ and resurgent agricultural input subsidy programs, as exemplified in Malawi's Farm Input Subsidy Program (FISP). By and large, these approaches ostensibly seek to improve smallholder agricultural productivity, food security, and economic status by increasing the adoption of "improved technologies" like hybrid seeds and synthetic fertilizer and expanding access to markets.

Such development efforts exist in Malawi where smallholder farmers in Malawi, who make up 78% of the adult population, suffer from impoverishment, malnutrition, illness, and other significant challenges (National Statistical Office 2011:36). According to the Malawian government, 50% of the population lives on less than a dollar a day (National Statistical Office 2012a:204). Chronic malnutrition causes stunting in 47% of all children under five, HIV

¹ The Alliance for a Green Revolution in Africa has been a focal point of renewed investment, which is largely funded by the Bill and Melinda Gates Foundation who have pledged \$3.2 billion (Bezner Kerr 2012:219, 221). Much of this funding is for "agricultural biotechnology and other intensive technological solutions, involving corporations such as Monsanto" (Bezner Kerr 2012:221). In 2012, the New Alliance for Food Security and Nutrition was started at a Camp David summit as a partnership between governments and private companies (ONE 2013:6). Under the New Alliance, over 60 companies have committed to invest \$4 billion (ONE 2013:6). A significant portion of the money comes from transnational corporations like Syngenta and Yara and targets sourcing and trading crops and investing in inputs and farming (Hong 2013).

prevalence is 10%, and life expectancy is 54 years (National Statistical Office and Macro 2011:130; Government of Malawi 2012a:2; UNDP 2012:154). Most farmers focus on maize production using conventional agriculture techniques, such as chemical fertilizer. However, many farmers are not able to produce enough food to last all year and have limited access to diverse foods, which contributes to persistent food insecurity, malnutrition, and impoverishment. As such, the success and failure of agriculture is vital to Malawian smallholder farmers who primarily depend on farming for their livelihoods.

In agriculture and food security policy circles, there is a long standing debate about what type of agricultural methods can effectively address climate change, environmental degradation, impoverishment, and hunger (Lyson 2002:193; Wegner and Zwart 2011:14–15; Rosegrant et al. 2014:xv). Debates about agricultural production methods, particularly in low-income regions like sub-Saharan Africa, pivot on the question of input use – whether production should be based on high external or low external inputs (Wegner and Zwart 2011:15, 35; Rosegrant et al. 2014:3).

An evaluation of these polarizing approaches involves exploring several key questions, including: What impact does agricultural technology change have on farmers’ livelihoods, access to food, and food consumption? How do farmers learn about and adopt different technologies? What role does crop diversity play in food consumption and nutrition?

In this dissertation, I explore these questions through a study of the relationship between agriculture, food security (see later in chapter), and food practices among smallholder farmers in Lilongwe Rural District in Malawi (see Figure 1). I worked with farmers who solely use conventional, high external input farming practices and farmers who use permaculture practices, a low external input agroecology design system. Malawi was an apt place to conduct this research, because it has an agrarian economy, farmers face compounding problems and systemic



Figure 1. Map of the Central and Southern Regions of Malawi

Source: Benson 2002, 6

vulnerabilities, and individuals and NGOs have taught permaculture in Malawi for the past twenty years. Further, Malawi is the only country in Africa, and one of the few in the global South, to have hosted an International Permaculture Convergence, the main international meeting of the permaculture movement.

Throughout much of the world, conventional high external input agriculture techniques include the use of inorganic fertilizer, hybrid seeds, pesticides, irrigation, mechanization on large-scale farms, and increasingly genetically modified crops (Lyson 2002:194; Stone 2010:382–383; Morgan and Murdoch 2000:163–165). One significant application of conventional agriculture was the “Green Revolution” in Asia and Latin America in the 1960s-

1970s. Many scholars attribute sizable yield increases and lower food prices to the adoption of hybrid cereal varieties, fertilizer, and often irrigation, which were key components of the Green Revolution (Eicher and Staatz 1990:9–10; Evenson and Gollin 2003:758, 760–762). Supporters further claim that the lessons from these successes and biotechnology advances can be applied to improve agricultural productivity in low-income countries, while also addressing concerns about climate change and sustainability (AGRA 2013:45, 164; Chang 2009:500–501, 511; Borlaug 2000:487–488; Bertini and Glickman 2013:11, 13, 19; The Montpellier Panel 2013:11–13). The main proponents of conventional agriculture have been European and North American universities, government agriculture departments, and transnational agribusinesses (Lyson 2002:194; Kloppenburg 2004:12–17, 158–160).

In contrast to conventional agriculture, low external input agriculture encompasses overlapping systems, such as organic, conservation, and biodynamic farming, and practices, such as organic inputs, no-tillage, and agroforestry (Vandermeer 1995:201–202). Proponents assert that these practices can improve yields while reducing input costs and conserving the environment, which can be especially appropriate for resource-poor farmers (FAO 2011:9; De Shutter 2010:3; UNCTAD 2013:2; Milder, Majanen, and Scherr 2011:1; Altieri 2002:1–2, 20–21). Support for low external input practices comes from a range of actors, including sustainable and organic agriculture, local food, and agroecology movements, and, more recently, from universities, the United Nations (UN), and NGOs (UNCTAD 2013; De Shutter 2010; Martínez-Torres and Rosset 2014; Parmentier et al. 2014; Wezel et al. 2009; IAASTD 2009).

Critics of conventional agriculture often argue that it threatens future food production by contributing to a reduction in soil fertility and biodiversity, pollution, environmental degradation, and climate change (Pye-Smith 2011:5; Nellemann et al. 2009:65; UNCTAD 2013:2). Some

critics also assert that high external input agriculture is not well suited to low-income smallholder production in sub-Saharan Africa, which is particularly vulnerable to climate change and environmental degradation (Wegner and Zwart 2011:8, 30; IFPRI 2013a:2–3; Nellemann et al. 2009:7–8, 33–34, 41–46; FAO 2011:7–8). Some also contend that conventional agriculture approaches often primarily focus on cereal production, which does not sufficiently address the fact that protein and micronutrient deficiencies from inadequate dietary diversity are significant causes of malnutrition in Southern Africa (Sullivan et al. 2006; Pinstруп-Andersen 2010:15, 23, 141–143; Romero-daza et al. 2009).

Critics of low external input agriculture typically argue that such techniques require more cultivated farmland, increased labor requirements, and have lower crop yields. As a result, low external input techniques can be less productive, efficient, and economically competitive than conventional techniques and can increase environmental degradation (Seufert, Ramankutty, and Foley 2012; de Ponti, Rijk, and van Ittersum 2012:1–2, 8; Trewavas 2001; Giller et al. 2009:25–29). Some also assert that low external input techniques can be inappropriate for labor and resource constrained farmers in sub-Saharan Africa for whom adoption of these techniques may be too difficult or risky (Giller et al. 2009:25, 31; Baudron et al. 2012:394, 405–408).

In Malawi, both “sides” of the debate tend to use the Malthusian specter of population growth for support, such as citing Malawi’s population density and growth rate. In addition, both sides often treat agriculture and food security as technical, rather than political, problems. For example, narratives surrounding the government’s Farm Input Subsidy Programme (Dorward and Chirwa 2011:237–241; Denning et al. 2009:7–8) and NGOs’ and the UN’s conservation

agriculture and climate-smart² initiatives (Thierfelder et al. 2013:47–48, 56; Andersson and D’Souza 2014:3–4; Mloza-Banda and Nanthambwe 2010:3, 65, 89; Kaczan, Arslan, and Lipper 2013:3–4, 9, 17, 19), center on farmers’ adoption of specific agricultural techniques with the aim of improving household food security, agricultural production, and environmental degradation in a context of climate change. By offering solutions largely based on agricultural technology change, actors, such as the Malawian government, the UN, and international NGOs, engage in depoliticized and partial discussions that elide questions of the right to food and economic equality in Malawi.

In light of these influential debates that shape agricultural policies and programs in Malawi, I explore permaculture as a form of low external input agriculture to analyze the impacts and limitations of its use for farmers. My initial encounter with permaculture occurred on my first trip to Malawi in 2006 during a tour of a small permaculture organization, Everlasting Harvest,³ in Lilongwe Rural District during an undergraduate study abroad trip. Everlasting Harvest presented permaculture to me as a panacea for the food insecurity and agricultural problems facing Malawian farmers. However, I wondered, if permaculture could solve these problems, why do few farmers use permaculture in Malawi? Why do few academic studies investigate, let alone support, permaculture?

During preliminary research on subsequent trips in 2008 and 2010, conventional farmers identified access to information about alternative farming methods as a significant constraint to

² Conservation agriculture focuses on minimal tillage, permanent soil cover, and crop rotation (Andersson and D’Souza 2014:1). Climate-smart agriculture is a blueprint for agricultural practices that improve productivity, adapt to climate change, and reduce greenhouse gas emissions, which uses various sustainable agriculture practices, such as conservation agriculture techniques, agroforestry, and organic inputs, depending on the context (Kaczan, Arslan, and Lipper 2013:3–4).

³ I use pseudonyms for farmers and the permaculture organizations I worked with (Ulimi Centre, Everlasting Harvest, and Community Health) to protect research participants’ anonymity.

solving agricultural and food security problems during interviews with me. Consequently, I became interested in the extent to which farmers could use permaculture to address their problems.

In 2010, I visited Everlasting Harvest, a new permaculture organization called the Ulimi (farming) Centre, and a permaculture project run by a global health non-profit called Community Health. A study on permaculture adoption in Malawi (Thornton 2008), my preliminary research, and reports from NGOs pointed to benefits from permaculture practices, as well as socio-cultural, economic, political, and environmental constraints to permaculture adoption. For this study, I evaluated the impacts of using permaculture by comparing the agricultural practices and food security of smallholder conventional farmers to farmers who use permaculture in Lilongwe Rural District in partnership with the Ulimi Centre and Everlasting Harvest. The central research question was, can smallholder farmers use permaculture to improve their household food security given cultural and structural constraints to the adoption and use of permaculture practices?

Malawi's Agro-Food System

The nature of food production in Malawi, and its concomitant vulnerabilities, exists within multi-layered agro-food systems. In academic literature, these systems are conceptualized as existing at the international, regional, national, and local levels, and consisting of actors, places, networks, flows, and structures through which food production and consumption take place (Kloppenborg, Hendrickson, and Stevenson 1996:34; Goodman and DuPuis 2002; Pinstrup-Andersen 2010:1). The actors and structures of broader socio-cultural, political,

economic, and environmental systems shape, and are shaped by, agro-food systems.⁴ Here I outline the main characteristics of these complex systems that are relevant to Malawi.

Sociologist Friedmann traces two fundamental changes in global agro-food systems – diets and cuisines changed with circulation of people and plants during European colonialism from the 1600s to mid-1900s; and power shifted from colonial states, mercantile companies, and farmers to transnational corporations and numerically to consumers with the rise of capitalism, industrialized agriculture, and food commodification after World War II (1995:17–22).

Agricultural trade later increased with the deregulation of trade since the Uruguay Round of the General Agreement on Tariffs and Trade in the 1980s and the establishment of the World Trade Organization (WTO) in 1995 (Phillips 2006:42). Shiva and Jonasse argue that the WTO unequally structures global trade regimes, often to the benefit of industrialized countries and agro-food corporations, by enabling predatory practices and monopoly control of major food chains and agricultural inputs (Shiva 2000:7–10, 17; Jonasse 2008:3).

The increasing consolidation of agro-food corporations, global interconnection, and transnationalization of food chains, although often uneven and incomplete, in part characterize the current global agro-food system (Goodman and Watts 1997:1–4, 14–15; Hendrickson and Heffernan 2002:347–350, 356–358). These trends have further entrenched the global South as a zone of cash crop and fresh food production for a minority of wealthy and often urban consumers within capitalist expansion and globalization (McMichael 2009:32; McMichael 1992:349; Goodman and Watts 1997:10–12), which began with European extraction of agricultural goods during colonialism (Davis 2002:299–300; Wolf 1982:313–342; Mintz 1985:41–44). Such

⁴ I use Giddens's differentiation that "systems... have structures," and are "reproduced relations between actors or collectivities, organised as regular social practices," and structures are "rules and resources, organised as properties of social systems" (1979).

integration and globalization has created greater vulnerability for consumers and producers who are alternatively incorporated or marginalized within the global economy according to anthropologists Marchione and Phillips (Marchione 2008; Phillips 2006:40–41). Several social scientists also argue that current trends of increasing food demand, fossil and bio-fuel use, food prices, financial speculation for food commodities, global land grabbing, and climate change are intensifying the vulnerability and inequality in the agro-food system (McMichael 2009; Vanhaute 2011; Clapp 2014; Holt-Gimenez 2008).

The above global trends are also present in sub-Saharan Africa. In addition, colonial rule (Berry 1993:14–18; Ng'ong'ola 1986:240–256; Chanock 1977; Rodney 1974:234–237), expanded market participation and competition (Barker 1989:17), and national food policies that favored urban populations from the 1960s to 1980s (Sandbrook 1985) significantly impacted the organization and form of smallholder agriculture. Many economies in the region remain heavily reliant on agricultural production and exports (Diao et al. 2012:2). In the 1980s and 1990s, the International Monetary Fund (IMF) and the World Bank were instrumental in instituting market deregulation through structural adjustment, such as removing agricultural subsidies and restructuring agricultural markets (McMichael 1992; Goodman and Watts 1997; Scoones, Devereux, and Haddad 2005). In the 2000s, local markets and populations negatively felt the impact of international price surges, inflation, currency fluctuations, and volatility and decline of commodity prices (Diao et al. 2008; Agarwal 2014; Minot 2013). As in the global agro-food system, agro-food corporations have growing power and market penetration, and food chains are becoming more global, such as through contract farming (Little and Watts 1994:54, 219); however, these trends are particularly selective and uneven in sub-Saharan Africa. Anthropologists Messer and Shipton assert that Anglo-American led development efforts, such

as the promotion of Green Revolution technologies, mechanized farming, and foreign crops, have provided little benefit to farmers (Messer and Shipton 2002:236–238). Others argue that the above processes broadly contribute to food dependency, production decreases, fewer small-scale farmers, land scarcity, and environmental degradation (Marchione 2008; McMichael 1997; Araghi 1995; Patel and Delwiche 2002).

Malawi's place in the global and sub-Saharan African agro-food systems is relatively minor, despite having an above average rate of participation in agriculture and relatively favorable agroecological conditions (Diao et al. 2012:245, 247). As anthropologist Ferguson observed about some other African countries (2006:14, 41), Malawi is at once selectively incorporated within and excluded from the global economy. Only a small portion of Malawi's agricultural exports go to other countries on the continent, while 44% goes to the European Union (EU) (Douillet and Pauw 2012:1–3). Malawi's primary export is unprocessed tobacco, followed by uranium and thorium ore, tea, and sugar (UN Comtrade 2010:1). In contrast, Malawi's major imports include medical supplies, petroleum, and fertilizer and major importers include South Africa, the EU, and India (UN Comtrade 2010; WTO 2014).

Malawi is the world's largest exporter of burley tobacco, primarily to US-based leaf-buying companies Universal Corporation and Alliance One International who sell the leaf to Philip Morris and British American Tobacco (Douillet and Pauw 2012:2; Otañez, Mamudu, and Glantz 2007:261). According to Otañez, Mamudu, and Glantz, these companies largely control the local tobacco market and drive Malawian trade policy generally (2007:261, 265).

Economists Douillet and Pauw conclude that within the sub-continent, Malawi is a relative loser in multilateral trade talks and trade integration, in part due to its reliance on raw tobacco exports to Europe and the United States (2012:2). Malawi's trade regime is one of the

most open in the world and includes a number of overlapping trade agreements and memberships (UNCTAD 2006). Malawi is a member of the Common Market for Eastern and Southern Africa, the Southern African Development Community, and the World Trade Organization (WTO). Malawi reduced agricultural tariffs and receives some trade preferences as a party to the Agreement on Agriculture under the WTO, the Cotonou Agreement with the EU, and the African Growth and Opportunity Act with the United States (Otañez, Mamudu, and Glantz 2007; UNCTAD 2006).

Agriculture is the basis of the Malawian economy and most Malawians' livelihoods. Malawi's economic development agenda concentrates on agriculture, because the sector employs a majority of the population and accounts for just over a third of GDP (Droppelmann, Makuwira, and Kumwenda 2012:1, 7). The agriculture sector is divided into the estate sector, which produces high-value export crops on freehold or leasehold land, and the smallholder sector, which comprises the majority of farmers who cultivate food and cash crops on inherited customary land (Harrigan 2003:847). The smallholder sector relies on maize and tobacco production, with key drivers including government policy, international commodity prices, maize prices, and rainfall (IFPRI 2013b:2). About 35% of land area is forested, and agricultural production takes place on almost all of the 59% of cultivable land (Saka et al. 2013:120; UNDP 2012:160).

Prior to colonization, agriculture in present-day Malawi included swidden management and diverse crop production including indigenous grains millet and sorghum (McCracken 2012:13). Farmers in present-day Malawi started incorporating indigenous Mesoamerican crops between the mid-1550s and mid-1800s. Maize likely arrived to Eastern and Southern Africa through Arab and Portuguese Indian Ocean mercantile trade routes. European missionaries first

recorded maize cultivation in the area in the 1850s (McCann 2005:29, 97–98; Miracle 1966:96–100). Maize became an important grain crop in present-day Malawi in the early 1900s and a staple by 1930 in response to powerful social, ecological, and political changes that resulted from British colonization in 1891 (see Chapter 2) (Vaughan 1982:359; McCann 2005:26). Today, maize dominates cultivated land area (Saka et al. 2013:123), and Malawians are the third highest per capita consumers of maize in the world through direct human consumption of white maize (McCann 2005:166). Due to maize’s agronomic characteristics, it can be particularly vulnerable to weather shocks, has higher nutrient requirements than most cereals, and is susceptible to pest damage and rot in storage (McCann 2005:7; Miracle 1966:11–13). Agriculture in Malawi is vulnerable to weather variations and shocks, because maize production is primarily rainfed (GFDRR 2011:1–3). Malawians’ reliance on maize contributes to food insecurity and malnutrition due to annual maize shortages and inadequate diet diversity (WFP 2012:41; Yeudall et al. 2007; Lin et al. 2007; Dickinson et al. 2009:3).

Although most Malawian farmers are smallholders, the government, tobacco leaf companies, agribusiness, donors, NGOs, and civil society organizations make up the dominant players, and often beneficiaries, in the agriculture sector according to development studies scholar Chinsinga (2011b:59). These actors primarily promote conventional agriculture technologies, such as hybrid seeds,⁵ chemical fertilizers, pesticides, and irrigation (Chinsinga 2011b; Bezner Kerr 2010:104). Foreign corporations sell the bulk of agricultural inputs in Malawi, offering farmers’ limited input options (Chinsinga 2011b:60–61; Holden and Lunduka 2010; Bezner Kerr 2012:224). US-based Pannar (now part of DuPont) and Monsanto and

⁵ In Malawi, genetically modified and engineered seeds are not yet commercially available and the government banned the importation of genetically modified food unless milled. However, this may change as the government is currently reviewing and testing GMO maize and other biotech crops for sale (AGRA 2013:65).

Zimbabwean-based Seed Co. dominate the commercial seed market in Malawi. The seed sector is also shaped by public institutions (i.e. Agricultural Development and Marketing Corporation, government research stations, etc.) and NGOs (i.e. Action Aid, Oxfam, CARE, World Vision, etc.) (Mloza-Banda, Kaudzu, and Benesi 2010:23). Norwegian-based Yara is a primary fertilizer supplier in Malawi, the only multinational fertilizer company in Africa, and a major promoter of recent green revolution efforts in Africa according to Holden and Lunduka (2010:6–7).

Major multilateral donors, such as the IMF, the World Bank, and the UN, and bilateral donors, such as the United Kingdom (UK) and the United States, help shape agricultural policy through funding and technical assistance. Milner contends that since the institution of IMF and World Bank structural adjustment policies in 1981, the Malawian government has had restricted agricultural development policy choices (2005:53–54). The government’s constrained policy choices have political implications, because, as Chinsinga and Eggen assert, agriculture and food security issues, particularly concerning maize, are pivotal political issues that shape local perceptions of government legitimacy (Chinsinga 2011b:59, 63; Eggen 2013:704–705).

Malawian civil society organizations (i.e. Civil Society Network on Agriculture, Farmers Union of Malawi, National Association of Smallholder Farmers in Malawi, etc.) and international NGOs (i.e. Total Land Care, Oxfam, Dan Church Aid, etc.) seek to influence agriculture and climate change policy through advocacy and lobbying (Chinsinga, Chasukwa, and Naess 2012:18–19). NGOs (i.e. Sasakawa Global 2000, ActionAid, Plan International, Heifer International, etc.) also influence farmers’ agricultural practices by providing agricultural inputs to farmers, building market infrastructure and agro-processing, and providing extension services (Masangano and Mthinda 2012:10–12; Milner 2005:55–58).

Chinsinga considers FISP, the national fertilizer and seed subsidy program, as an example of how scientific and development ideology and economic interests align among political elites, donors, and agribusinesses in the promotion of conventional agriculture in Malawi (Chinsinga 2011b:65–67). The implementation of FISP involves cooperation between the government, funders like the UK and Norway, input suppliers like Monsanto and Agricultural Resources Limited, agro-dealers, NGOs, and local chiefs (Chirwa and Dorward 2012:1–5; Dorward and Chirwa 2011:234, 238).

The agro-food system in the Central Region broadly resembles that of the rest of Malawi. In 2008, Lilongwe Rural District had the highest district population in the country with 1.23 million inhabitants (excluding Lilongwe city), which increases land pressure (National Statistical Office 2011:7). Despite proximity to Lilongwe city, subsistence farming is slightly more common in the Lilongwe Rural District than it is nationally, as the main job of 87% of the district's population over the age of 15 (National Statistical Office 2012b:68). The Kasungu-Lilongwe Plain livelihood zone, one of the government's livelihood zone categories based on geographical area and livelihood opportunities, farmers produce most of the food consumed in the area, grow tobacco as the main the cash crop, and raise little livestock (Malawi Vulnerability Assessment Committee 2005).

Impoverishment is pervasive, with 50% of the population of 15 million living on less than a dollar a day (National Statistical Office 2012a:204).⁶ The food and agricultural problems facing smallholder farmers today have been in the making since the late-1800s as Malawi's agricultural system changed with the Columbian Exchange, migration, the slave trade, British

⁶ The poverty line is set at total consumption below MK 37,002 per year (\$246.68 or \$0.67/day). Using the MK 150 to 1USD exchange rate from February/March 2010 that was used to determine the poverty lines (National Statistical Office 2012a:203).

colonialism, environmental degradation, capitalism, and globalization (see Chapter 2) (Mandala 2005). While Malawi has made some progress in improving food security and nutrition over the past two decades, food insecurity and chronic malnutrition remain severe (National Statistical Office and Macro 2011:130; Government of Malawi 2012a:2).

Impoverishment, poor agricultural production, and food insecurity among Malawian smallholder farmers persists within a detrimental systematic cycle. Many farmers with whom I worked presented impoverishment and material deprivation as an everyday fact of their lives and lived experiences.

On a macroeconomic level, limited economic and agricultural diversification contributes to impoverishment in Malawi. Some authors propose that impoverishment has remained high because colonial and post-independence government policies restricted smallholder farmers' economic opportunities (Ellis, Kutengule, and Nyasulu 2003:1504–1505; Droppelmann, Makuwira, and Kumwenda 2012:12). Today, there is little opportunity for nonfarm labor, because of poor transport and electricity infrastructure, sparse market linkages and integration, the high cost of doing business, and limited access to credit (Droppelmann, Makuwira, and Kumwenda 2012:16–19; Milner 2005:47–48). National and development policies often emphasize the need to improve the agriculture sector to reduce poverty (Chirwa, Kydd, and Dorward 2006:16–17). According to Otañez, Mamudu, and Glantz, the economy's reliance on tobacco, and trade policies that primarily benefit countries and corporations in the global North, contribute to impoverishment by reducing the price farmers receive for tobacco (2007:262). Droppelmann et al. also conclude that the economy and agriculture sector must diversify away from maize and tobacco to reduce rural poverty (2012:1, 12).

Many scholars point to land appropriation during colonialism, and subsequent biased land policies and unequal land distribution, as a key cause of impoverishment in Malawi (Milner 2005:45–46; Peters 2002:159; Kanyongolo 2008:83–34). Today, Malawi is one of the most densely populated countries in Africa and one of the least urbanized in the world (Droppelmann, Makuwira, and Kumwenda 2012:4). Land held privately increased under government neoliberal economic policy, which decreased land available under customary inheritance for smallholder farmers (Kanyongolo 2008:91). Since at least the mid-2000s, competition and conflict over land has increased with population growth and increased mobility, social differentiation, economic inequality, and agricultural intensification and extensification (National Statistical Office 2010:xi; Peters and Kambewa 2007). Some participant farmers reported such increased competition and conflict, particularly given their proximity to Lilongwe city.

Mussa and Pauw conclude that smallholders face multiple types of vulnerability that increase households' likelihood of being poor – namely, climatic shocks, environmental degradation, price volatility for crops, and health crises (2011:2). Malawi's agriculture sector is primarily rainfed and so is highly vulnerable to climate change and weather shocks (Saka et al. 2013; Chinsinga, Chasukwa, and Naess 2012). Rainfall in Malawi has high annual variability, and droughts and floods have occurred with increased frequency and severity in the last two decades (GFDRR 2011:1–3). Climate change models predict that climate change will increasingly have a negative effect on agricultural production in Malawi as temperatures increase (Saka et al. 2013:142). A high portion of farmers experience annual food deficits that require farmers to purchase food and divert money away from investment in livelihood activities (Ellis, Kutengule, and Nyasulu 2003:1504). According to the UN, food price volatility is higher in Malawi than most other sub-Saharan African countries (UNDP 2012:164–165). Chirwa, Kydd,

and Dorward write that maize price spikes during the hungry season make it difficult for farmers purchase food in times of shortage (2006:2–3). Limited public services and safety nets further contribute to impoverishment, particularly poor education and health services (Benson, Chamberlin, and Rhinehart 2005:543, 546–547). Malawians experience a high disease burden and the health sector’s capacity is severely limited and highly dependent on donor funding (WHO 2014; Bowie 2006; Zere et al. 2007:76–78; Chirwa 2013:iii, 7–9). As a result, systemic limited access to food, land, labor, employment, and environmental resources compound and result in food insecurity according to geographer Bezner Kerr (2005a:61).

In the face of limited land availability, environmental degradation, and climate change, farmers often rely on purchased agricultural inputs to maintain agricultural production. Farmers often own few livestock to provide manure or draft power (Carr 1994:34), which Ellis, Kutengule, and Nyasulu write has been critical to poverty alleviation in other countries (2003:1501–1502). Chinsinga argues that the liberalization of the agriculture sector has restricted farmers’ access to agricultural inputs because of decreased investment in public research and seed breeding, increased response of agro-dealers to political and profit interests rather than farmers’ needs, diminished availability of open-pollinating and indigenous seed varieties, and higher inputs costs (Chinsinga 2011a). Some farmers can access fertilizer and hybrid maize seed inputs at a highly subsidized rate through FISP, but the program does not provide enough inputs for farmers, is fiscally unsustainable, and emphasizes maize production (MAFS 2007:xvii).⁷ Farmers use these inputs to contend with environmental problems in the present; however, input use is not a sustainable coping strategy and does not address the underlying problems of soil infertility and inadequate rainfall that make them necessary on an ongoing basis. In addition,

⁷ FISP has accounted for 40% to 70% of government agriculture budget (Ricker-Gilbert, Jayne, and Shively 2013:337).

these inputs are primarily used to increase maize yields, which fails to address the issues of food quality and malnutrition associated with predominately maize-based diets (GFDRR 2011; Oxfam International 2009; Pinstrup-Andersen 2010; Bezner Kerr 2012). Indeed, despite a national maize surplus since 2007/08 after FISP implementation in 2005/06, there was an increase in rural poverty and food insecurity in 2011/12 (IFPRI 2013b:2).

Rural households in Malawi experience “layered vulnerabilities” (Saxton 2013:61) and possess few alternative livelihood opportunities outside of farming. Therefore, it is in light of the multifaceted problems and vulnerabilities within Malawi’s agro-food system that alternative agriculture strategies gain potential relevance to smallholder farmers.

Permaculture as an Alternative

Agroecology is one form of low external input agriculture. Agroecology applies ecology to agriculture (Wezel et al. 2009) by “focus[ing] on the forms, dynamics and functions of interrelationships among environmental and human elements” according to Uphoff (2002:41). Agroecologist Altieri asserts that agroecosystems aim to mimic ecosystems, “thus exhibiting tight nutrient cycling, complex structure and enhanced biodiversity” (2002:8).

Permaculture, a contraction of permanent agriculture, is a design system for the application of agroecology. Bill Mollison and David Holmgren developed permaculture in Australia in the 1970s based on agroecology and indigenous farming systems (Mollison 1988). The techniques used in permaculture are not unique to it, but draw from other agricultural and land management practices and farmers have used them around the world historically (see Chapter 3). According to agroecologists Ferguson and Lovell, a global permaculture movement disseminates and uses the design system and associated practices (2013:5).

In Malawi, some farmers use and organizations promote permaculture with the stated goal of trying to address the food and farming problems facing smallholder producers. Wilson, a lead Malawian permaculture trainer at the Ulimi Centre (Ulimi) told me that permaculture is “a design system that create[s] harmonic integration between people and nature for [their] mutual benefit,” as he often defined it during educational activities and public tours of Ulimi.⁸ Wilson’s description of permaculture builds on international permaculture definitions and seeks to convey Ulimi’s approach to permaculture education and implementation (see Chapters 3 and 5). The permaculture farmers who participated in the study generally viewed permaculture more narrowly as an agricultural method or design system (see Chapter 3). In practice, permaculture plots in Malawi are often organic, low-input, and biodiverse, and farmers used techniques like intercropping, planting trees and perennials, and resource recycling (see Chapter 6).

There are numerous permaculture projects globally, including at least eighty-seven in Africa (Permaculture Research Institute 2010). However, they are largely disparate, small-scale projects. Permaculture is not widely known in agriculture or development sectors and has failed, thus far, to draw broader funding and policy support for several reasons. First, the small-scale, grassroots nature of permaculture, while part of its strength, contributes to its slow dissemination and minimal visibility. Second, permaculture is a design system, rather than an easily replicated model, which makes it more difficult to teach and adopt than a typical agriculture project. Further, permaculture challenges how governments and NGOs usually teach people to farm. Scientists, governments, and agribusinesses have devalued and eroded indigenous farming knowledge, like that used in permaculture with the imposition of monocropping and Green Revolution technologies. Third, skepticism remains about whether organic, labor intensive,

⁸ I conducted this interview with Wilson at Ulimi on July 3, 2012 in English.

small-scale farming can meet people's food needs. There has not been enough documentation or research on permaculture to evaluate its impact or its application on a large scale (Ferguson and Lovell 2013:2; Holmgren 2006:7). Academia has not seriously engaged with permaculture, and companies do not have a profit incentive to research and disseminate it (Veteto and Lockyer 2008:49, 54; Ferguson and Lovell 2013:4).

Permaculture practitioners have written most of the existing permaculture literature. Anthropologists Veteto and Lockyer state that permaculture "has largely been ignored" in academia generally, and in anthropology specifically, because it was developed when discrete disciplinary approaches were well not suited to address the holistic approach of permaculture (2008:49). Agroecologists Ferguson and Lovell assert that inconsistent permaculture definitions may "cause confusion and hinder rigorous and systematic discussion" (2013:2). Permaculture has thus remained marginal and often seen as idealistic and impractical (Veteto and Lockyer 2008:49; Holmgren 2006:5).

Academics have explored diverse topics in relation to permaculture; however, significant gaps remain in scholarship on permaculture. A number of academic articles on permaculture focus on foundational permaculture texts rather than presenting empirical data (Jungck 1985; Mannen et al. 2012; Peeters 2011; Veteto and Lockyer 2008; Domanique 1989; Michael and Meacham 2001). Others describe the application of permaculture in various contexts, while offering limited critical analysis (Lockyer and Veteto 2013:113–205; Peeters 2011; Mukute 2009; Leahy 2009; Arko-Achemfuor 2014).

A few social scientists productively explore permaculture development and activism. Anthropologist Gold analyzes the use of permaculture in development and revolutionary discourse in Cuba to show how the concept is used to attract donor funding and inserted in

national environmental discourse that serves revolutionary political and ideological goals within Cuba (2014). Kelly and Kelly discuss permaculture education in El Salvador and found that educators' were able to teach permaculture in a way that was practically relevant to participants and that can contribute to future resilience and peace building (2013). Sociologist Furze analyzes the application of permaculture in a rural land-sharing collective in Australia and found that members were unable to implement permaculture because they disagreed on interpretation, did not develop a strategy for change and conflict resolution, and remained isolated and viewed as illegitimate in the wider community (1992:151). English and cultural studies scholar Lewis uses practice theory to analyze "permablitz" activities in Australia, in which permaculturalists gather to collectively transform suburban spaces by implementing permaculture designs. Lewis discusses permablitzes as a form of green, lifestyle activism in which people try to create change by developing sustainable forms of living in their everyday lives (2014).

There is some academic work on permaculture in southern Africa. Anthropologist Perry discusses the relevance of permaculture in South Africa, the application of permaculture in Xhosa homesteads, and critiques dominant development models used in the Eastern Cape (2013). Environmentalist Mukute conducted research with a small group of permaculture farmers in Zimbabwe and found that farmers were primarily motivated to practice permaculture to increase food production, generate income, and improve their resource base (2009:151–152). Public health researchers Wills, Chinemana, and Rudolph discuss a permaculture urban food garden in South Africa, finding that while the garden focuses on food production, the project helps to build human, natural, economic, and social capital (2009).

The most in-depth academic work done on permaculture in Africa has been through Master's theses and Doctoral dissertations. Phillips (1999:115, 137) and Thornton (2008:32, 42–

43) discuss the varying degrees of permaculture implementation and found obstacles to permaculture practice, including limited organic and permaculture farming knowledge, a lack of resource access and control, public perception of permaculture, and problems within NGO programs (Peck 2004:207; Phillips 1999:107–108, 126, 144; Thornton 2008:35, 37, 53). Despite these obstacles, they state that permaculture helps to improve food security and livelihoods and regenerate the environment. Peck (2004:104, 116), Phillips (1999:106, 134–136), and Thornton (2008:44, 48–49, 54) however provide limited evidence about the benefits of permaculture. Thornton did not find conclusive predictors for permaculture adoption in Malawi, but found that adopters were positive deviants within their communities and adoption was associated with age and land ownership (2008:52–53). These academic works provide useful entry points to understanding permaculture practice in southern Africa, while leaving questions and a need for further data collection.

Research Methods

I conducted research from September 2011 to July 2012 using a mixed methods approach drawn from ethnographic, food security, and rapid rural appraisal methods that I developed in consultation with Everlasting Harvest and the Ulimi Centre. After learning about and visiting the organizations, I approached them about hosting my research project. The organizations did not pay me, however they gave input about the work, facilitated my entry in communities, and Ulimi provided me with free housing. The organizations' primary interest was that I research the food security and diet impacts of permaculture application, farmers' motivation for adoption, and the constraints farmers faced. The organizations explicitly wanted to be able to present the research results to potential donors and policy makers, particularly because there is limited academic and program evaluation data about permaculture. Therefore, I incorporated structured methods to

allow for systematic comparison between households who used permaculture and those who did not. In addition, using structured methods was necessary to collect and analyze quantitative data that donors and policy makers often view as legitimate.

I did not overtly feel pressure to find particular results during the research, although throughout, I reflected on the organizations' and my interests and farmers' perceptions of those interests. I also explicitly discussed with research participants that while I was working with the organizations, I was not an employee and that their individual responses would remain confidential and were unrelated to any current or future NGO projects. Research participants may have nonetheless told me what they thought I wanted to hear or that would enable them to benefit from future NGO projects. In particular, participants may have downplayed the constraints they faced implementing permaculture, although I tried to emphasize to farmers that I wanted to know about their thoughts and experiences.

I conducted research with local research assistants Geoffrey Mlongoti, whom I had known for the prior five years, Chisomo Kamchacha, and Enock Chitheka who translated from the local language, Chichewa, and helped design and conduct the research (see Figure 2).⁹ Sia Mwale also helped transcribe and translate interview recordings. All are trained translators who had experience prior to working with me. Throughout, I refer to “we” or “us” when discussing interactions or activities involving me and one or more of my research assistants to acknowledge their role. Through previous experience in Malawi, studying, tutoring, and daily practice, I learned relevant food and farming vocabulary and reached a limited working proficiency in the language. I was able to engage in informal conversations and understand the general content of

⁹ I was unable to find a female research assistant. I had this problem during a previous research project where we could not find a woman who was fluent in English and able to stay somewhere without a family member. During that project, I found that my position as a woman helped encourage women to talk about female issues because they thought I would be interested as a fellow woman even though I had a male translator. I think the open disposition and relative social positioning of the male translators as young, unmarried men helped as well.

interviews and NGO activities. I developed relationships and conducted interviews in English with most NGO employees and six participant farmers. My language ability was a limitation and particularly precluded participant observation in many circumstances. However, it was not



Figure 2. Research Assistants Chisomo and Geoffrey and Me at a Permaculture Training

prohibitive given our use of formal interviews and structured questionnaires and the research focus on farming practices and food security. Further, I was very cognizant of the potential problems posed by translation and that translation is a social act with political implications (Rubel and Rosman 2003:15, 18; Agar 2011:4–6; West 2005:633, 639). My research assistants and I discussed translations issues at length at beginning of the study and continued to discuss translations throughout.

Geoffrey, Chisomo, and Enock were collaborative partners in the research. They helped improve the quality of the research and provided invaluable information and insights throughout. They facilitated entry into the communities, ensured cross-cultural understanding, improved the relevance of the research questions, increased our productivity, and developed relationships with some participants better than I could. Chisomo in particular has maintained an ongoing relationship between the research participants and permaculture organizations, through which farmers have learned about the research results.

We used cluster sampling to select ten villages in three clusters near the organizations where some farmers practiced permaculture. The Ulimi Centre was located a few kilometers

from Clusters A and B. Everlasting Harvest is situated in Cluster C. At the start of the study, Ulimi was just beginning a project with Ufulu (freedom) Farming Club, a farmer cooperative in Cluster B, and planning to begin a project with villages in Cluster A. Everlasting Harvest was working with the villages in Cluster C at the time. After selecting the villages, we discussed the study with local chiefs and received their permission to conduct the study.

Next, we recruited two sample groups – one consisting of farmers who used permaculture and another of those who did not living in the same villages. A total of 44 households (HH) consisting of nuclear family groups living together were recruited to participate in the study.¹⁰

The permaculture farmer sample group (referred to as permaculture farmers or PF) consisted of 16 households. This group included all of the households in the villages who were practicing permaculture when we enrolled participants in the study in 2011, and an additional two households who volunteered to participate after adopting permaculture through participation in an Ulimi program during the study.

For the purposes of this study, we treated permaculture as an agroecology design system because that is how the farmers primarily understood and used it. We determined three criteria for permaculture adoption, regardless of scale: (1) self-identify as practicing permaculture (pemakacha) because some others use similar agroecology practices without knowing about permaculture; (2) exposure to demonstrations or information about permaculture from an NGO; and (3) intentional use of multiple permaculture practices in one place. For instance, we counted a farmer as practicing permaculture if s/he constructed beds in their yard, intercropped several

¹⁰ We used the household unit for sampling and much of the analysis because it is at the nuclear household level that food production and consumption take place, although households often live near extended family. As anthropologist Peters writes, the household unit (banja) consisting of spouses, their children, and possibly a few other relatives are a major village social unit and situated within broader social relations and lineage structures (2010:183–184). We were not always able to get to know everyone in a family, because some adults were often away working or caring for other family members, and a few young women never became comfortable talking with us due to power differentials and in deference to their husbands.

crop varieties, used organic inputs, and watered plants using greywater with the intent of practicing permaculture. In contrast, there were farmers who did not meet these criteria. For example, a few farmers participated in introductory permaculture trainings but did not self-identify as using permaculture even though they intended to adopt it, because they had only tried one new practice in isolation, such as making compost or growing one crop variety organically.

For comparison, we selected a control farmer sample group (referred to as conventional farmers or CF) consisting of 28 conventional farming households living in each cluster. We selected 20 households using the random-walk method (ask households to participate while walking through a village using a random starting point) and quota sampling (skipped households during random-walk if demographic quotas were filled so participant demographics were similar to district proportions) (Magnani 1997:30–31; Bernard 2006). Eight households who were participants in an Ulimi program volunteered to participate and were ultimately included in this group because they did not adopt permaculture by the end of the study.

According to the UN Food and Agriculture Organization's (FAO) widely used definition, food security refers to people's "physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (Food and Agriculture Organization 1996). Food security is a process embedded within broader socio-cultural, ecological, economic, and political contexts and structures (Vanhaute 2011:49; Fazzino 2004:154; Lappé, Collins, and Fowler 1977:100; Bezner Kerr 2005a).¹¹ Food sovereignty was developed in the 1990s to critique of food security as part of the development paradigm that stresses national and household food self-sufficiency in a liberal market economy (Boyer

¹¹ Theories of famine have been instrumental in shaping understandings of the causes and impacts of hunger and food insecurity (Vanhaute 2011:48). The first definition of food security in 1974 focused on food availability (Baro and Deubel 2006:525; Pottier 1999:11). Both theories of famine and food security shifted to focus on individual and household food access and entitlements in the 1980s based on Sen's work (Baro and Deubel 2006; Pottier 1999; Edelman 2014).

2010:322, 330–331; Duffield 2001:100). Food sovereignty centers on one's access to productive resources (Windfuhr and Jonsén 2005:22) and control over food, often at a national level, within the power structures and hierarchies of the global food system (Msachi, Dakishoni, and Bezner Kerr 2009:701; Patel 2009:668; Boyer 2010:331,343). I recognize limitations of the concept of food security; however, for this study I assessed food security to determine the impact of permaculture application on household food access, not households' or communities' access to productive resources, as an assessment of food sovereignty would measure.

We collected data on four key components of food security – food access, experience of food (in)security, food consumption, and food production. During multiple seasons, we repeated a food security assessment and 24-hour diet recall (Kennedy, Ballard, and Dop 2011; Perez-Escamilla et al. 2004). We conducted interviews and focus groups with participants on their food and farming practices and questionnaires on agricultural production and household characteristics. With the permaculture farmers, we also conducted interviews and focus groups on how permaculture practices affected their crop production, agricultural labor, land use, land quality, livelihoods, food access and consumption, and health. We also completed interviews with a few permaculture organization employees about their views on and use of permaculture, with village chiefs about local history and problems, and clinic health workers and traditional healers about health problems and locally available medical care. We completed 185 interviews, 10 focus groups, and 237 surveys.

Informal conversations and socializing in addition to participation in farming, food preparation, and meals were an important part of the research. It is a limitation that I did not do more of this informal socializing and participation with farmers, which was in part due to

logistical constraints, methodological choices, and language limitations.¹² We participated in activities with farmers in their homes, fields, and gardens to learn about and document practices including planting, cultivating, and harvesting crops, as well as cooking, food processing, and consumption. We also observed malnutrition clinics at the Cluster B clinic to learn about how they discuss and treat malnutrition. At times during these activities, my gender positioning was somewhat flexible because of being white, which enabled me to access customarily female and male spaces.

We observed and participated in NGO activities. We observed 75 hours of farmer training, demonstration tours, and outreach activities to learn how the organizations' personnel discussed, taught, understood, and used permaculture and how participant farmers received those messages. Ulimi and Everlasting Harvest largely functioned in English. As a resident at Ulimi, I participated in everyday activities. In particular, I learned a significant amount about how to farm through embodied experience. During cooperative weekday farm work, I learned to maneuver a hoe – how to position my feet, hips, and back, hoist the hoe and shape the earth until my arms shook and ached. Then a male Malawian colleague would direct me to a less physically demanding task, such as mulching under newly planted trees or weeding. Ulimi's farm routine was part of my daily routine, such as growing and harvesting food for dinner, caring for chickens, weekly harvesting and packaging of crops for sale in Lilongwe, and giving tours.

I developed friendships with NGO employees and many research participants. My relationship with some research participants was more of one between a teacher and student or aunt/uncle and niece. As an unmarried, childless woman who was still in school, many farmers saw me as a young woman who was not quite an adult. This positioning seemed to help some

¹² Chichewa is not a widely spoken language and there are few instruction materials; therefore, I had limited ability to study it prior to conducting research.

participants feel comfortable sharing information and instructing me about different topics despite obvious power-laden racial and wealth differences.

The mixed methods approach that we used had several advantages. Using ethnographic research methods, we spent time learning from farmers through interviews, focus groups, discussions, observation, and participation in activities. The qualitative data was necessary to contextualize the quantitative data gathered and shape statistical analysis. Further, using multiple types of data allowed us to analyze and verify results from multiple sources. Anthropologist, Peters argues that this complementary methodology is particularly useful for understanding complex, interconnected topics like farming and food security in Malawi (1999).

Participant Permaculture Organizations and Farmers

A group of foreigners and Malawians founded the Ulimi Centre in 2009 as a Malawi-based NGO focused on permaculture demonstration and education. Ulimi lies on the very edge of Lilongwe city boundaries, with dirt roads, electricity, but no running water. On one side of Ulimi is a large government complex and boxy two-story homes, and on the other, is a large forested estate with a dairy and high-end lodge that separates Ulimi from nearby villages with whom it works and where several employees live. The owners of the estate, a white South African family, allow Ulimi to operate on part of its 650-hectare property, and as a result, sit on Ulimi's board. Ulimi provides training to smallholder farmers on permaculture design and agroecology techniques and works to help farmers implement permaculture through outreach and extension work and limited material support like seeds. Its main demonstration site is the largest permaculture demonstration site in the country at about thirty hectares (see portion in Figure 3). It aims to be entirely Malawian run, and it has made significant progress in hiring Malawian staff in all positions, including people from surrounding villages and in management and technical



Figure 3. Aerial Photo of the Ulimi Centre (left); Ulimi Centre's Market Garden and Classroom in the Background (right)

Photograph: Austin Dunn (left), Oliver Cripps (right)

positions. Before 2010, Ulimi had very limited funding, so foreigners, who were often white, helped run farm operations and programs and do other skilled tasks like accounting on a volunteer basis or while receiving low stipends.

Ulimi's primary projects are in Lilongwe Rural and Dowa districts in which they train smallholder farmers in permaculture design and agroecology techniques. Ulimi helps farmers implement permaculture in their villages and agricultural production through outreach and extension work and limited material support like tree seeds. Since 2012, Ulimi has expanded its permaculture training and extension work to more farmers, villages, and districts, including a new project targeting 15,000 farmers in Mzimba, Nsanje, and Thyolo Districts. Ulimi also has an edible, leguminous, and biofuel tree-planting project and provides training to other organizations' employees, such as through an apprenticeship program. In addition, Ulimi advocates for permaculture and agroecology at a national level through networking, local media, and participation in NGO and government dialogues.

Ulimi initially tried to be self-sustaining by funding its activities through course fees and selling produce grown at its demonstration site. However, that model was not viable. In 2012,

Ulimi generated \$24,000 in revenue. In 2013, Ulimi's financial situation significantly changed as revenue increased to \$125,000, which enabled the center to raise salaries, hire more staff, improve center facilities, and expand programs locally and in Dowa district. The majority of Ulimi's funding comes from Scottish Government grants and small amounts of funding have come from the Nordic Development Fund, the Canadian-based Red Soil Project, the US Agency for International Development (USAID), and the US Peace Corps.

I lived at Ulimi during the study in converted stables with dirt floors and towering thatch roofs, with a mix of young, mostly white foreign volunteers, interns, and staff. In the building next-door, Wilson, the Malawian outreach and operations manager, lived with his young son and wife, Rachel, who managed Ulimi's intensive home garden and food forest demonstrations and was in charge of cooking lunch for the staff. While I was at times out of place as neither a staff member, intern, or short-term volunteer, I quickly became incorporated into the daily routine for Ulimi volunteers and resident ex-pat staff – communal dinners, cooking and dish rotations, bucket baths, garden work, chicken care, and morning farm chores with all Ulimi staff on weekdays.

Everlasting Harvest was not a registered NGO, though it functions as a community-based organization. The Smiths, a family from the United States, runs Everlasting Harvest out of their home, nestled in a village trading center, at which they started implementing permaculture in 2003 and which serves as a demonstration site. Features like a brick fence instead of a straw or reed fence, an SUV parked out front, foreign visitors, and trees, shrubs, and vines enveloping the small property differentiated their home from others in the village. The Smiths first came to Malawi as US Peace Corps volunteers in 1997. Dan Smith teaches permaculture courses throughout the country for organizations, such as Community Health and Children of the

Nations. Nora Smith engages in Everlasting Harvest’s work, but also works full time as a nutritionist in the development sector. They are active in the permaculture community in Malawi, and like Ulimi, advocate for permaculture at a national level through networking, tours, media, and engagement in development and government dialogues.

Everlasting Harvest employs a few young men from the village and surrounding villages who they trained in permaculture to help maintain and improve their permaculture demonstrations, assist in giving tours, and conduct local community outreach. Its demonstration site serves as a teaching tool for the surrounding community and groups ranging from government health workers and NGO employees, to international tourists and reporters (see portion in Figure 4). Everlasting Harvest began a small “model village” program in 2006 in which local families live rent-free in homes on the Smith’s land in exchange for practicing permaculture in their yards. The model village provides household-level demonstrations for other households in the area and visiting groups. Employees conduct community outreach with model village farmers and others in the area to teach and encourage permaculture. In their community, Everlasting Harvest uses a relatively hands-off approach with the stated goal of improving the



Figure 4. Seating Area Next to Food Forest and Fish Pond at Everlasting Harvest (left) and Garden Bed with Bottle Irrigation (right)
Photograph: Oliver Cripps (left), Joseph Lanning (right)

sustainability of changes made by individuals. In the last few years, the spread of permaculture in their area started to occur through informal farmer-to-farmer training without their direct involvement.

Given that Everlasting Harvest is small and run from the Smith's family home, it has a small budget. It occasionally gets funding through donations, which it uses for specific projects, like intern or community trainings. Dan earns money teaching permaculture courses at other NGOs like Ulimi and charges low consultancy fees when doing occasional permaculture consulting work in Malawi.

The participant villages were located just outside of Lilongwe city and are groupings of approximately twenty to fifty households largely made up of extended families. Malawi's first president, Kamuzu Banda relocated the capital to Lilongwe in 1975. Kamuzu Banda's government displaced thousands of rural people outside of city boundaries to build the capital (Potts 1985:191). South Africa funded the capital project and their apartheid town planning influenced the city zoning and layout (Englund 2002:140).

It took time for us to introduce ourselves initially to the communities. Unlike in the villages next to the government complex where white foreigners pass by regularly in logo embossed SUVs, I did not cause a commotion walking around where kids ran after me chanting aaaaa-zun-gu, aaaaa-zun-gu (white person). However, for the first month or two, most people we passed while walking or biking stopped to inquire who we were and what we were doing there after completing the obligatory greetings. After a while, most people knew who we were and stopped asking us what we were doing. In some cases, word spread about us and children who we had not met suddenly knew who we were. I was then greeted with enthusiastic calls of Abigail-o! and sometimes a high pitched muli bwanji?! (how are you?). Reflecting my unusual

and privileged position, it took longer for the kids to greet Geoffrey and Chisomo similarly. I tried to maintain consistency in my actions and self-presentation at the NGOs and villages to help show respect to and build trust with area residents given my privileged, visible, and attention garnering position as a foreign, white female. The nearby villages where some Ulimi staff lived and where we conducted research, while separated in many ways, were not isolated from each other and my positionality and actions in each shaped it in the other.

Despite the villages' proximity to the capital, people live rural lifestyles. While villages have positive associations of familial relations and social reciprocity according to anthropologist Englund (2002:137), participants often characterized their villages as spaces of impoverishment, resource scarcity, and agricultural production. One farmer observed, "Life in the village is hard. We can harvest a lot of yields, but then there are things that are needed like soap, and we end up selling the maize and get ourselves into troubles."¹³ Participants commonly described village life as a continual struggle to meet all of one's basic needs.

None of the villages has electricity, running water, or tarmac roads. Each village has clusters of houses made of unfired or fired brick walls with thin grass thatch or metal sheet roofs, separated by meandering paths, hardpan dirt, occasional trees, and patches of maize. Most of the villages also housed small churches, small grocery or produce stands, and tearooms in people's yards. Fields of maize growing in ridges, sparsely intercropped with pumpkins and sometimes beans, and small patches of forested graveyards surrounded villages (see Figure 5). Just over half of participant household families (23 HH, 56%) got their water from a borehole (protected deep well) and the rest got water from an open well or river (18 HH, 44%). Most of the participant households had customary inherited agricultural land and relied on farming as their primary food

¹³ Research assistants transcribed and translated the quotes throughout the dissertation from Chichewa to English. We conducted this interview in Chichewa in Cluster C on November 30, 2011.

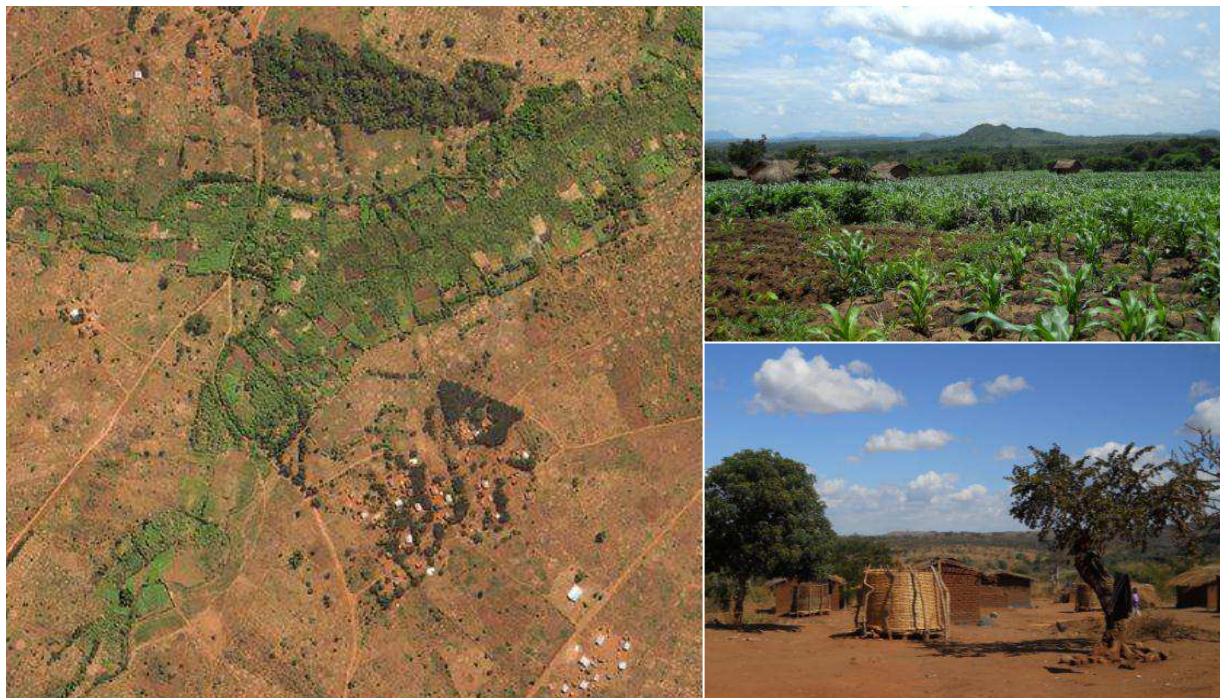


Figure 5. Maize Fields Surrounding a Village During the Rainy Season (left) and a Village During the Dry Season (right)

Photograph: Austin Dunn (left), rest by author

source and economic activity. Most engaged in other subsidiary livelihood activities like informal agricultural labor, small household-based businesses, and a few engaged in skilled wage labor. Due to the differences in village locations, participants had varying access to Lilongwe, medical facilities, schools, markets, paved roads, and rivers. There were also some microclimatic and environmental differences including rainfall, wind, pests, crop diseases, and tree cover.

We collected demographic information from 41 HH. The age of household heads ranged from 23 to 81 years old. Seventy-three percent of household heads were in a monogamous marriage (30 HH), 10% were widowed (4 HH), 10% (4 HH) were in polygamous marriages, and 7% (3 HH) were divorced. The average nuclear family size was 5.95. Beyond the nuclear family, 21 HH (49%) considered other nuclear families to be part of their household. Just over half of adults (23 HH, 56%) reported having 5.7 dependents on average, while the rest of adults said that their dependents were many or all of their relatives. Household heads had varying education

levels. Four household heads (10%) had no schooling, 26 (65%) attended some or all of primary school, 9 (22.5%) attended some or all of secondary school, and one (2.5%) attended college to study agriculture. Overall, men completed more years of schooling at an average of 8 years compared to women who completed an average of 4.95 years.¹⁴ Educational disparity by gender is also found nationally (National Statistical Office 2012a:25)

In the study population, 16 HH (39%) had houses made of semi-permanent wall materials, 25 HH (61%) had walls made of permanent materials, and about half had grass roofs and half had iron sheet roofs.¹⁵ A hoe was the only item owned by almost all households. The other items owned by at least half of households were a mosquito net, radio, watering can, mortar and pestle, bicycle, cell phone, chair, table, bed frame, and an ax. In total, 32 HH (78%) owned livestock, most commonly chickens (average of 8.23 chickens). Nineteen HH (46%) owned two or more types of livestock, such as goats and/or pigs in addition to chickens.

All of the participant households engaged in small-scale household farming. However, most used mixed livelihood strategies by supplementing their income with other sources including informal business, wage labor, and piecework, as Bezner Kerr writes is common in Malawi (2005b:170). All but one household engaged in two (18 HH, 44%) or three (22 HH, 54%) livelihood activities. There was no statistically significant difference between the livelihood activities used by permaculture and conventional farmers.

While these other income sources supplement household farming, agriculture is central to many of these tasks. After farming, the only other livelihood activity done by over half of

¹⁴ Wilcoxon signed rank sum test showed a statistically significant difference between the number of years of schooling completed by men and women ($p=0.0000$, $z=-5.423$).

¹⁵ The housing materials are better than the district on average, where 43% of households have permanent wall materials and 35% have iron sheet roofs (National Statistical Office 2012b:79–80).

households was selling crops (see Table 1). Ten HH (24%) reported doing piecework (ganyu) for other farmers, which is short-term informal labor for which one might receive cash payment or maize for their labor. Piecework

Table 1. Livelihood Activities, n=41

Livelihood Activities	%, HH
Farming	100% (41)
Selling Crops	76% (31)
Informal Business	34% (14)
Formal Employment	24% (10)
Piecework (ganyu)	24% (10)
Selling Other Agricultural Goods	22% (9)

was often seasonal and available during the busiest part of the farming cycle to prepare others farmers' fields for planting, to plant crops, and to harvest maize. Depending on the task and household, farmers reported earning between MK 2,000 (\$13¹⁶) and MK 5,000 (\$32) an acre for piecework. Farmers explained that the goal of farming as a livelihood activity was both subsistence and market-oriented. Farming successfully is critical to households' food access and livelihoods, and thereby their health and well-being.

Outside of agricultural tasks, informal, household-based business was the next most common activity, with 14 HH (34%) in this sector. Women typically cooked snacks to sell in their villages and at local markets. A few others resold groceries or did skilled labor like tailoring or carpentry. Some also did other types of piecework like brickmaking or building.

The few households on the higher end of the income spectrum made about MK 750 (\$4.80) a day from formal skilled employment, such as being a teacher at a public school (2 PF HH, 16%), health surveillance assistant at a government health clinic (1 CF HH, 4%), or employee of an international NGO (1 PF HH, 6%). There was a class difference between these households and others, marked by speaking English, wearing business attire, and completing more years of school. More permaculture farmers had wage employment and higher education

¹⁶ Throughout I use an exchange rate of MK 157 to 1 USD for 2011 through May 5, 2012. The currency was devalued by nearly 50% on May 7, 2012 which caused inflation and a rise in the cost of living (IRIN 2012).

levels overall than conventional farmers, because most permaculture farmers lived in Cluster C, where more families moved because of employment opportunities at the adjacent government agricultural research station, several NGOs, and trading center. In comparison, most families in Clusters A and B had lived there for generations and there was little opportunity for non-farm employment.

Despite our efforts to select sample groups with similar household characteristics, there were a number of differences between the groups. We were constrained by who practiced permaculture and lived in the surrounding villages. In retrospect, a case control sampling method may have been more effective. There was a statistically significant ($p \leq 0.05$), though often small, difference for a number of household variables. On average, permaculture farmers had slightly higher physical capital,¹⁷ higher perception of ability to get assistance within their social network,¹⁸ larger household sizes, older household heads, less estimated agricultural land, fewer families in the household, more livelihood activities, and more years of education completed by the most educated household head than conventional farmers did.¹⁹ I control for these differences

¹⁷ Physical capital is an asset-based measure that is used as a proxy for long-term economic status (Cordova 2008:3). Ownership data was collected on 27 assets and the approximate price of each item was used to calculate household physical capital. The Cronbach's alpha test results were just below what is usually considered a strong result, with an alpha of 0.68. The physical capital score was positively correlated as expected with education level of household member with highest education (0.35), highest education of a household head (0.29), household size (0.30), number of household livelihood activities (0.21), and a household member having a job (0.21). Education both costs money and may help improve household livelihoods, livelihood diversification is seen as beneficial for livelihood resilience, having a job increases earnings, and having a larger household means that more people are contributing to the household economically.

¹⁸ I conducted a quantitative measure focused on one's perceived ability to get help with food, farming, money and childcare. I determined that this measure is sufficiently valid for this study, although it is not particularly strong. The Cronbach's alpha test results were just below what is usually considered a strong result, with an alpha of 0.65. The score for their perceived assistance within their social network was positively correlated as expected with reporting having support from people in your community (0.50), physical capital (0.39), number of people who discuss or help with food (0.32), education level of household member with highest education (0.26), number of people who discuss or help with farming (0.25), having friend nearby (0.24), and being married (0.23).

¹⁹ Wilcoxon signed rank sum test showed a statistically significant difference between the sample groups' physical capital ($p=0.000$, $z=-5.511$), perceived assistance within their social network ($p=0.000$, $z=-5.513$), nuclear

in statistical analysis. I did not find a statistically significant difference between other variables like type of landownership, wage labor, number of orphans in the household, marriage status, selling agricultural products, or belonging to an organization.

Dissertation Framework

In this dissertation, I broadly explore the relationships between agriculture and food practices by exploring how farming practice changes affect farmers' food access and diet. To do so, I draw on political ecology, structural violence, and anthropology of food literature. I seek to contribute knowledge about agricultural technology and diet change in Malawi and more broadly about diet- or food-based approaches to improving nutrition and environmental health.

While my use of political ecology is often implicit, it undergirds my exploration of agricultural practices and food security as embedded within the broader context and power relations that form and maintain Malawi's agro-food system. Geographers Peet and Watts write that political ecology emerged in the 1970s from political economy and ecology frameworks to understand environmental crises by addressing resource access and control (2004:6).

Anthropologist Escobar describes political ecology as an interdisciplinary field that focuses on the relationships between topics such as culture, politics, development, capital, and the environment (2008:21). A political ecology perspective sheds the nature/culture divide historically posited by Western science to see people and the environment as mutually constitutive (Tsing 2005; Smith 1998; Schmidt 1971; Katz and Kirby 1991:262, 264). Many history and anthropology studies on agrarian change in Africa have productively focused on questions of how resource access, social relations, capital and labor relations, and power

family size ($p=0.000$, $z=-5.527$), household head age ($p=0.000$, $z=-5.512$), estimated agricultural land size ($p=0.002$, $z=-3.773$), number of families in household ($p=0.000$, $z=-5.19$), number of livelihood activities ($p=0.000$, $z=-5.666$), and highest education of a household head ($p=0.000$, $z=-5.423$).

structures shape land management and agricultural practices (Berry 1993; Cliggett 2005; Netting 1993; Watts 1983; Mandala 2005; Schroeder 1999; Fairhead and Leach 1996). In addition, within political ecology, anthropology, and livelihoods literature, scholars have used the concept of adaptive capacities or strategies to understand how farmers respond to adverse conditions, vulnerability, and environmental shocks (Watts 1983; Chambers 1995:195; Ellis, Kutengule, and Nyasulu 2003; Crane, Roncoli, and Hoogenboom 2011; Folke et al. 2005).

Political ecology, structural violence, and anthropology of food literature inform my analysis of food security and access, food practice change, and malnutrition. Famine literature, including political ecology, has productively shown how food insecurity, hunger, and malnutrition are rooted in impoverishment and unequal entitlements to food (Sen and Drèze 1999; de Waal 1997; Watts 1983; Davis 2002; Vaughan 1987). As Watts writes, “if famine is about the command over food, it is about power and politics broadly understood” (Watts 1987:205). Anthropologists have shown that so too are food insecurity and hunger embedded in broader social, political, economic, and environmental systems characterized by impoverishment and embodied in “adverse outcomes associated with structural violence” (Farmer 2005:308), such as malnutrition and disease (Scheper-Hughes 1992; Messer 2009:12). Drawing from liberation theology, medical anthropologist Farmer describes structural violence as social systems in which “suffering is ‘structured’ by historically given (and often economically driven) processes and forces that conspire... to constrain agency” (2005:40).

Anthropological work has demonstrated that broader social relations and economic forces shape and constrain food practices and contribute to the formation and maintenance of taste and food preferences (Mintz and Du Bois 2002; Mintz 1985; Mintz 1996; Bourdieu 1984). While food consumption is a biological necessity, it occurs in culturally meaningful ways (Sahlins

1976:168–169; Mintz 1985:3) and is structured by socio-cultural and symbolic categories and boundaries (Douglas 1972:61). I particularly use Mintz’s work on the anthropology of food and diet change (Mintz 1985; Mintz 1996) to analyze the relationships between food production and consumption and how agricultural change relates to diet.

Permaculture dissemination and organizations in Malawi are largely embedded in the development sector. In this way, permaculture and conventional agriculture were disseminated in similar ways and the impetus for them came from the global North. Permaculture is consistent with stated mainstream neoliberal, participatory development goals for sustainable household self-management and self-sufficiency as synthesized by Duffield (2001:101). This calls into question to common permaculture idioms – is permaculture “revolution disguised as organic gardening” (Babbs 2012), and can “all the world’s problems be solved in a garden” (Ferguson and Lovell 2013:16)? I build on political ecology and structural violence perspectives to help understand the socio-economic and agroecological context in which farmers learned, evaluated, and applied permaculture, as well as to analyze its impact within Malawi’s agro-food system.

Within an information and resource environment geared towards conventional agricultural production and in the face of limited time and resources, the permaculture farmers we worked with progressively implemented permaculture practices over several years. The permaculture farmers largely implemented permaculture in a low risk fashion by including permaculture as part of their livelihood strategies, often implementing it on previously uncultivated land, rather than supplanting their existing agricultural practices and livelihood strategies.

There was variation between households, however, permaculture farmers reported a range of agricultural, environmental, livelihood, and food and nutrition security benefits related

to the agricultural practice changes they made with permaculture implementation. For example, permaculture farmers had higher agrobiodiversity and lower purchased input requirements on average compared to conventional farmers. In addition, the permaculture farmers all reported improvements in food access since beginning to use permaculture. Permaculture farmers also on average had higher food security and diet diversity scores than conventional farmers. Many permaculture farmers diversified their diet, altered food practices, and incorporated new foods within existing Malawians cuisine patterns largely in response to improved access to fruits and vegetables from permaculture production. Following Bourdieu and Mintz, I suggest that participants' food preferences and consumption choices are constrained by food access (Bourdieu 1984), in contrast to a common narrative that Malawian food preferences are a static product of culture (Devereux 2002; MOAFS 2011:60; Tiba 2011; WFP 2012:41).

The food and farming practice changes made by farmers using permaculture indicate how farmers could flexibly maneuver within Malawi's agro-food system. Using permaculture largely did not alter farmers' systemic risk, with the exception of somewhat decreasing farmers' dependence on the market. However, in particular ways, permaculture farmers experienced a degree of improved adaptive capacity to deal with scarce resources and problems affecting their food access and farming. Sen explains the importance of evaluating the "capabilities," or ability to act, that individuals have within particular social, political, and economic systems "to lead the kind of lives they value – and have reason to value" (1999:18). For example, permaculture education and practice improved permaculture farmers' adaptive capacity to contend with overlapping vulnerabilities related to impoverishment, environmental degradation and inadequate access to food, land, and labor. Agricultural and food practice changes resulting from permaculture improved farmers adaptive capacity to deal with food insecurity by improving

agricultural production, reducing food-purchasing costs, and diversifying food practices and consumption. These changes partially affected the patterning of risk and vulnerability experienced by farmers as some farmers reported that using permaculture helped them to mitigate some problems and respond to others. However, the broader agro-food system and climate change, and potentially farmers' small-scale application of permaculture, limited the benefits farmers experienced. The scope of impact of smallholders' permaculture use was primarily limited to the household level because permaculture use did not yet change other critical systemic determinants of farmers' livelihoods and well-being.

Outline of Chapters

First in Chapter 2, I discuss how trade, colonialism, and development shaped agricultural practice and human interaction with the environment in Malawi. In Chapter 3, I describe permaculture as a design system, social movement, development approach, and its applications in Malawi. Then, in Chapter 4, I discuss the relationship between participants' food access, practices, and preferences and how those affect nutrition and health. Chapter 5 explores how farmers learn to perform conventional farming and permaculture through social and individual learning and describes the process of permaculture adoption. In Chapter 6, I compare the farming practices used by conventional and permaculture farmers and the extent to which permaculture farmers applied permaculture practices and design principles. Next, in Chapter 7, I investigate how the use of the different agricultural systems shaped farmers' vulnerability to problems and shocks and their adaptive capacity to deal with them. In Chapter 8, I assess the impact of permaculture practice on participants' food security, diet, food practices, and health. Finally, in Chapter 9, I conclude with a review of the study findings and their broader implications, and I

present the policy implications for the development sector and the permaculture movement based on the research findings.

CHAPTER 2

FROM COLONIALISM TO DEVELOPMENT: THE MAKING OF CONVENTIONAL AGRICULTURE IN MALAWI

We sat in a field to rest under one of the only trees in Cluster A that produced enough shade for more than one person that was not within a graveyard. I rested, with my arms crossed and head propped up by my greying purple and tan backpack, peering through the seemingly brittle maize stalk bases with spindly exposed roots and trails of dirt left by termites crawling up the stalks. The quiet felt thorough and misleadingly empty – belying the hands and sweat and hours that formed and filled these fields. Row after row of small ridges and furrows stretched across the field down the hill to the river, across which Ulimi was located. Clusters of twisted bean vines and sprawling pumpkin vines were interspersed among the maize. To my right, the maize abruptly stopped and instead small, bright green groundnuts grew in ridges. The soil texture was gritty and dry, with little visible humus, organic matter, or signs of life. I did not see any fungus lacing through the soil, earthworms, or pollinating insects.

Current agricultural practices and environmental conditions are products of change over hundreds of years. Agriculture has been central to individual and community livelihoods, the national economy, and a source of political power and conflict historically. Social, economic, and political forces shaped agricultural change in Malawi before colonization in ways that remain important today, such as those leading to crop changes. Colonialism and development policies, retaining significant continuity between the colonial and post-colonial eras (Mulwafu 2011:1), shaped farmers' agricultural practices, interaction with the environment, and crop choices, which led to the dominance of conventional agriculture techniques and maize

production. Throughout the discussion of agricultural change, I include important contours of political-economic change and the development sector in Malawi.

Pre-colonial Agriculture (Prior to 1891)

Prior to colonization in present-day Malawi, shifting swidden agriculture was widely practiced, in which farmers used land for a few years until the soil was depleted, left the land fallow, and cleared new land for cultivation (Mulwafu 2011:24; McCracken 2012:13).²⁰ A forest-fallow system was also used in the Shire Highlands, in which crops were planted in “earth-covered mounds of ash and vegetation (matuto)” after cutting and burning trees (McCracken 2012:13). Some older study participants reported planting on matuto or flat ground in the Lilongwe area into the 1960s. Another planting system used during the pre-colonial period involved clearing and tilling the land and then broadcasting seeds (Mulwafu 2011:24). As is still the case today, most cultivation took place in dry-land fields (minda) during the rainy season, which was supplemented by garden (dimba) production in low-lying areas and along bodies of water in the dry season (Morris 1998:51; Pachai 1972:386; McCracken 2012:13).

Chiefs were “ceremonial owners of the land” (Mulwafu 2011:26) and managed natural resources by exerting authority over which trees one could cut and when and where one could hunt, which Mulwafu argues helped to conserve the environment and biodiversity (Mulwafu 2011:33, 55). Abambo (father) Chalimba, a 55-year-old permaculture farmer, told me that this system fully broke down in Cluster B in the 1980s due to population pressure, after which he thought deforestation increased.

²⁰ Historians have primarily written about Malawi’s agricultural history in the southern region, so the available historical information about the Central Region is more limited (Green 2007:125).

Crops grown in present-day Malawi started to shift away from crops that were originally domesticated in Africa beginning in the 1500s with the so-called Columbian Exchange. The Columbian Exchange refers to the plant and diet circulation that occurred as part of Iberian trans-Atlantic trade and particularly the slave trade (Carney and Rosomoff 2009).

In the 1850s, multiple staple crops existed in present-day Malawi. For example, finger millet and sorghum were the staples of the matrilineal Maravi or Nyanja-speaking peoples (today known as Chewa and most populous ethnic group) in the Upper Shire Valley, maize and finger millet were staples of the Tumbuka and the Ngoni in the north, and millet, cassava, and bananas were staples for different groups north of the Lake (Tew 1950:38; Pachai 1972:96–97; McCracken 2012:13).²¹ Historian Mulwafu states that farmers planted crops where appropriate given soil characteristics and commonly intercropped (Mulwafu 2011:26–27, 36–37).

Maize likely arrived in Africa along two different routes. In West Africa, maize traveled across the Atlantic in the early-1500s as part of the Columbian Exchange and its cultivation spread to supply food for slave traders and transatlantic slave transport (McCann 2005:23; Carney and Rosomoff 2009:55, 65). Historian McCann writes that the historical record about the arrival and incorporation of maize into agriculture and diets prior to colonization in Southern Africa is vague (2005:95). In East and Southern Africa, maize likely arrived from the Indian Ocean coast in the mid-1500s as part of Arab and Portuguese mercantile trade and Brazilian maize varieties possibly arrived first in Southern Africa (McCann 2005:29, 97–98; Miracle 1966:96–100). McCann, Carney, and Rosomoff posit that farmers may have incorporated maize as part of diverse cropping systems because maize yields are higher than millet and sorghum, its

²¹ The formation of these ethnic groupings, among others, was influenced by colonial racial and tribal ideology, migration, British use of indirect rule, and nationalist efforts after independence (Apter 1999:582; McCracken 2012:205, 232–234; Vaughan 2000:239–240).

husk protects the grain, it can be consumed early as a vegetable or as a mature grain, and it matures faster than millet and sorghum (McCann 2005:6, 26–27; Carney and Rosomoff 2009:56–58).

In present-day Malawi, farmers first incorporated maize into agricultural production as a vegetable crop in floodplain gardens sometime prior to the mid-1800s (McCann 2005:98). David Livingstone recorded maize cultivation during his missionary travels in the Upper Shire (see Figure 6) in 1859 (Livingstone and Livingstone 1865:111). A variety of other crops were grown in gardens as well, such as rice, tomatoes, groundnuts, sugar cane, and cocoyam (Morris 1998:52). This reflects changes in crop cultivation by the mid-1800s as, for instance, cocoyam originated in Southeast Asia and sweet potato, pumpkin, and tomato are indigenous to the Americas (Carney and Rosomoff 2009:20–21). Towards the south, maize became the main crop in the 1880s or 1890s (McCracken 2012:13).

In the early-1800s, household units organized subsistence agricultural production (Vaughan 1982:353). In the mid-1800s, historians Vaughan and McCracken assert that men and women largely shared agricultural production tasks; however, men hunted, fished, and produced and traded cloth and iron, while women produced and exchanged salt and pottery (Vaughan 1985:38; McCracken 2012:15).

Explorers and missionaries first visited present-day Malawi, notably with David Livingstone, in 1858, whose involvement was the catalyst for Britain's involvement in present-day Malawi (McCracken 2012:37–38). The missionaries sought to bring free trade and incorporate present-day Malawi into the global economy as a “necessary precondition for the spread of Christianity” (McCracken 2012:39).

In the mid-1850s, European influence hampered agricultural production. A drought in 1862-63 in Central and Southern Africa precipitated a famine in present-day Malawi in combination with the British anti-slave trade campaign, ivory traders, and Portuguese-led slave raiders. Increased slave raiding and conflict limited farmers and communities' ability to cope with the drought as many were captured or fled to poor agricultural land, mobility was restricted to find food, and political instability increased (Mandala 2005:30–34).

Agricultural Change During Formal British Colonialism (1891-1964)

Outside influences altered agricultural production techniques during colonialism, while continuing to shape crop selection. In the 1880s, a small community of British settlers and the British African Lakes Company purchased almost a million acres of ostensibly uninhabited land from local chiefs in order to push the British government to annex the Shire Highlands region before the Portuguese (see Figure 6) (Vail and White 1989:166; Pachai 1972:325). Amid growing conflict between the British and Portuguese in the region, the Portuguese conceded to British demands to withdraw from the Shire region in 1890. Colonial rule began after the British and Portuguese governments reached a final agreement on June 11, 1891, defining the boundaries of British and Portuguese territories in the region (McCracken 2012:56). The first British colonial administrator named the region of present-day Malawi the British Central Africa Protectorate and then officials renamed it Nyasaland (meaning lake land) in 1907 (McCracken 2012:57).

The confluence of British colonial ideals of science, empire, and development reshaped agriculture in Nyasaland (I will use this term for present-day Malawi during the colonial period for clarity). Agriculture was a focus of British development efforts across their African colonies due to the centrality of agriculture to their respective economies (Tilley 2011:117). Historian

Tilley characterizes British colonies as development-oriented states because “their telos, from the start, was focused on resources, revenue, and production rather than political participation” (2011:493). Anthropologists typically describe development as a concept of progress and modernization with roots in the rise of industrial capitalism in Europe in the late-18th century (Edelman 2005:6; Hobart 1993:5). Several scholars establish that European imperialist and colonial ideology was based on an internalized, negative valuation of African identity, which was grounded in Victorian-era scientific racism²² that anthropologists helped develop and codified in relations of the rulers and ruled (Hountondji 1983:17; McClinock 1995:42–51; Fanon 1967:8–11; Comaroff and Comaroff 2012:54). As such, while I continue to use the term development for clarity, my use of the term development throughout the dissertation refers to this problematic and contested concept.

From the beginning of the colonial era, the British administration’s policies resulted in a process of underdevelopment in Malawi. Dos Santos characterizes underdeveloped countries as ones that are subject to dependent relations with other countries “that deepens and aggravates” their problems (dos Santos 2003). Anthropologist Wolf argues that underdevelopment resulted from the development of global markets, capitalism, and the extractive and unequal relationships formed between Europe and their colonies (1982:21–23). The colonial land tenure system was an initial part of this process that reverberates today. In 1902, the government began the dual land tenure system by declaring that all land belonged to the Crown except portions previously claimed by European settlers, which was private land under colonial law (Ng’ong’ola 1990:31). Estates pushed smallholders off the most fertile land, particularly in the south (Green 2007:118). Land regulations evolved with colonial economic interests. Land laws initially concentrated on

²² Race is not based in biology, but is a social construction that arbitrarily distinguishes categories of people based on phenotypic characteristics and is a sociopolitical reality (Marx 1998:16, 264; Goodman 2001:31).

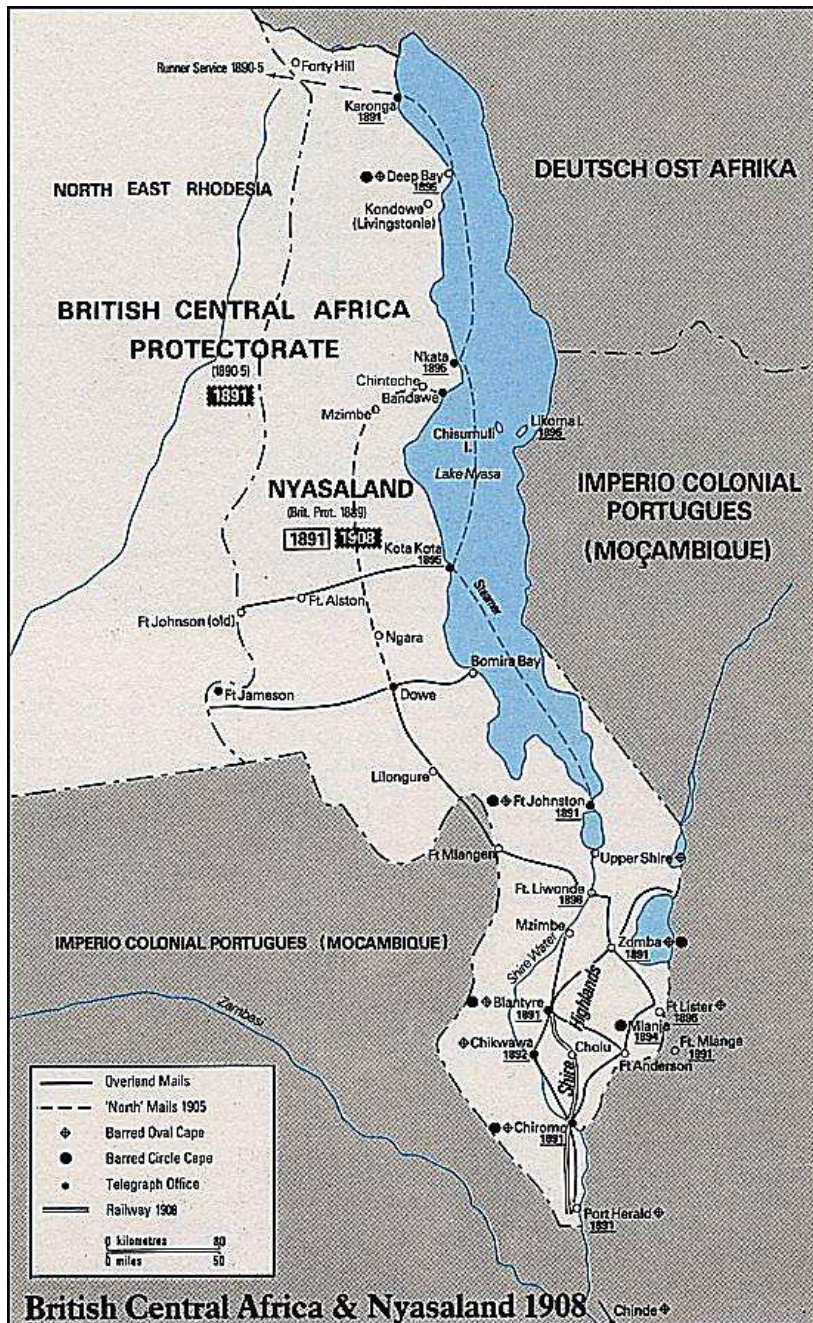


Figure 6. Colonial Map of Nyasaland and the British Central Africa Protectorate from 1908
 Source: (Luscombe 2012)

British land ownership and later incorporated some peasant rights under African trust land after the mid-1930s, which expanded government control over land use (Ng'ong'ola 1990:45, 53).

At the end of the 1800s, there was significant social and ecological change with expansion of the slave trade, immigration, and British colonization. These changes impacted agriculture and required farmers to adapt to remain self-sufficient in food (Vaughan 1982:360) due to land shortages, lower soil fertility, and growing food insecurity (Morris 1998:52).

Farmers increasingly grew maize because it has higher yields per acre and more genetic variability than indigenous staples (Vaughan 1982:359; McCann 2005:26). Maize could also be sold to earn money, which farmers particularly needed to pay the hut tax instituted by the British

in 1891 (McCracken 2012:61, 88). In addition to use as a vegetable crop, farmers incorporated maize as a grain crop in fields (*minda*) after 1900 (Smale 1995:820). Maize began replacing older staples by 1915, and by the late 1930s, Malawians reported it as a staple (Williamson 1955:128; Vaughan 1982:359). Peasant producers preferentially grew and developed a preference for white maize over other varieties during the early 1900s, which remains today, at least in part in response to the bias for white maize in the British starch market (Smale and Jayne 2003:10–11, 15; McCann 2005:112, 115). Unlike the indigenous staples millet and sorghum, maize cultivation contributed to British economic interests by enabling peasant farmers to earn cash to pay the hut tax and supplying British markets with raw materials. Christian missionaries also demonized millet, because they saw millet beer as a social evil (Mulwafu 2011:45). As a result, colonial officials enacted policies to incentivize maize cultivation, including price and marketing efforts and extension and research work to increase maize yields (Kettlewell 1965:248, 258–260). In comparison to sorghum and millet, maize is less drought resistant and more susceptible to pest attacks (Mandala 2005:186).

The non-agricultural economy was also reshaped between 1891 and 1910 (McCracken 2012:74). Colonial government policy induced labor migration toward the mines and pushed locals into wage labor, particularly in settler agricultural estates and mines, using the hut tax (Vail and White 1989:158). McCracken suggests that these economic changes unevenly affected communities depending on their status prior to colonization, their economic activities, and the intensity of colonial rule in their area (2012:93–97).

The British administration focused agricultural development strategies on building and protecting an export-oriented, white settler estate sector, which produced coffee, tea, cotton, and tobacco (McCracken 2012:74, 82; Droppelmann, Makuwira, and Kumwenda 2012:14; Vail and

White 1989:174–175). Government promotion of the estate sector continued into the 1990s and the division of the agriculture sector into the estate and smallholder sectors remains today (Droppelmann, Makuwira, and Kumwenda 2012:13–14).

Colonial settlers first introduced and used agronomic practices from Britain and the British Empire in the cash crop sector in Nyasaland, including the application of synthetic fertilizer (MAFS 2007:xiii). In keeping with agricultural technology advances in Europe in the late-1890s and early-1900s, colonial agricultural researchers began trials of synthetic fertilizer use on tobacco in Malawi in 1921 (Hornby 1927:309; McNeill 2000:23–24). Synthetic fertilizer was applied by 1927, if not sooner, in estate tobacco production (Hornby 1927:305), to counter the loss of nitrogen in soil, which colonial official Hornby claimed was “one of the most important problems to be dealt with in the country” (1927:304).

European settlers enforced a labor-rent system (*thangata*) in the south, the center of estate production, in which residents on settler estates had to perform agricultural labor under harsh conditions (Kandawire 1977). *Thangata* altered land, labor, and gender relations in the region, requiring men to work to retain land rights and making women dependent on men for land access, which was not previously the case for matrilineal groups (Vaughan 1982:360–361; Newbury 1980:110). Further shifting gender relations, missionaries emphasized the importance of marriage and family under the control of the husband, rather than kinship (Morris 1998:44). Meanwhile, the state made the men the economic head of household, while promoting the importance of the household as the basic economic unit (Vaughan 1985:42).

Initially, the colonial involvement in peasant production focused on protecting and helping the estate sector and providing exports for British markets. Mulwafu and Bezner Kerr write that colonial state intervention in peasant agriculture was based on colonial agricultural

scientists' racist and modernist assumptions that local farming practices were inferior to European methods (Mulwafu 2011:1, 37; Bezner Kerr 2010:100–101). Thus, Tilly argues that colonists marginalized local agroecological knowledge, ignored it, or thought it was destructive (2011:2750).²³

The agricultural extension system began in 1903, motivated by the demand for raw materials during European industrialization, such as cotton (Masangano and Mthinda 2012:4). As early as 1909, Christian missionary schools taught Malawian students to “grow European vegetables, so that an increasing supply is obtainable” according to a colonial report (The Imperial Institute 1909:54).²⁴

By the end of the 1920s, peasant cash crop production was the basis of the colonial economy and an important source of tax and export revenue for the colonial government (Green 2009:250–252). Peasant cash crop production grew in the Lilongwe Plain and Southern Province as the settler estate sector faltered in the 1920s and 1930s with falling tobacco prices, weather shocks, and labor shortages (McCracken 2012:162–163, 167, 172, 178, 187–188).²⁵ The focus of the administration's intervention in this sector was on marketing to ensure that the colonial government captured profits from peasant cash crop production (Green 2009:252–253). Produce markets also developed in the 1920s where peasant farmers regularly sold maize (McCracken 2012:172).

²³ Tilly concedes that this was not exclusively the case as colonial officials and scientists had conflicting mandates and some, like anthropologists in particular, took local practices and knowledge seriously (2011:134, 137–138, 158).

²⁴ According to Mulwafu, Christian missionaries had less of an impact on agriculture than on areas like education and health (2011:42).

²⁵ Green argues that Malawi remained economically unattractive and a strong, large white settler estate sector did not develop in Malawi as it did in other countries like Zimbabwe (2007:125).

Historians Mandala and McCracken argue that the political and economic changes wrought by colonialism altered peasant entitlements to food. Back-to-back famines in 1922-23 and 1924-25 occurred with a severe drought because historical chiefly responsibility and support systems that cushioned food shortages in the past were disrupted by crop shortages from World War I, colonial rule, and new food markets (Mandala 2005:36–46; McCracken 2012:188). By the 1930s, seasonal ndiwo shortages and annual maize shortages occurred (Williamson 1972; Barker 1943). The form and prevalence of food insecurity and malnutrition has remained fairly consistent since the 1930s (Mandala 2005; OPC 2009).

The Central Province became an important tobacco growing region. Local anti-colonial sentiment increased in the Central Province as European planters began cultivating tobacco near Lilongwe in 1920 and the government intervened in the tobacco market (Vail and White 1989:174–175). In the late-1920s and 1930s, the number of sharecropper tenants increased significantly in the Central Region, and in Lilongwe in particular, although McCracken asserts that it was not as exploitative as the thangata system in the Shire Highlands (2012:170–171). Anthropologist Englund states that the Central Region became the “growth centre in the colony,” because of increased tobacco production and communication and road infrastructure (2002:140). In the Central Region, the Native Tobacco Board began selling fertilizer to select farmers at a subsidized rate in 1949 to improve tobacco yields (McCracken 2012:249).

The colonial government had a significant impact on peasant agricultural practices through soil conservation efforts. The Nyasaland Department of Agriculture began to work on soil conservation in the 1920s. By the end of the 1930s, colonial agriculture officials were convinced that local agricultural practices, such as shifting cultivation, were causing soil erosion and lower soil fertility, creating an ecological crisis. Colonial officials were in part motivated to

act by the impacts of the Dust Bowl in the United States (Mulwafu 2011:4, 66, 72–78; McCracken 1982:112). Historians counter that environmental degradation occurred due to cash crop production, population density, and land and labor constraints (Vail and White 1989:176; Green 2009:257). Mulwafu asserts that colonial officials thought soil conservation was necessary for improving agricultural production and rural development (2011:84).²⁶ Mulwafu also suggests that the colonial government used conservation policy (locally called *malimidwe*) to interfere in subjects' lives and control resources (2011:3). According to Mulwafu, the policy altered peasants' relationship to the environment and created new conflicts with the state over land and labor, particularly for women, on whom the labor burden of conservation policies (i.e. ridge construction) disproportionately fell as did agricultural labor generally (2011:6–7, 103). The Natural Resource Ordinance of 1946 (McCracken 2012:319) legalized the use of force to compel certain agricultural practices to “modernize” agriculture and improve the food supply, including early planting, correct crop spacing, and uprooting old stalks, which are practices that extension officers still encourage today (Masangano and Mthinda 2012:4). Beginning in the mid-1940s, the government concentrated soil conservation efforts on enforcing compulsory contour ridging in fields (Vail and White 1989:177–178). By the 1940s and 1950s, farmers widely opposed the government agricultural policies and forced ridging in particular due to its significant labor requirements and colonial imposition in their farming practice (Vail and White 1989:176; Ng'ong'ola 1990:57; Mulwafu 2011:54). Despite opposition, the practice of using ridges in fields became nearly universal by 1955, after which the government lessened criminal prosecution for

²⁶ The idea of conservation changed over time, as it was about food production and survival for communities in the pre-colonial period, initially focused on forest and game reserves for the colonial government, and then focused on soil conservation after the 1930s (Mulwafu 2011:117).

noncompliance and it is a standard and largely unquestioned practice today (Green 2009; Ng'ong'ola 1990).

Agricultural and economic changes increased peasant vulnerability to food insecurity. Peasant maize production and sales increased to meet cash needs by the late 1940s (Vail and White 1989:177). The Great Famine occurred in 1949-50, which Vaughan argues was in part caused by drought and inadequate colonial government response (1987). Green discusses the colonial government debate at the time over the extent to which increased smallholder tobacco production, at the expense of maize production, contributed to the famine (2007:123). In response to the famine, the government increased enforcement of agricultural regulations in theory to protect agricultural production. Due to concern over the negative impacts of monocropping maize on soil fertility and structure, the colonial government tried to reduce maize production in the 1950s by lowering maize prices, abolishing marketing facilities, and destroying maize (Vail and White 1989:177).

In the wake of a decline in British power, development efforts increased in Nyasaland. Ndulu et al. write that British colonial power declined in Africa due to increasing local resistance and “the realignment of global power in the Second World War” (2008:42). According to Escobar, during this decline, “the ground was prepared for the institution of development as a strategy to remake the colonial world and restructure the relations between colonies and metropolises” (1995:26). The British explicitly formalized the beginning of development through the Colonial Development Act of 1929 and the founding of the Colonial Development Corporation in 1948, which funded infrastructure and economic development projects in Malawi and other colonies with the stated intention of improving colonial economies and commerce with Britain (Escobar 1995:26–27; McCracken 2012:244–246; Abbott 1971:68, 70–73).

In 1953, the British incorporated Malawi into the Federation of the Rhodesias and Nyasaland amid overwhelming Malawian opposition, shifting power to white Rhodesian politicians (McCracken 2012:274–279). In the 1950s, the coercive agricultural and conservation policies fostered unique mass village protests that bolstered support for the anti-colonial, nationalist Malawi Congress Party (MCP) in combination with opposition to the Federation (Vail and White 1989:178; Masangano and Mthinda 2012:4; Mulwafu 2011:7, 144–147). Resistance in each region centered on the colonial policy that negatively impacted them the most – labor migration in the Northern Province, economic policies in the Central Province, and thangata and Yao chiefly dominance in the Southern Province (Vail and White 1989:176; McCracken 2012:304). Agrarian change and populism, and the use of force in conservation policies in particular, was an important impetus for independence due to the mass resistance that development among the peasantry (Green 2011:155). The MCP later won self-government in 1964 under the leadership of Kamuzu Banda, who negotiated with the British for independence during a wave of successful independence struggles on the continent (Vail and White 1989:178).

Agricultural Change and Development Since Independence (1964-Present)

According to McCracken, Malawi’s current political and economic system is rooted in the legacy of its colonial experience and dictatorship after independence (2012:458). At independence, Malawi’s state and economic system and its political boundaries were remnants from the colonial period (Chazan et al. 1992:26; Lewis 1998:36). Vaughan states that “the new Malawian nation was in fact the product of a long history of movement and migration, sedimentation, give and take between many ethnic and cultural groups” (2000:239–240).

British rule ended on July 6, 1964, although a formal colonial presence remained until 1966 (McCracken 2012:336, 430). A few participants described independence as when they

obtained their freedom (ufulu), while one participant in her 70s/80s (she did not know her age) said that she was told that Kamuzu had come to replace Queen Elizabeth (II). Nyasaland was renamed Malawi, after the Maravi, as part of Kamuzu's construction of the Malawian national identity around a "shared" Chewa culture and heritage (Vaughan 2000:239).

Kamuzu Banda consolidated power soon after independence, beginning a 30-year dictatorship (McCracken 2012:336, 430–440). Sociologist Mitchell characterized Kamuzu Banda's rule as a "mixture of terror and ritualized paternalism" (2002:5). Through restrictive laws and their coercive and repressive enforcement, Kamuzu Banda emphasized "four cornerstones [of] unity, loyalty, discipline and obedience" while trying to modernize Malawi in the image of the West (McCracken 2012:433). Ake and Sandbrook characterize personal rule, like that of Kamuzu Banda's, as coercive, violent, and based on patron-client relations, which functioned to deny popular political participation and damage the legitimacy of state institutions (Ake 1996; Ake 1981; Sandbrook 1985).

At independence, most of the population lived in rural areas and the economy depended on agriculture (McCracken 2012:282). From 1965-1979, Kamuzu Banda's strategy was one of state-monopoly capitalism with a heavily regulated economy based on household agricultural production (Cammack and Kelsall 2011:89; Davison 1993:415). While the MCP initially supported smallholder farmers, they shifted support to estates because of poor smallholder performance (Green 2007:126). Hirschmann states that Kamuzu Banda's aim was to build a strong commercial cash crop estate sector on cheap labor and a "peasant-created surplus" (1990:469). The government created the Agricultural Development and Marketing Corporation (ADMARC), which the government still operates today, to control peasant cash crop sales (Hirschmann 1990:470). In a continuation of colonial policies and in service of short-term

political concerns, economic and agricultural development policy focused on estate production by enabling estates to appropriate land, instituting labor policies that helped provide cheap labor, investing in estates, and controlling cash crop marketing (Chazan et al. 1992:259, 263; Ake 1996:45; Green 2007:119–120; Kherallah et al. 2001:24). Hirschmann contends that government economic policies eroded the peasantry’s ability to improve and protect their “material and nutritional security” (1990:485).

After independence, the government repealed the colonial agricultural laws and further promoted conventional agriculture techniques, which were in line with scientific advances and the agricultural development approach of the time. Mulwafu concludes that the government largely focused on the same issues as the colonial government, such as soil erosion and cash crop production, and continued to blame smallholders’ practices and population growth for environmental degradation. Mulwafu contends that broader structural factors and inequalities, such as land dispossession, impoverishment, resource access, and cash crop production, contributed to environmental degradation (2011:215–216, 219–222). Bezner Kerr draws continuity between colonial scientists’ and Kamuzu Banda’s advancement of “modern” farming practices and discouragement of indigenous staple production (2010:102). Government policies furthered the transition from low-input polyculture systems used historically in Malawi to higher-input monocrop systems, which continues today. Agricultural production methods used in Europe and the United States have been models for agricultural development in low-income countries and exported since colonization (Eicher and Staatz 1990:7; Gupta 1998:54). In particular, the Green Revolution impacted agricultural development in the 1960s with proponents asserting that high yielding grain crops grown with chemical fertilizer and pesticides was a scale-neutral technology package, and therefore, was applicable for small-scale, low-income farmers

(Mazoyer and Roudart 2006; Gupta 1998; Norberg-Hodge, Goering, and Page 1993; Stone 2010; Eicher and Staatz 1990:9).

In the 1960s, a government stated aim of national agriculture policy was to increase maize yields per acre in Malawi (Ministry of Natural Resources 1967). In line with Green Revolution technologies at the time, Kamuzu promoted fertilizer among smallholders through cheap credit and a universal fertilizer subsidy starting in the mid-1970s (Gurara and Sala 2012:1). Smallholder fertilizer use increased in the 1970s and Malawians overall purchased the most fertilizer per capita in sub-Saharan Africa (Kadyampakeni 1988:1304; Gurara and Sala 2012:1; Kydd and College 1982:374). The government concurrently promoted hybrid maize seed adoption (Chirwa 2005:3). The first variety of hybrid maize seed in Africa, called Southern Rhodesia-52 (SR-52), was developed in the late-1960s in the Federation of Rhodesia and Nyasaland (McCann 2005:140). McCann asserts that SR-52 “transformed African landscapes, racial politics, and diets over the next forty years” (2005:140–141). Large-scale farmers in the region quickly adopted the seed, while smallholders were slower to adopt it (McCann 2005:141). In the 1970s, the government began importing SR-52 for estates and improved open-pollinated varieties for smallholders (Smale 1995:824).

The government continued to promote the use of ridges to conserve the soil (Green 2009). Two female participants in Cluster C, who were born during colonialism, said that they planted on flat ground or rounded mounds (*matatu*) until Kamuzu’s government came and encouraged them to make ridges. One female farmer said, “The [government] spokesperson used to come indeed. They were saying that you should be doing it this way...everyone should do ridges to do well—it’s a law, this one, that whoever doesn’t do it won’t find luck.”²⁷ One 57-year-

²⁷ We conducted this interview in Chichewa in Cluster C on May 23, 2012.

old female farmer said that extension workers during Kamuzu's time encouraged them to construct ridges to conserve water, prevent soil erosion, and conserve fertilizer. Constructing ridges is a labor intensive, ubiquitous, and largely unquestioned practice today (Green 2009).

A few participants over the age of 50 reported that in addition to hybrid maize, Kamuzu also encouraged farmers to grow cassava, sweet potatoes, tobacco, groundnuts, sunflowers for oil, and soya. One woman said that Kamuzu restricted crop sales and discouraged farmers from selling crops. Another woman said that he discouraged intercropping by telling farmers to plant crops in different ridges to increase yields and to label each crop section with signs.

The government ostensibly altered the agricultural extension system to focus on education and persuasion (Masangano and Mthinda 2012:4). In 1969, extension services began to focus on training progressive farmers (achikumbe), which was similar to the colonial progressive farmer program (Ministry of Agriculture and Natural Resources 1980; Masangano and Mthinda 2012:4–5; Mulwafu 2011:223–224). In a stated effort to improve the extension system, the government began to work with groups and started several agricultural programs. For instance, the National Rural Development Program instituted various agriculture programs and assigned extension workers to all areas of the country. The Lilongwe Land Development Project (1968-1981) was one of the largest agricultural development projects at the time through which the government intended to change peasants' farming methods to increase yields. According to Ake, project managers instituted this project, like others in Malawi, in an authoritarian manner (1981:158–159). In 1981, the Block Extension System, largely funded by the World Bank, began using on-farm demonstrations, and according to Masangano and Mthinda, failed to evenly and consistently reach all farmers with extension services (2012:5–6).

Malawi has received foreign aid since gaining independence from the British; however, aid flows substantially increased after 1981. Malawi entered a financial crisis after accumulating debt in the context of a global recession, oil price shocks in the 1970s, global inflation, and failed development strategies in addition to drought and impacts of the Mozambican civil war (Chazan et al. 1992:306; Lewis 1998:383; Ake 1996:103; Bezner Kerr 2012:221). Kamuzu Banda sought funding from the IMF and the World Bank after Malawi's economy rapidly declined in 1979 and 1980 and the government accumulated a high debt burden (Hirschmann 1990:471). In 1981, both institutions began their involvement in Malawi, which continues today.

Since the 1980s, the development apparatus and development discourse has significantly influenced the practice and impacts of foreign aid in Malawi. The development apparatus has developed as a system of power, knowledge, and action since the 1940s (Escobar 1995:10, 46). The development apparatus is enacted through development policy that is primarily formulated, funded, and implemented by wealthy countries (i.e. US, UK, Norway, Japan, etc.), multilateral institutions (i.e. World Bank, IMF, etc.), NGOs (i.e. Oxfam International, CARE, World Vision, etc.), and private foundations (i.e. Bill & Melinda Gates Foundation, Clinton Foundation, etc.) in low- and middle-income countries. Development ideology and discourse, based on assumptions of modernization theory²⁸ and societal evolutionism, constructs a knowledge set about 'the rest' as Other, which "functions as an ideology" and system of representation (Hall et al. 1996:186), through which poor countries were transformed into the underdeveloped 'Third World' (Ferguson 1994:xiii; Escobar 1995:7, 11). Escobar, among others, argues that the development apparatus and discourse has transformed problems grounded in impoverishment and inequality

²⁸ Modernization theory based on five stages of growth, the history of colonialism, and unequal global power relations significantly influenced the concept and practice of development (Rostow 2003:124–129). In modernization theory, the existence of "uneven geographical development is interpreted as the product of a differentiated diffusion process from the center that leaves behind residuals from preceding eras" (Harvey 2006:72).

into technical problems, which elides the historical and current role of Western countries, economies, and transnational corporations in the impoverishment of the global South (1995:23, 44–45, 52). Anthropologists Smith and Ferguson also posit that development discourse paradoxically offers a myth of universal belonging and equal material and social conditions in Africa (Smith 2008:9–10; Ferguson 2006:33, 174–175).

At independence, Malawi adopted the UN’s definition of community development with the stated goal of promoting local participation, self-help, and community level self-reliance (Kishindo 2003:380). Yet, in the late 1970s and 1980s, economic neoliberalism came to dominate development discourse and practice as the way to ostensibly attain modernization and improved well-being (Edelman 2005:7; Leys 2005:110). Harvey defines neoliberalism as a

theory of political economic practices that proposes that human well-being can be best advanced by liberating individual entrepreneurial freedoms and skills within an institutional framework characterized by strong private property rights, free markets, and free trade (2005:2).

Duffield argues that adherence to the dominant neoliberal development ideology has prevented development efforts from addressing the unequal global political and economic power relations that produce and reproduce global impoverishment and conditions of material deprivation (2001:101). As Ferguson writes concerning Lesotho, this general “failure” of development “has its own logic” and effects (1994:276) – it selectively decreased the role of the state, expanded bureaucratic state power, and depoliticized poverty and the state (1994:256).

As required by the IMF and World Bank, Malawi implemented structural adjustment programs (SAPs) in the 1980s, which did not solve the country’s economic problems as impoverishment and debt rose (Gaynor 2011:20). Malawi’s economy further declined in 1986 because global tobacco and tea prices declined, prompting more World Bank programs and loans (Kherallah et al. 2001:25). Since Bretton Woods Institutions imposed conditionalities, Milner

writes that the Malawian government “has not had the freedom to direct agricultural development in the country” (2005:53). Dionne, Kramon, and Roberts conclude that development priorities, conditionalities, and aid flows in Malawi are shaped by donors’ “humanitarian, political or commercial” motivations and their development, political, and economic ideology (2013:5–6).

The Malawian government deregulated the agriculture sector to adhere to SAP conditionality, including deregulating price and exchange rates, reducing trade barriers, allowing smallholders to grow burley tobacco, and dissolving marketing boards (Southgate and Graham 2006; Clapp 2009; Chang 2009; Kherallah et al. 2001). After market deregulation, Cargill, a US-based transnational food conglomerate, purchased a controlling interest of the state-owned National Seed Company of Malawi (NSCM) in 1988 and concentrated production on maize seed (CAS-IP 2009:7; Cromwell and Zambezi 1993:59). With declining national food availability in the 1980s and pressure from donors and officials, the government reinstated public hybrid maize research, which released hybrid maize seeds (MH17 and MH18) with the harder grain texture preferred by smallholders in 1990 to encourage adoption (Smale 1995:824–827; Milner 2005:36). According to Smale, smallholder adoption of hybrid maize rose from 7% to 24% from 1988 to 1992, because MH17 and MH18 were released, NSCM increased marketing, extension officers organized credit clubs through which farmers got hybrid seed and fertilizer (1995:826–827), and the government formed the Smallholder Fertilizer Revolving Fund to improve fertilizer distribution (Kherallah et al. 2001:24).

From 1980-1994, Kamuzu Banda’s rent management system weakened because of economic decline, SAP induced economic restructuring, the merging of politics and the civil service, and Banda’s rising age (Cammack and Kelsall 2011:90–91). In the early 1990s,

inflation, unemployment, and hunger grew (Ihonvbere 1997:226). International donors restricted the government's ability to function by freezing significant portions of aid in 1992/93 in response to authoritarianism and human rights abuses (Cammack and Kelsall 2011:90–91; Wroe 2012; Ihonvbere 1997:226). In response to growing domestic and international calls for political liberalization, Kamuzu Banda held and lost a referendum on multiparty democracy in 1993. Bakili Muluzi, the leader of the United Democratic Front (UDF), was elected president in 1994 during the first multiparty election (Ihonvbere 1997:226, 229–231, 237).

Under the UDF's neoliberal platform and IMF and World Bank structural adjustment, the government further deregulated the economy, including removing international trade restrictions, removing food subsidies, and devaluing the Kwacha (Øygaard et al. 2003:29, 33; Englund 1999:148; Kherallah et al. 2001:28). In addition, the government decreased (1994/95) and then eliminated fertilizer subsidies (1995/96) (Kherallah et al. 2001:25). One participant explained that, at this time, she felt that hunger became rampant under Muluzi because the government stopped supporting farmers and the elderly and only encouraged maize production. Deregulation also allowed for competition in the seed sector, and Monsanto took over NSCM after buying Cargill's seed business in 1998 (CAS-IP 2009:7; Cromwell and Zambezi 1993:59; Mloza-Banda, Kaudzu, and Benesi 2010:14). The government also fully liberalized the tobacco sector, including ending the smallholder tobacco production quotas in 1997/98 at the direction of the World Bank (Kherallah et al. 2001:25; Harrigan 2003:854). Agricultural growth in the 1990s, at about seven percent, drove per capita GDP increases due to an expansion of land under cultivation. Despite the reforms in the 1990s many production constraints remained, including inadequate infrastructure, limited access to credit, and land degradation according to Diao et al.

(2012:246). Kherallah et al. state that donors began several programs to facilitate smallholder input use beginning in 1995 in response to declining productivity and food insecurity (2001:27).

Mloza-Banda, Kaudzu, and Benesi assert that the model for the national agricultural development strategy since the late-1990s has been conventional, industrial agriculture focused on a few crops, high-potential yield varieties, and chemical fertilizer and pesticides although Malawi has no mechanized or industrial agriculture (2010:30). Bezner Kerr characterizes the current agricultural system in Malawi as based on neoliberal logic, with “strong roots in the Green Revolution and a Western-driven concept of modernity and progress,” which holds that agricultural production improvements rely on conventional input use (2010:103). Muluzi’s government institutionalized the effort to promote adoption of hybrid seeds and fertilizer through the Starter Pack Programme (1998-2000) and the Targeted Input Programme (2000-2005) (Mloza-Banda, Kaudzu, and Benesi 2010:14) ostensibly to improve smallholder maize production and national maize self-sufficiency (Chirwa 2005).

The economy declined in the mid- to late-1990s, leading to Kwacha devaluation and debt relief from the IMF and World Bank as a Heavily Indebted Poor Country in 2000 (IMF 2006:ii). In the 2001, the government sold the maize stock reserve in response to IMF pressure to pay off debt, which, in combination with a drought, precipitated a famine in 2001/02 (Ellis and Manda 2012). Since 1990, aid for agriculture and food security spiked in years with severe food crises, including 1991/92, 2002/03 and 2004/05 (GDPRD 2011).

Bingu wa Mutharika was elected president in 2004, and within months, started the Democratic Progressive Party, to gain independence from UDF influence (Cammack and Kelsall 2011; Joala 2012). The economy grew during Mutharika’s first term, however, according to some, Mutharika returned to ways of Kamuzu Banda with hard-budget clientelism, an

intolerance of opposition, consolidation of presidential power, and a disregard for the constitution, courts, and civil society (Cammack and Kelsall 2011:92–93; Joala 2012). Like Kamuzu Banda, Mutharika reinstated wide-spread farm input subsidies through the Farm Input Subsidy Programme (FISP) (2005-present), from which he gained popular support (Cammack and Kelsall 2011:93; Chibwana and Fisher 2011:2). Mutharika implemented FISP against the recommendations of multilateral donors, with the government’s stated aim of intensifying agricultural production and increasing maize yields to improve national food security. Further, according to Aberman et al., “fertilizer subsidies has become synonymous with ensuring the political legitimacy of those in power” (Aberman et al. 2012:2). Since instituting FISP, Malawi has had one of the highest agricultural growth rates in Africa at around six percent annually. Maize yields increased in 2007, however, Diao et al. assert that the yield gains since 2007 have proven to be in part dependent on adequate and timely rainfall and other weather conditions (Diao et al. 2012:246, 270).

After Mutharika’s reelection in 2009, the economy declined after suffering a number of crises and from Mutharika’s increasingly autocratic style and political repression (Cammack and Kelsall 2011:93). In 2011, Mutharika expelled the British ambassador over criticism in a diplomatic cable revealed by WikiLeaks (Al Jazeera 2012; Wroe 2012:139). After that incident, Malawi’s largest donors, the UK, EU, and US suspended aid that accounted for about a third of Malawi’s budget (Dionne, Kramon, and Roberts 2013:14; Wroe 2012). In combination with lower export earnings, I and others observed that aid suspension had swift, severe economic impacts that hampered individual’s access to basic goods and the government’s ability to provide goods and services, such as funding FISP and importing medicine and fuel (Dionne, Kramon, and Roberts 2013:14; Wroe 2012:139).

From 1965 to 2011, Malawi has been loaned and granted \$25.3 billion in ODA (aid commitments, not actual disbursements) from 47 organizations for 9,648 projects (AidData 2014). Major multilateral donors included the Global Fund, the UN's World Food Programme, and the World Bank²⁹ (The Robert S. Strauss Center 2011; Ministry of Finance 2011a). Major bilateral donors include, the US, UK, Germany, and Norway (Dionne, Kramon, and Roberts 2013:15). According to government figures, ODA commitments have largely been grants, although multilateral organizations and some bilateral donors like China and India still give loans (Ministry of Finance 2011b). The government reports that aid is fragmented across donors, projects, and sectors, with many donors working in the same areas, potentially duplicating efforts (Ministry of Finance 2011b).

When aid is not frozen, Malawi receives more aid per capita than the average low income country (Dionne, Kramon, and Roberts 2013:13), with Official Development Assistance (ODA) representing about 30% of the national budget and 60% of the development budget (GDPRD 2011). The health sector receives the most aid, followed by education, economic governance, roads and transportation, water and sanitation, and agriculture (Dionne, Kramon, and Roberts 2013:15). Within agriculture and food security, the most money is budgeted for improving access to inputs, followed by improving agricultural production and diversification, providing extension services, with food security and reducing post-harvest losses lagging behind (Government of Malawi 2012b:282–284).

Today, there are numerous NGOs operating in Malawi. According to Kishindo, NGOs are more involved in development at a community level than the government in many areas (2003:380). The national Council of NGOs had 357 registered NGOs in 2013. There are other

²⁹ The World Bank funded 149 projects between 1966 and 2013 totaling \$3.8 billion (2013).

unregistered NGOs operating in the country, such as Everlasting Harvest. NGOs have little incentive to report funding to the government so there is little data on aid flows outside of the public sector (GDPRD 2011). NGO presence is considerable, including those of varying size and national and religious orientation. It is an attractive country for NGOs to operate as a safe country with severe impoverishment.

As of 2009, Malawi received \$66 million in ODA for agriculture, which makes Malawi a top ten recipient of ODA for agriculture in sub-Saharan Africa (UNDP 2012:164–165). There is no comprehensive data available about NGOs in Malawi that focus on agriculture or have agriculture programs. Since the Ministry of Agriculture and Food Security (MoAFS) developed a project database in 2004, they have tracked 193 agriculture and/or food security projects that were funded and implemented by over 80 donors and NGOs (GDPRD 2011). The agriculture sector is the most fragmented sector based on the number of donors and projects. The EU is the primary donor for agriculture and food security, amounting to 45% of funds in 2010/11. Other donors include Ireland, Norway, USAID, World Bank, the African Development Bank, and the UK's Department for International Development. Donors also have their own priorities within the agriculture sector in Malawi that do not always overlap with each other or with government priorities. From 1990 to 2008, agricultural production, processing and marketing has received the most funding, closely followed by rural socio-economic development (primarily food security, followed by rural development), and a minority went to emergency and welfare (primarily food aid, followed by basic nutrition, among others) (GDPRD 2011; Ministry of Finance 2011b; Dionne, Kramon, and Roberts 2013). One older participant said that she identified a shift to NGOs involvement since Mutharika. She said that Kamuzu Banda's government directly communicated with farmers through village meetings, but that Mutharika instead communicates

with farmers through NGOs. She said that NGOs came to the villages to tell farmers that Mutharika wanted Malawians to farm instead of depending on purchasing food, to grow tobacco, and later soya when global tobacco prices fell.

In the 2000s, the concepts of empowerment and participation, stripped of their radical content by situating impoverishment alleviation in self-help neo-liberal terms, became key goals for donors and NGOs in a new development paradigm that aimed to foster social as well as economic change (Duffield 2001:40–42; Bebbington et al. 2007:597–598; Berner and Phillips 2005:17–18, 20). In practice, decision making about development projects at a community level was often dictated by village chiefs and community participation and empowerment frequently involved villagers providing free labor (Kishindo 2003:380–382, 386).

Agricultural development programs range in focus, approach, and position about different agriculture technologies like hybrid seeds (Chinsinga 2011b:63). There are projects that promote organic techniques or the sustainable use of natural resources, such as agroforestry or legume intercropping (Milner 2005:61), conservation agriculture (Mloza-Banda and Nanthambwe 2010), and climate-smart farming (Kaczan, Arslan, and Lipper 2013). Some donors, like the Norwegian Agency for Development Cooperation, Irish Aid, and UN FAO support both low and high external input techniques, such as agroforestry and FISP respectively (Chinsinga, Chasukwa, and Naess 2012).

Most programs and funding promote conventional agriculture, such as by supporting FISP. Milner writes that NGOs typically focus on transferring crop production technologies, such as Action Aid and World Vision International that have large projects that promote hybrid seed (2005:58). NGOs often simply purchase seeds from Monsanto, Pannar, and Seed Co. (CAS-IP 2009:8). Some focus on market infrastructure and commercializing smallholder farming

(Milner 2005:55–56). For example, the UK’s Department for International Development contributed £10.5 million to buy fertilizer for Malawi’s Farm Input Subsidy Programme in 2011/12 and £18.4 million on enhancing Malawi’s fertilizer, seed, and maize markets from 2007 to 2011 (DFID 2014). NGOs (i.e. Africare, Action Aid, World Vision, etc.) and multilateral institutions (i.e. UN World Food Programme, FAO, etc.) also provide agricultural extension with the stated objectives like improving food security and livelihoods, agribusiness/entrepreneurship, community empowerment, and promoting livestock production (Masangano and Mthinda 2012:10–11, 18).

For example, Sasakawa Global 2000’s program has been an influential agricultural development project in Malawi and one that participant farmers commonly referenced learning techniques from that they use. Sasakawa Global 2000 is a Japanese-funded NGO that encourages a particular conventional technology package – planting one hybrid seed per planting station, micro-dosing fertilizer, no intercropping, and herbicide use. Sasakawa works closely with agribusinesses like Monsanto and the government to provide inputs to farmers on credit. While Sasakawa focused on smallholder commercial farmers for their projects, their message was widely disseminated to farmers (Bezner Kerr 2010:104–105).

Conservation agriculture is another set of techniques being widely encouraged by the government, NGOs, and Monsanto through agricultural development programs in Malawi. Conservation agriculture in this case is presented as an ecological and labor saving alternative to current practices, however it is still based on a conventional technology package of using herbicides to enable reduced tillage and incorporating legumes (Bezner Kerr 2010:105).

In addition, donors fund and NGOs administer food security and nutrition programs. The UK’s Department for International Development, for example, provided £20 million worth of

food aid and cash to 480,000 food insecure people in 2013/14 and budgeted £3.9 million for under- and mal-nutrition treatment and education from 2013 to 2015 (DFID 2014). In addition, USAID funded \$80.7 million to Catholic Relief Services and eight NGO partners to implement the Wellness and Agriculture for Life Advancement program. The program targets maternal and child nutrition through behavior change strategies, education, and food-based nutrition interventions and agricultural productivity through conservation agriculture practices, irrigation, micro-loans, and market linkages and information (USAID 2014).

In the context of climate change and renewed donor attention on agriculture and food security, there is consensus in Malawi about the need to address these issues. However, there is disagreement about the causes and solutions to these problems (Chinsinga, Chasukwa, and Naess 2012:6–7). In Chapters 5, 6, and 7, I explore differences between conventional agriculture and permaculture, which lie at different ends of the spectrum within this debate.

Conclusion

Crop production in present-day Malawi began changing in the 1500s as a result of international trade. Through colonial development policies and programs, the British introduced agricultural techniques from Europe to Malawi. This trend has cemented with the promotion and normalization of conventional agriculture as part of colonial and post-colonial government policy and development interventions. The changes in agricultural production that took place over hundreds of years in Malawi have shaped how farmers interact with the environment, their relationship with the government, their livelihoods, and diets. As I discuss in Chapter 5, the agricultural information available to farmers largely focuses on conventional agriculture, which presents farmers with limited options about how to farm.

CHAPTER 3

PERMACULTURE AS DESIGN SYSTEM, SOCIAL MOVEMENT, DEVELOPMENT APPROACH AND ITS APPLICATIONS IN MALAWI

I first met Bauleni Mvula in 2010 while visiting Everlasting Harvest, which is located not far down a wide dirt road from the Mvula's village. The Mvulas are one of the permaculture farmer families with whom I worked. In 2011, Bauleni Mvula managed Everlasting Harvest's permaculture demonstrations and trained others in permaculture. Later during the study in 2012, Ulimi hired him to manage their permaculture demonstrations and conduct trainings, so he moved to Ulimi's farm where I lived.

While he was still working for Everlasting Harvest, he gave a young, European volunteer from Ulimi a tour of Everlasting Harvest's demonstrations. I accompanied them on the tour. The volunteer asked Bauleni about what kind of agronomic information they teach farmers during permaculture trainings. Bauleni framed his answer in terms of Malawian indigenous agricultural practices and a critique of Western development and knowledge.

"If you look back in history, you find that our fathers, our grandparents have been farming the same way we are doing [with permaculture]. Only that the knowledge has been pushed backwards because of the progress, people are aiming for progress. Every Malawian would like to be Westernized, that's why we are just forgetting our parents knowledge... They had this knowledge, but because we are aiming towards progress, we are pushing back the knowledge that our parents were using for quite a long time, that's why we have to go back and teach [farmers] which is a digger and you know which is a nitrogen fixer," he said, referencing plant categories used in permaculture design.

“But, but they’ve been cultivating in such a way, if you look back into history, [clap] no hybrids have been used, no chemicals have been used, no fertilizer has been used. The people have just been um farming a natural way because nature was their own best teacher. So we are not teachers, we are just facilitators, we are just facilitating what is already there,” Bauleni said.³⁰

A few months later, Bauleni took Ulimi’s Malawian gardening staff on a tour of the same demonstrations at Everlasting Harvest, as part of an effort by the two organizations to work together more closely. Bauleni again positioned permaculture against Western knowledge and development, while talking about race to his Malawian audience, with the exception of my presence.

Bauleni discussed how Malawian cooking and food consumption has changed, which he said contributes to severe health problems and short life spans. He explained that he thinks Malawians have forgotten the knowledge of their parents and grandparents. He said that today, people in Malawi value knowledge and practices of people who have lighter complexions because they want development. However, he expounded that he thinks casting aside the knowledge and practices of their ancestors has had damaging results for the environment and Malawian’s well-being.

Bauleni’s framing of permaculture knowledge points to an uncomfortable truth about permaculture knowledge and development practice, which I further discuss in this chapter. Different indigenous groups around the world developed and historically practiced much of the design concepts and practices that are a part of permaculture. Mollison and Holmgren, the founders of permaculture, appropriated this knowledge and presented in a way that some saw as valuable and authoritative because their position as university-educated white males from a wealthy country validated indigenous practices and knowledge. The seeming Western origin of

³⁰ Bauleni gave this tour in English in Cluster C on April 26, 2012.

permaculture has lent it validity as an agricultural system and development strategy, both to NGOs and funding agencies and to Malawian farmers who are bombarded with and have internalized racially grounded development discourse that promotes Western ways of life and forms of knowledge. Yet, some participant farmers and Malawian permaculture trainers I worked with, like Bauleni, used the relatively privileged position of permaculture knowledge to reassert the value and authority of their ancestor's knowledge. However, to a degree, some trainers asserted some practices onto a reimagined past of how Malawians' farmed historically as the existing historical and oral record about agricultural practices before European imperialism is limited. As Bauleni said, he has "to go back and teach" farmers the ecological and agronomic knowledge of their ancestors; however, not all of the permaculture practices he taught were necessarily used in Malawi in the past.

The permaculture design system, social movement, and conceptions of social change that circulate within the social movement, shape the application of permaculture in Malawi. The information and approaches to permaculture education used by Ulimi and Everlasting Harvest largely comes from the international movement. Within Malawi, permaculture is largely part of the development sector. Its dissemination and adoption has spread in the last twenty years, however permaculture organizations and projects are disparate and face a number of challenges.

Practitioner literature on permaculture, particularly the texts written by founders Mollison and Holmgren, significantly influence permaculture education and practice globally. I heavily rely on practitioner work in this chapter to reflect permaculture ideology as the influential founders of and actors in the permaculture movement present it. The practitioner work on permaculture is a wide body of literature including textbooks (Jacke and Toensmeier 2005a; Jacke and Toensmeier 2005b; Mollison and Holmgren 1978; Mollison 1979; Mollison 1988),

manuals (Hemenway 2009; Morrow 2010; Holzer 2004; Nordin 2005), design and sustainability focused books (Holmgren 2002), cookbooks (Clayfield 1996; Legge 2014), memoirs (Dawborn and Smith 2011; Eric and Jonathan 2013), and examples of permaculture (Birnbaum and Fox 2014), among many others. The main practitioner texts are not necessarily representative of permaculture practice globally and often broadly focus on the design system, the application of in particular contexts, or specific techniques.

Permaculture as a Movement

Beginning in the 1980s, a social movement developed among practitioners of the permaculture design system. The permaculture movement has shaped permaculture education globally and that of the permaculture trainers in Malawi, which in turn, shapes how they understand and teach permaculture.

Anthropologists Lockyer and Veteto write that permaculture was rooted in 1960s counterculture and emerged in the 1970s along with bioregionalism and other alternative agriculture approaches, such as the Tasmanian organic farming movement in which Mollison was an active member (2013:xii, 7, 98). According to Holmgren, Mollison built the foundation of a movement with “energy and charisma” by tapping “feelings of” the late-1970s and early-1980s, including through publications, an intentional community, and a “course that laid the foundations for the Permaculture Design Course” (Dawborn and Smith 2011:23). Holmgren asserts that Mollison exhibited charismatic leadership in the early years, which led to the development of a rigid ideology among some and an over-hype of permaculture that was not supported by practical projects or evidence (Dawborn and Smith 2011:24).

By 1981, permaculture had grown and gained some traction as Mollison won a Right Livelihood Award and trained an initial group of people in a standardized design course

(Lockyer and Veteto 2013:99). The geographic scope and number of people trained in permaculture grew in the 1980s as some people trained in permaculture went on to teach others, and so on. The permaculture curriculum evolved from Mollison's early teachings (Dawborn and Smith 2011:20) and the curriculum used for certificates became standard in 1984 (Lockyer and Veteto 2013:99). An international community of permaculture designers emerged, holding their first convergence (meeting/gathering) in 1984 (Dawborn and Smith 2011:24).

Permaculture continues to grow through this model of "itinerant," or traveling, teachers connected to permaculture centers, community-based organizations, schools, and NGOs who teach introductory and Permaculture Design Certificate courses (PDC)³¹ (Ferguson and Lovell 2013:15). The Permaculture Institute estimates that 100,000 to 150,000 people have completed PDCs globally (Tortorello 2011), however, no organizations systematically track global permaculture teaching.

People in the social movement use and organize around the design system (Ferguson and Lovell 2013:15). The movement is self-organizing and started in the 1980s, a time at which anthropologist Harvey writes many other protest movements formed (2005:200). It has taken the form "a loose global network" (Mollison 1988:ix), which anthropologist Escobar writes is common to contemporary transnational social networks (2008:259).

The permaculture movement consists of intersecting and overlapping networks of permaculture practitioners, teachers, supporters, and activists that have remained autonomous and often place-based (Lockyer 2007:252). The form of the permaculture movement is commensurate with Juris's analysis of contemporary social movements. Juris writes that networks are often both the organizational structure and political model, while in practice, they

³¹ Bill Mollison developed the Permaculture Design Certificate course to teach permaculture design. There is a recommended syllabus to uphold the integrity of the certificate globally, however there is no monitoring or enforcement of the course content (Permaculture Institute 2013).

are “unevenly distributed... and exist in dynamic tension with other competing logics” (2008:11). The movement claims not to have an organizing or central body (Mollison 1988:ix). The degree to which local, place-based networks are connected to other regional or international networks vary, particularly among Southern networks that are more likely to be disconnected from other networks by language and access to resources and technology. In the largest global survey of permaculturalists to date, Ferguson found that respondents were overwhelmingly white across 46 countries (2014:5)

Individuals in the network often practice permaculture at their homes, gardens or farms, schools, or intentional communities, or work professionally in permaculture as farmers, teachers, or NGO employees, among others. Permaculture is also spread through local and bioregional organizing (Ferguson and Lovell 2013:15), and disseminated through websites, written work, radio, community gardens, school programs, and sharing within social networks, among others. There are regional and international permaculture events that are important networking points. Internationally, the International Permaculture Conference and Convergences (IPC) are main gatherings where people share information, build networks, and discuss the direction of permaculture. The 11th IPC in Cuba in 2013, which I attended, was the largest convergence to date, with over six hundred participants. IPCs typically require that one have a PDC to attend the convergence part of IPCs, as opposed to the conference portion that is intended as the public portion of the event. In this way, IPC organizers often treat the PDC as mark of credibility and an entry point to the movement.

Permaculture as a Design System

Mollison and Holmgren reference that they developed permaculture from a combination of information from academic disciplines³² (i.e. biology, systems ecology, and physics) and indigenous environmental management practices and polyculture farming systems. Mollison and Holmgren's focus on multi-species cropping, system yields, sustainability, and low-input and indigenous practices was in line with farming systems research in the 1960s/70s (Hart 2000:42–46). Mollison and Holmgren also drew from a number of other approaches when they developed permaculture, namely: (1) Howard and Eugene Odum's ecological systems theory,³³ which was the ecological approach of the time (Lockyer and Veteto 2013; Holmgren 2004; Holmgren 2006; Ferguson and Lovell 2013:3); (2) the concept of permanent agriculture³⁴ (Ferguson and Lovell 2013:3; Smith 1929); (3) the Australian Keyline design system, which is a system of holistic landscape analysis (Ferguson and Lovell 2013:4); and (4) Masanobu Fukuoka's work on sustainable, natural farming that is based on learning from nature (Fukuoka 1978; Holmgren 2006:4–5). These influences are evident in the design system. However, the fact that Mollison and Holmgren did not systematically cite or acknowledge these sources reduces the legitimacy of permaculture for some and raises their stature for others. In addition, Mollison and Holmgren promote some concepts that agroecology research does not support (Ferguson and Lovell 2013).

³² What is categorized as science in academic institutions is socially constructed and contextually dependent, as Agrawal argues (1995).

³³ Odum developed an applied form of systems ecology, which views “ecosystems as networks through which energy flows and is stored and transformed” (Ferguson and Lovell 2013:3–4). Odum's work on ecosystem design posited that species are “distinct but interchangeable system components which should be selected from a global pool... [to] produce yields for human use with minimal labor input” (Ferguson and Lovell 2013:4).

³⁴ The term permanent agriculture came into use in the early 1900s in the US to refer to sustainability and later referred to a focus on perennial crops after Russell Smith's work on tree crops and agroforestry (Ferguson and Lovell 2013:3; Smith 1929).

Mollison defined permaculture as “the conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability, and resilience of natural ecosystems” (1988:ix). Mollison and Holmgren present permaculture as a solution to industrialized agriculture and monocrop grain production in the global South (1978:1, 3). Later, it also became understood as a contraction of the words permanent culture, to “encompass human settlement more broadly” (Ferguson and Lovell 2013:3) and because adopting permaculture involves changing one’s typically unquestioned, everyday practices (Mollison 1988:19; Bell 2005:107; Holmgren 2002:xxviii, 47–48).

Permaculture, like all agriculture systems, is grounded in a normative framework, which perhaps is made uniquely explicit in the ethics associated with permaculture (Ferguson and Lovell 2013:16). Permaculture “is an ecotopian methodology” (Lockyer and Veteto 2013:11) that is guided by ethical principles which are used as “ethical testing questions” to evaluate action in relation to values (Dawborn and Smith 2011:326). Holmgren’s explanation of the ethics in his book show that he and Mollison developed the ethics based on the assumption that humans are presumed to be inherently self-interested and driven by survival instincts (2004).

Permaculture is also predicated on assumptions that the founders of permaculture made about environmental sustainability, which are integral to the ethical principles. First, the founders explicitly understood environmental sustainability as a matter of life and death for the earth and for all people. Second, they assumed that there is an environmental crisis underway that is largely a result of fossil fuel use (Mollison and Holmgren 1978:4; Mollison 1988:1). Holmgren writes that they intended permaculture to be a “‘positivistic’ response to the environmental crisis” by primarily promoting solutions to the crisis (2002:xv).

Mollison's stated goal of the design system is to meet the needs of people and the environment, which in practice requires producing a yield, maximizing efficiency, and conserving and reusing resources (1979:8). Hemenway states that, ideally, each component of a permaculture system has its needs met by other system components (2009:56). In this systems perspective, Bell and Holmgren assert that inputs and outputs are equally valued ecosystem components (Bell 1992:191; Holmgren 2002:111).

Practitioners implement permaculture through the design system, a set of principles and tools that focus on agricultural production, while also addressing energy and resource management and the design of living spaces and communities. Mollison and Holmgren present the design system as idealistic and focused on ecosystem mimicry and systems thinking (Mollison 1988:12; Mollison and Holmgren 1978:4, 7–8; Bell 1992:75–78). Different teachers use different permaculture principles. However, Holmgren's 12 design principles are commonly used, which are as follows: (1) observe and interact, (2) catch and store energy, (3) obtain a yield, (4) apply self-regulation and accept feedback, (5) use and value renewable resources and services, (6) produce no waste, (7) design from patterns to details, (8), integrate rather than segregate, (9) use small and slow solutions, (10) use and value diversity, (11) use edges and value the marginal, and (12) creatively use and respond to change (2004). The aim of these principles is to guide overall designs, encourage systems thinking, evaluate choices, and make decisions about particular actions. They are meant to be easily understandable and broad enough to be applied and adapted to specific contexts and goals (Holmgren 2004).

The techniques used in permaculture are not unique to it. Many are similar to other sustainable agricultural practices that farmers have used historically all over the world, including in Malawi. Examples of overlapping practices include tropical home gardens, forest gardening,

using earthworks to harvest and control water, permanent intensive cultivation, and planting complex polycultures (Ferguson and Lovell 2013:14; Carney and Rosomoff 2009:25; Netting 1993:65–70). Further, in a study of Xhosa homesteads, Perry contends that indigenous forms of homestead designs are commensurate with permaculture design principles and techniques (2013:120–122). The design concepts can similarly be found in use elsewhere, such as among the Kofyar in Northern Nigeria, which anthropologist Netting writes “have fields in concentric circles of diminishing intensity of land use,” centered around the family home (Netting 1993:65), which is in effect the zone system. Zones are a permaculture design tool that refers to the spatial organization of a garden in relation to one’s living space in order to maximize energy and resource usage within the permaculture system (Mollison and Holmgren 1978:49). Given that most of the specific practices and techniques used in permaculture have independent origins, Ferguson and Lovell suggest that “ecosystem mimicry and system optimization” are the two key evaluative criteria for the use of techniques in permaculture (2013:14).

Permaculture for Social Change

According to Ferguson and Lovell, a model for social change developed within the movement, which is in part based on content in foundational permaculture texts. Ferguson and Lovell posit that there are two main components: (1) “solutions to environmental and social crises are both simple and known,” and therefore individuals are empowered to act, rather than needing to depend on scientists, governments, business innovation, among others; and (2) “a model of social change that emphasizes individual personal responsibility and voluntary action and a relative lack of interest in influencing policy or large institutions” (2013:16). Mollison begins the *Designer’s Manual*, a central permaculture text, stating that people must act now to reverse the destruction of the environment and that “the only ethical decision is to take

responsibility for our own existence” (1988:1). Sociologist Furze contends that in locating the source of change in individuals, Mollison elides the structural obstacles that people may face instituting change, such as those based on structural inequality, discrimination, or oppression (1992:145). While anthropologists Lockyer and Veteto describe permaculture as a utopian philosophy (Veteto and Lockyer 2008; Lockyer and Veteto 2013), I suggest that the methods that many permaculturalists promote are neoliberal because of the emphasis on individual action and responsibility. As Lewis’s work on permaculture explains, the proposition of the common permaculture model for social change is that subversion and disengagement will force change by powerful actors without needing to work directly within those systems or with those actors (2014:12). However, there is diversity in the movement and disagreement about how to bring about the permaculture utopian vision.

Permaculture in Malawi

Individuals who learned about permaculture introduced it in Malawi at least beginning in the early-1990s. An important starting point for permaculture in Malawi came from Margaret, a British ex-pat. Her work led to the foundation of Everlasting Harvest and later Ulimi. Sitting on Margaret’s deck, overlooking her permaculture garden and catching glimpses of Lake Malawi shimmering beyond the trees, we talked about how she learned about permaculture and became involved with permaculture in Malawi. Margaret said that she first heard about permaculture in 1991 from a Cape Town student. She went on to explain that while searching for what to do for a women’s garden project in 1992/93, she heard about and visited Fambidzanai Permaculture Center in Harare, Zimbabwe. A group who Bill Mollison trained in Botswana started Fambidzanai in 1988, and it is now one of the oldest permaculture centers in Africa (Fambidzanai Permaculture Centre 2013). Then in 1993, she said some other people she knew in

Malawi were interested in permaculture, so she organized the first permaculture training in Malawi in 1994, which a white, male South African taught who was working on permaculture in the region.

She later published a cookbook, which is how Nora and her husband Dan from Everlasting Harvest were initially introduced to permaculture. The Smiths got in contact with her, and inspired by Margaret's work, they then learned about and implemented permaculture in their home and work. With Nora's initiative, GTZ³⁵ funded the development of a school pilot project, the School Health and Nutrition project, which the Ministry of Education implemented across the country and the activities of the Permaculture Network in Malawi. Margaret said that the project "took [permaculture] from one end of the country to the other." The Smiths were later central to having an IPC hosted in Malawi, which spurred the foundation of Ulimi.

Margaret said that just a few people in different areas adopted permaculture, and they were often people she did not expect to adopt it. She said that she wondered if more people do not adopt permaculture because of a "lack of ability to think outside the box." She continued, "And also, I would hope, to trust what people come in and tell you what to do, um, because we have too much agriculture stuff going on, with good intentions, but..." she trailed off, referring to the fact that there have been many agricultural development programs in Malawi that have had varying levels of success.³⁶

The use of permaculture has grown in Malawi since 1994; however, there is not a large or closely connected network of practitioners. In the 1990s, permaculture practitioners formed the Permaculture Network In Malawi (PNM) to share information and best practices. At various

³⁵ Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, formerly GTZ, is an organization owned by the German federal government working in international development and technical cooperation.

³⁶ I conducted this interview in English on the lake shore on July 6, 2012.

points, PNM has been an active organization, comprising about a hundred individuals and organizations (Thornton 2008:8). PNM used to publish a regular newsletter edited by the Smiths. The official organization largely disintegrated over internal conflicts, including race-based power differentials in leadership and disappeared funds, and after GTZ stopped funding it when Nora got a new job. The weak network has practical implications for its ability to promote permaculture nationally and strengthen existing projects.

Wilson explained his perspective of the PNM. He said that permaculture in “Malawi is now twenty years. The permaculture network doesn’t work. There’s no permaculture network.” Wilson explained that with the support of GTZ, “We used to meet, meet and meet. After that, then, we’re not meeting.” He continued, describing the conflicts, competition, and politics that have hampered the networks’ unity and functioning, and the need for national cooperation to mobilize around permaculture and influence government policy.

Wilson explained to me that he thinks permaculture practitioners and groups in Malawi can work together better if they register a national permaculture organization and “network through demonstrations in our communities,” and “exchange visits.”

“You see, then little by little we’ll be building up that kind of networking through demonstration. Then government will be able to see, ‘Oh! You go to this place and they find there’s a good demonstration, you go to this place there’s a good demonstration. ‘What’s happening?!’ You see?’” Wilson exclaimed.³⁷

As Wilson explained, limited networking, hampered by poor infrastructure, limited technology access, and socio-economic and racial divisions, negatively affected permaculture organizations and practitioners’ ability to work together, share resources, and demonstrate the utility of permaculture to a broader national audience. Others at Ulimi and Everlasting Harvest

³⁷ I conducted this interview in English at the IPC 11 in Cuba on December 1, 2013.

lamented that there is little coordination and cooperation among permaculture organizations in Malawi. Indeed, even Ulimi and Everlasting Harvest that have a long working relationship and are located near each other, have not always had a close working relationship due to disagreements over approaches and funding sources.

Permaculture Definitions

Globally, practitioners have different perceptions of what permaculture is and its scope of application. I identified three conceptions of permaculture used by educators and farmers in Malawi, some of which align with conceptions that Ferguson and Lovell found in permaculture literature (2013:5). These conceptions exist along a continuum of increasing breadth, and the categories are not discrete.

In the first conception, permaculture is an agricultural design system and best practice framework, in line with Mollison's definition of permaculture. Permaculture farmers' permaculture education, perceptions of permaculture, experiences with conventional farming, and the benefits they experienced from practicing permaculture shaped their understandings of permaculture. Permaculture farmers commonly identified permaculture as: (1) permanent or ongoing farming; (2) the practices that are used in permaculture, particularly organic production or farming without the use of synthetic fertilizer, the limited use of hoes and ridges, and intercropping; (3) the design and planning involved and considering available resources; and (4) the results of permaculture, including increased crop diversity. Some permaculture farmers upended the notion of conventional farming as modern farming, instead referring to conventional farming as "old" and positioning permaculture as a new way of farming, which belies the indigenous roots of many permaculture practices. Some permaculture farmers also referred to conventional farming as "anyhow" farming, meaning unplanned or haphazard, emphasizing the

increased design and planning involved in permaculture. This first, narrow conception is the foundation of permaculture and is primarily how the participant farmers discussed and applied permaculture.

Amayi (mother³⁸) Sesani is a permaculture farmer who lives with her family in Everlasting Harvest's model village who is in her early 30s and often had her toddler daughter in pigtailed in tow. As was common among the permaculture farmers, Amayi Sesani described permaculture as a farming system in relation to conventional farming, focusing on the characteristic of permanence and resource use in permaculture.

She said, "Permaculture, the way I know it myself, I say it is an ongoing farming. When you do it, it never ends, it just continues. Even when the rainy season ends, it doesn't end with it, sure. So we say it's an ongoing farming—long lasting farming."

"In the other [conventional] farming, we can say we will go and clear [the land], we will go and make ridges, and then we will weed and go to do whatever. While in this [permaculture] one, when we do these designs, like how this place is," she said while gesturing towards the permaculture garden in her yard, "that means we will just throw these [debris] in and it will be manure. We will not use a hoe at all, we will just take seeds and plant and they grow well."³⁹

Here she identified a key differentiating characteristic of permaculture that challenges normative conceptions of what it means to farm in Malawi. Permaculture education often teaches farmers not to make ridges using a hoe. Mloza-Banda and Nanthambwe write that farmers in Malawi are often skeptical of decreased tillage, because it goes against the perception that hoeing is integral and necessary for farming (2010).

³⁸ It is customary to address Malawian adults in this way even if one is not biologically related. In the dissertation, I primarily refer to adults as mother/father before a pseudo surname.

³⁹ We conducted this interview in Chichewa in Cluster C on May 21, 2012.

Other permaculture farmers talked about permanence, growing during all seasons, and the garden always being green when describing permaculture. A few farmers with more training or exposure to permaculture literature explained that permaculture means permanent agriculture.

Permaculture farmers also characterized permaculture in terms of the benefits they experienced. For example, Josephy, a teenage boy who practices permaculture at his home in Cluster C, told us how he knows if someone is practicing permaculture.

He said, “So when we’ve known that a person is doing permaculture, the skills are evident, and it’s how someone’s home looks.”

“When we say someone is doing permaculture, we observe from the food he eats, he is supposed to eat all food groups. And what air he breathes in... So when we are planting stuff it’s one part of permaculture.”⁴⁰ To Josephy, the skills, aesthetics, and benefits of permaculture also characterize its use and differentiate it from conventional farming.

The second conception is broader and defines permaculture as a holistic design system for sustainable living and sustainable development, guided by the ethical principles of permaculture. In Malawi, the NGOs typically used this conception when explaining permaculture, discussing their work, and training farmers. As Wilson, an influential Malawian trainer and head of outreach and operations at Ulimi stated, permaculture is an approach to sustainable development, as “a design system that create[s] harmonic integration between people and nature for [their] mutual benefit.” For the trainers and NGOs, improving agricultural production is part of a broader strategy for sustainable development, rather than the primary aim of permaculture. As is common internationally, the NGOs reference the three ethical principles that ostensibly guide permaculture practice – care of the earth, care of people, and fair share or redistributing surplus (Mollison 1988:2; Dawborn and Smith 2011:ix).

⁴⁰ We conducted this interview in Cluster C on February 7, 2012.

In Malawi, trainers taught these ethics because they thought they were applicable to farmers given their reliance on the environment and local social norms of sharing and reciprocity. For example, Ulimi defines permaculture as “a design system based on ethics and principles that can be used to guide individuals, households and communities towards a sustainable future.” Everlasting Harvest bases their definition on Mollison’s original definition and uses the three ethics. In contrast, farmers I worked with did not reference the permaculture ethics when describing their perceptions of or interest in permaculture. However, a few permaculture farmers positioned permaculture against the injustice they perceive to be a part of the prevailing conventional agriculture system, such as unequal access to resources and the power of agribusiness.

The third conception encompasses the previous definitions, but sees the permaculture design system and ethical principles as applicable to most areas of human life and activity. In Malawi, trainers and advocates have this conception of permaculture. Margaret, who some permaculturalists in Malawi call the mother of permaculture in the country, positions permaculture in opposition to slash and burn agriculture, describing it as “the wisest way to grow more food, as we work with Nature not against her to improve and enjoy our lives!” She continues that permaculture “uses common sense, [and] local [and] traditional knowledge to give us a holistic design system for sustainable living.” After working for decades in permaculture, Margaret’s perception of permaculture has further expanded, and today she thinks that it can even be a “pathway to peacemaking.” While Everlasting Harvest writes in organization material that permaculture “is a system of living,” and is applicable to “all aspects of life” and “everything we do in life,” they instead taught permaculture to farmers more narrowly as a

design system for sustainable living and development. In practice, they adhered to the second conception of permaculture.

Permaculture NGOs and Projects

Globally, there are over 140 permaculture aid projects. Of those, over half are in North America, with the rest split between South America, Europe, Australia and New Zealand, and Asia. In Africa, there are projects in each region of the continent (Permaculture Research Institute 2010). Many projects are small and community-based, although projects vary in size and there are examples of prominent international NGOs using permaculture. For example, Community Health ran a model permaculture farmer program in Malawi to try to help HIV/AIDS patients improve their nutritional intake. World Vision ran a three-year permaculture project in Sri Lanka that worked with 600 farmers directly and 1,400 indirectly to implement permaculture systems (World Vision 2014). In Indonesia, Oxfam funded a permaculture school that taught ex-combatants and tsunami survivors, with the stated aim of improving their food security and livelihoods, while protecting the environment (Woolverton 2007). In Malawi and South Africa, NGOs and schools have used permaculture “as a sustainable, non-donor dependent tool for improving the health, food and nutrition security, and livelihoods,” of orphans and vulnerable children, according to a recent USAID report that summarized how to apply permaculture to orphan and vulnerable children projects (not funded by USAID) (Greenblott and Nordin 2012:1).

In Malawi, a number of organizations have been involved with permaculture. From interviews, publications, and information available online, I found 16 organizations whose personnel received permaculture training, 27 projects with a permaculture component, and 11 permaculture organizations (see Table 2 and Figure 7). Of these, 24 organizations are based

Table 2. Permaculture in Malawi

Type of Organization	Personnel received permaculture training	Permaculture component in project	Permaculture organization	Total
Bilateral/multilateral institution	1	3		4
International NGO	10	9	1	20
Malawian government	1	1		2
Malawi-based NGO or organization	4	8	7	19
Malawi-based NGO or organization, started by foreigner		4	3	7
Tourism		2		2
Total	16	27	11	54

internationally and 30 are based in Malawi, though foreigners in Malawi started some like for Ulimi and Everlasting Harvest. There were likely other permaculture trainings and projects that have occurred in Malawi that I could not find. While multiple types of organizations engaged in a range of permaculture activities, most organizations whose personnel receiving permaculture training were international NGOs.

Permaculture training is the main component of 26 out of 27 projects, and 21 projects started permaculture demonstration gardens. Organizations have used permaculture in a variety of programs, such as part of school, health, livelihood, orphan care, refugee, and prison programs. A few projects began as early as the mid-1990s, with more beginning in the 2000s through the last few years. Not all of these projects are ongoing, although several are. The budgets and scope for projects vary considerably. Everlasting Harvest projects for instance cost very little and involved a handful of villages. Love’s Harvest, an Anglican NGO, had a project that provided permaculture training to create kitchen gardens to about twenty villages and a permaculture demonstration farm. The project budget is \$500/village/year to provide permaculture teaching, tools, seeds, fruit trees, and goats (Springer 2011). Community Health’s model permaculture farmer program with demonstration gardens at health clinics and extension support for HIV/AIDS patients to create permaculture kitchen gardens was their least expensive program. In contrast, the permaculture project that I found with the largest budget was the Kulera

Biodiversity Project led by Total Land Care in the Central and Northern Regions of Malawi. I could not get much information about the permaculture component of the project, but it has a \$7 million budget from USAID to improve biodiversity and livelihoods and has reached 13,195 people through a permaculture teaching component (ECODIT 2013).

Ulimi and Everlasting Harvest promote permaculture as a development strategy to improve people's lives, livelihoods, and the environment. The model of social change promoted by many in the global movement influenced the logic and strategy employed by Ulimi and Everlasting Harvest. Some in the movement explicitly understand permaculture as a strategy for

sustainable development that can have wide reaching

effects. For example, Holmgren states that,

permaculture is a conceptual framework for sustainable development... its grassroots spread within many different cultures and contexts show its potential to contribute to the evolution of a popular culture of sustainability, through adoption of very practical and empowering solutions (2004:5).

Commensurate with the permaculture model for social change, their programming and teaching focused on individual participation and empowerment approaches that are common in mainstream development today.

Participation and empowerment approaches align with a shift in development in the mid-1990s, which posits that people's behaviors and attitudes need to change to achieve sustainability, empowerment, and more egalitarian social organization (Duffield 2001:39–42).

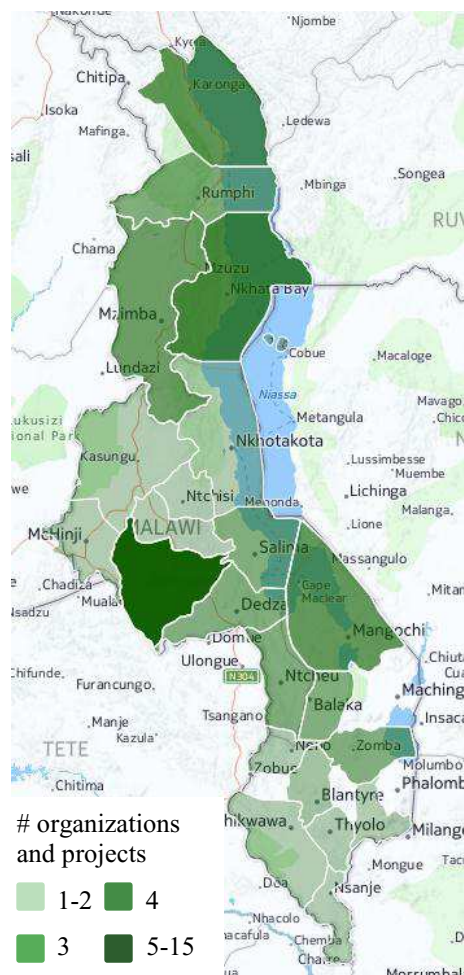


Figure 7 Density of Permaculture Organizations and Projects by District in Malawi

Peeters writes that participation is a key issue in permaculture as a sustainable development approach (2011:433). The permaculture approach is commensurate with current mainstream efforts to increase participation and self-help in development programs (Berner and Phillips 2005:17–19). In development programs generally, participation is supported as a means of improving people’s capabilities and to improve the effectiveness, quality, efficiency, ownership, and legitimacy of projects (Berner and Phillips 2005:18). However, particularly when situated within neoliberal political-economic systems (Mosse 2013:236–237), “there is a risk that the current ‘autonomous development’ orthodoxy may fail to adequately serve the needs of the poor, succumbing to a neo-liberal wolf dressed up as a populist sheep” (Berner and Phillips 2005:20). Participatory approaches may contribute to the depoliticization of deeply political problems like hunger and impoverishment, as Ferguson, de Waal, and Duffield, among others, have argued about the development apparatus in Africa (Ferguson 2006:101–103; Ferguson 1994:xv, 226; Duffield 2001:75–76) and Eggen argues has occurred in Malawi (2013).

While primarily using participatory and empowerment approaches, the Ulimi Centre and Everlasting Harvest staff identified a need for some degree of political and economic change to occur. Therefore, both organizations have worked to educate government officials, NGO workers, teachers, health workers, and private sector employees about permaculture through networking, demonstrations, tours, the media, and participation in national development dialogues. Their programs nonetheless are part of the development apparatus and at times employ top-down approaches.

Building off of Escobar’s differentiation between development paradigms in this paragraph (2008:172–173), the permaculture model of development that I observed was a hybrid model, sharing characteristics of several development theories, such as liberal, Marxist, and post-

structuralist theory. The criteria for change are transformation of social relations, development of productive forces, transformation of human-environment relations and consumption and production, improved sustainability/resilience, redefinition of value and yield, and holistic perspective and action. The mechanism for change, as discussed in regards to social change, is more carefully tailored (designed) interventions, change of practices of knowing and doing, small-scale and low-input interventions, and strengthening ecosystems. The movement ostensibly promotes development that is more egalitarian, reorients development toward satisfying requirements for social justice and sustainability, articulating the ethics of expert knowledge as political practice, and reorienting development toward environmental justice. As anthropologist Harvey asserts of some other social and political theories (2005:43), permaculture theory has not resolved the tension between social justice and individual freedom.

For example, Francis, a Zimbabwean permaculturalist discussed the permaculture ethical principles with me. He said, “We should not talk on the garden only. Sometimes we should be politicians... really talk [of a] bigger scale. Because we can do fair share on our two vegetables here,” he quipped. “But what happens to the diamonds? What happens to the oil? Which is making war.”⁴¹ Francis highlighted the fact that the predominant conceptions of change in the permaculture movement have not resolved potential contradictions between the need for structural change and the short-term practicality of individual action and disengagement from the broader political-economic system.

Much of the permaculture activity in Malawi takes place within the development sector, rather than as a social movement. The NGOs working on permaculture act as recognizable development organizations, with offices, white foreign personnel, cars, computers, and other resources. They have a formulated agenda like other development organizations and carry out

⁴¹ I conducted this interview in English at the IPC 11 in Cuba on December 1, 2013.

their work through programs with specific groups of people. Ulimi in particular works under typical project funding models with most of their funding coming from European governments.

Some permaculture farmers saw permaculture as a strategy for household-level development. Some farmers characterized development generally as forward progress and often a practical activity that improves households' and villages' material conditions and resource access. Amayi Mvula, for instance, said that by using permaculture practices, they were implementing development at their home. She explained that she thinks development requires participating in farming so one has enough food and does not suffer.

Some conventional farmers in the participant villages also said permaculture is a strategy for household development. For example, during a focus group with women in Cluster C, the women explained that they now see permaculture as development that they need at their homes and that those who are practicing permaculture are people who want development. In addition, when asking participants what foods show wealth, in one focus group, women in Cluster C described features of permaculture use in yards in Cluster C as signs of wealth, such as growing fruit trees and cassava around one's home. For some in Cluster C, these features of permaculture use that once garnered stigma began to connote wealth. These discussions showed how some in the participant communities saw permaculture as part of a broader development project instead of something negative, subversive, or revolutionary.

A critical program for the spread and credibility of permaculture in Malawi was the Ministry of Education, Science and Technology's School Health and Nutrition Program, which introduced permaculture into the national school curriculum in 2006 (Greenblott and Nordin 2012:4). The Ministry's program plan states that they included permaculture in the program as part of a broader effort to improve school environments using locally available resources instead

of donations and externally sourced inputs (Government of Malawi 2009:38). During the pilot program in 2007-08, permaculture was taught in 40 primary schools, 11 teacher development centers and teacher training centers across 8 districts. As part of the program, 150 teachers, members of school management committees, and agricultural extension workers were trained as permaculture facilitators (Greenblott and Nordin 2012:4).

The applications, dissemination, and credibility of permaculture have grown in Malawi since the mid-1990s, with organizations using permaculture in all regions of the country. A report from the UN Special Rapporteur on the right to food, after visiting Malawi in 2013, mentions that “permaculture vegetable and fruit gardens, which are vital for food security and nutrition, could be disseminated more broadly” (De Shutter 2013). While permaculture is growing, the projects remain largely small and disparate with little monitoring and evaluation, so the cumulative effects and impact scope of these projects is unknown. Ulimi and Everlasting Harvest staff often said that there is limited information sharing between projects, misunderstanding about permaculture, and that limited credibility regarding permaculture constrain projects.

Dan Smith, of Everlasting Harvest, estimates that about 300 people in Malawi have completed a PDC. He has trained a range of people, such as Community Health employees, students at the African Bible College, local farmers, and a mix of Malawian professionals and foreigners living in Malawi. However, he said that there are low adoption rates because people have a negative perception of local resources and indigenous practices and so see permaculture as backward. He also discussed his perception that people needed to be willing to do something different, innovate, and question their existing practices to adopt permaculture.

Wilson also discussed the challenges of convincing people about permaculture and permaculture adoption with Francis, Emily, and me at the IPC. “Most people have negative attitudes of permaculture. For example, like primary school, there’s compost toilet in the curriculum and a lot of mulching. Then people summarize that permaculture is compost toilet and mulching.”

Francis laughed in agreement.

Wilson continued, “You know, I had teachers from this teachers training colleges in my tour, they said ‘ah all these years, we had negative attitude to permaculture. We didn’t know, that what you’re doing is permaculture?’”

“You see there, so I think again there you see the approach. The way sometimes we represent our demonstrations... Sometimes, you know, the way you, you put your mulch. Okay? And if it’s not managed, it becomes chaos, okay?”

“Eehe eehe, you have to be presentable,” chimed Emily.

“The what? The approach itself is what matters,” Wilson said.

“So there are these structures, but I think we’ve been lacking those kinds of demonstrations. We have done great. [Pastor J.] has done great with his family. Dan and—”

“Individuals,” Emily interjected.

“Individual demonstrations,” affirmed Wilson.

Emily continued, “Ah no, it’s not good. Permaculture is really—rolling out to others, not only yourself. Yeah. One village to the next to the next to the next. Not just me here. You’re not helping anything.”

“There’s lack of cooperation,” Wilson said.

The individual nature of teaching and adoption may be an impediment to the growth of permaculture in Malawi. Permaculture staff said that there are few Malawian permaculture teachers, which limits their capacity to disseminate permaculture. While many people have received permaculture training, the NGOs do not know of many people who adopted permaculture and practice it enough to be trainers. Often permaculture courses in Malawi, like many PDC courses internationally, teach people from disparate communities and do not provide adoption support after the course. Larger community projects are only just beginning in Malawi like one of Ulimi's current projects. In the national and international policy environment that focuses on conventional agriculture, it is difficult for permaculture NGOs in Malawi to obtain funding, support, and legitimacy from the government, other NGOs, and farmers for their work.

While permaculture is growing, much of it remains individual demonstrations, rather than larger projects that disseminate permaculture and help others implement it. This is in part because permaculture organizations have often focused on training course models that do not facilitate community cooperation or engagement, which is commensurate with the permaculture education globally and the mainstream participatory development approach. In addition, there are common misunderstandings about permaculture, partly supported by the aesthetics of some permaculture gardens.

The limited dissemination and credibility of permaculture can hamper organizations ability to get funding for permaculture projects. There was some tension between Ulimi and Everlasting Harvest, among others, over self-identification with permaculture or agroecology. After much internal discussion, Ulimi renamed the organization in a strategic and political shift to position itself as an agroecology organization in an effort to bolster its credibility and obtain funding. Anthropologist Gold discusses how some NGOs in Cuba strategically deploy different

discourses of sustainability when choosing between terms like permaculture or agroecology based on which term they thought would best attract funding at the time (2014:5, 10). Gold states that “the discursive shift, from permaculturalist to agro-ecologist, implied new ‘allies,’” and funding, thus creating divisions and competition between individuals and groups (2014:2). Similar discourses and tensions existed among permaculture organizations in Malawi who deployed different terms to garner support.

In addition to the above particular constraints, the NGOs faced challenges that are common in the development sector. Ulimi struggled to find funding, to work within short-term project cycles, and receive funding for comprehensive permaculture programs. Instead, Ulimi at times received funding with narrow project scopes and tried to implement the programs in a more holistic manner. While there are permaculturalists, like Wilson and Emily who eschew the idea that development and advocacy efforts do need to directly address broader systems of power and exploitation, they are constrained in their ability to work on such broader change because of their place in the development apparatus. NGOs face the challenge that good policy is often complicated and not practical for structured, short term programs (Mosse 2013:233). As is common for development projects, some permaculture projects receive relatively short-term funding for specific projects that typically focus on training and interventions implemented by villages or individuals (Lockyer and Veteto 2013:207). Broadly, donor agendas and funding, available resources and information, short project timeframes, local governance and infrastructure, and the availability of specialized local staff constrained the NGOs activities.

Conclusion

The permaculture design system includes different techniques than conventional agriculture and has a unique history. The design system focuses on agroecology and systems

design, which the social movement, education, and permaculture organizations promote. Like conventional agriculture, the permaculture movement, although not the techniques, originated in the West and is supported and spread by development funding and organizations, although of smaller size than those supporting conventional agriculture. The permaculture organizations encounter familiar problems facing development organizations in their day-to-day operations and ability to implement new kinds of projects. While there are a number of permaculture activities in Malawi, adoption is disparate, which has hampered the continued spread of permaculture and the capacity of existing NGOs. Permaculture implementation has been impacted by its place in the development apparatus in Malawi, the design system itself, and perceptions of social change that exist within the permaculture social movement. In Chapter 5, I discuss permaculture teaching and adoption.

CHAPTER 4

FOOD PRACTICES, TASTE, AND NUTRITION

Several misconceived narratives circulate in Malawi about food shortages, food preferences, and malnutrition that center on two concepts – laziness and rigid cultural practices. For example, participant farmers often suggested to me that if they worked harder, their family would not suffer from food shortages. A few Malawian health workers in Cluster C told me that households lack food, and thus people suffer from malnutrition, because they are lazy, not because they face broader problems. Devereux (2002) and Tiba (2011:4–5) write that during the 2001/02 famine in Malawi, donors in part responded slowly because donors blamed Malawians’ “mindset” and “inflexible eating habits” that they only wanted to eat maize, and not cassava and sweet potatoes, which overly optimistic national food production estimates suggested there was enough of for people to eat (Devereux 2002:6). A recent World Food Programme report starkly stated, “it is often said that Malawians will only diversify their diet when faced with far greater affluence or complete starvation” (WFP 2012:41). Key lessons from a government and development conference on nutrition and health in Malawi concludes that the government must continue to focus on maize production because “farmers will only diversify when the staple is secured” (MOAFS 2011:60). I heard this sentiment expressed repeatedly by development workers in Lilongwe, which Carr similarly found in Malawi (1994:34).

These narratives highlight how broader ideologies about development and impoverishment contribute to a naturalizing discourse that blames individuals for their problems rather than recognizing existing structural violence. Such naturalizing discourse is an example of symbolic violence, which is a process of misrecognition through which structural violence is

legitimized and the sufferers of structural violence blame themselves for the consequences of structural violence (Bourgois and Schonberg 2009:17).

Poor, food insecure farmers do not eat what they do purely by choice. Participants' access to food shaped and constrained their food preferences and consumption, evidenced by flexible consumption with food shortages and changes in food practices with altered food access from practicing permaculture (see Chapter 8). Participants' oft-stated love of maize porridge as their favorite food is, I argue, not a reflection of innate tastes, but a product of necessity, food access, symbolic violence, and limited options and expectations. Low agrobiodiversity and impoverishment shape and reinforce the tensions between food access, food practices, and taste. Following insights from Mintz and Bourdieu, I suggest participants developed food preferences and meaning within food access constraints.

Food access, practices, and preferences shape food insecurity, malnutrition, and health outcomes. Limited food access and food practices contribute to malnutrition in Malawi; however, not because farmers are lazy or have inflexible food preferences. As Mandala writes, food consumption and production in Malawi are mutually constitutive and historically driven by complex socio-cultural, economic, and political factors (2005:19–21).

The food consumption choices that participants' had available to them were significantly constrained. As is common in Malawi, the participant farmer households faced persistent food access problems. During the study, most households at least once could not eat what they were used to and engaged in coping strategies due to insufficient seasonal food access and monetary constraints. Resulting hunger and malnutrition from limited access to food was not due to farmers' laziness or poor food choices, but was a result of systemic vulnerability and impoverishment in a context of structural violence.

Taste in Food Security and Malawian Cuisine

Although food studies about sub-Saharan Africa often focus on famine, food insecurity, and malnutrition (Baro and Deubel 2006; de Waal 1997; Vaughan 1987; de Waal and Whiteside 2003; Messer and Shipton 2002; Watts 1983; Davis 2002; Cliggett 2005), Ohna, Kaarhus, and Kinabo assert that “the significance of food is not exhausted through analyses of structural marginalization and food deficiencies” (2012:3). As Bourdieu writes, taste and food preference are central to food practices, as food consumption is necessarily a form of cultural consumption, even in situations marked by hunger (1984:175–178, 372).

Malawian cuisine largely centers on two components – nsima and ndiwo. Nsima is a stiff porridge that is predominately made today from maize in the Central Region. Nsima is the hard, filling portion of lunch and dinner that is seen as giving energy and strength (Morris 1998:187). Ndiwo is the soft relish or side dish in which one dips the nsima. Usually a vegetable or protein side dish provides flavor and the bulk of the micronutrients and protein in the meal. As is common with complementary or supplementary foods (Mintz 1985:12), the contrasting texture of soft ndiwo to the hard, smooth nsima makes nsima palatable and aids in swallowing it. Participants commonly said that nsima was their favorite food and that they would not be full or had not eaten unless they ate nsima. As one participant explained, “We just know that food is what? Nsima.” It is seen as a source of strength and is imbued with symbolic, cultural, economic, and political relevance.

The highly valued dish of nsima is in part valued due to its lack of flavor, which enables it to complement soft side dishes of ndiwo. Indeed, the maize porridge is bland, unpalatable, and participants said that it is inedible on its own. McCann writes that bland nsima with ndiwo is a defining feature of Malawian cuisine (2009:33). As such, participants necessarily implied ndiwo

when talking about eating nsima (Morris 1998:187; Berry and Petty 1992:105). Typically when asked what they had eaten for a meal, farmers would say “nsima basi” (nsima only). People often emphasized the importance of maize, like saying “maize is life,” or explaining that when they say food, they mean maize. Thus, food (chakudya) refers to a meal of nsima and ndiwo (Mandala 2005:218), as is common in south-central Africa (Morris 1998; McCann 2009).

Nsima is dependent on complementary ndiwo foods to create a delicious meal, as is common in starch-centered cuisines (Mintz 1985:11). The vegetables, legumes, fish, and animal proteins used for ndiwo are important, but subsidiary foods (Brantley 2002:78). The taste and quality of the ndiwo is critical for a satisfying meal, because it is what makes the nsima delicious and shapes how much ones eats (Morris 1998:188). Other foods, such as fruit, tubers, and beverages, are of lesser importance because they are not main components of meals (Brantley 2002:78). Cooking ingredients like oil, sugar, and salt, while needed to make food delicious, are not as important as the main foods (Morris 1998:188). Access to these complementary foods is often difficult and inconsistent due to seasonal shortages of fresh vegetables and the expense of protein foods and oil. Therefore, in informal conversations, participants often lamented how bland and repetitive their diet was.

Bourdieu and Mintz emphasize that taste and food consumption choices are constrained by material conditions, economic necessity, and social context (Bourdieu 1984; Mintz 1996). People develop a taste preference for, and imbue with meaning, foods to which they have access (Bourdieu 1984:175–178, 372, 379; Mintz 1985:xxix, 162, 182). Many participant farmers spoke warmly and enthusiastically about the foods they ate and the dishes they cooked, while also expressing discontent with their food consumption, as they were often not able to satisfactorily eat within their taste preferences. Instead of readily saying that they wanted to eat different

foods, farmers tended to express discontent with their diet in offhand remarks about being tired of eating the same thing day in and day out (nkhwani, nkhwani basi [pumpkin leaves, pumpkin leaves only]; or “masana dzulo therere, *masana dzulo therere*” [afternoon night okra leaves, afternoon night okra leaves]). However, when I specifically asked, 82% of households (23 HH) reported wanting to eat more of certain foods than they were able to, and a few who did not, said that was because they knew it was not possible. Primarily, they wanted to diversify staple consumption away from maize nsima by eating more rice and white potatoes, typically for lunch. They also wanted to consume more meat, eggs, and beans, among others. Participants did not express this as wanting to engage in new food practices or eat as people do in town, but to properly consume food within their existing food preferences.

Food access shaped and constrained participants’ food preferences rather than laziness or inflexible tastes. Adaptation and coping strategies during famines and severe food crises in Malawi have shown that food consumption is flexible (Tiba 2011:21–22; Babu and Mthindi 1994:280; Mandala 2005:77), as it is everywhere. Beyond that, some permaculture farmers started to change their food practices after permaculture use changed their food access (see Chapter 8). Participants’ oft-stated love of nsima and nsima as their favorite food is not a reflection of innate taste, but a product of necessity, food access, symbolic violence, and limited options and expectations. Low agrobiodiversity and impoverishment shape and reinforce these tensions between food access, food practices, and taste. As in Malawi, Bourdieu writes that the taste of necessity, which is determined by material conditions and scarcity, is transformed “into a taste of freedom, forgetting the conditions of which it is a product” (1984:175) through a process of symbolic violence. Knowledge that is naturalized, unquestioned, and seen as common sense is culturally constructed and implicitly learned within socio-cultural systems and appears as matter

of fact (Geertz 1983; Sperber 1982:162–163; Bloch 1989). Participants, while at times expressed discontent with their food consumption, primarily employed discourse about their food consumption as positive and a source of strength and health, without recognizing the foreign origins of maize, loss of agrobiodiversity and indigenous crops, and the concomitant low diet diversity that contributes to malnutrition and disease.

Some participants understood their food practices as markers of difference and shaped by material lack. This speaks to participants' differing experiences surrounding food access and the fact that participants identified wealthier people as eating different foods that they cannot access. Participants commonly said that being wealthy meant having enough nsima. For instance, Amayi Tembo said that one can tell if someone has enough nsima depending on how they cook nsima. If they cook without worrying that ufa (flour) will be over soon then they are rich. If they cook with anxiety that it will be over soon then they are poor, she said. The participant villages' proximity to town in part increased their exposure to what wealthier Malawians eat.

Taste is “embodied” in that taste is shaped by the physical act of eating, the effects of food on the body, and the evaluation of those effects (Bourdieu 1984:190). For instance, Malawians in part evaluate nsima and ndiwo foods based on how they feel in the mouth when eaten and make the body feel. Often farmers talked about eating in terms of kukhuta (to be full/satisfied); the opposite is njala (hunger), which is different from chaola (famine) (Mandala 2005:40). Feeling full (kukhuta) is a central evaluative criteria for food preferences and specific meals among participants. Conceptions of how nsima affects the body, labor required of the body, and the characteristics of nsima itself impact whether one feels full from eating nsima. According to my own experience, this dichotomy is embodied in sharp daily swings between a stomach that is empty and tight and one that feels bloated and weighted down by nsima. The

feeling of fullness provided by glutinous staples is a central criteria for meals throughout sub-Saharan Africa (McCann 2009:7). According to anthropologist Morris, to be full also “has a deep emotional resonance, indicating a feeling of well-being,” and the “term can also refer to a general satisfaction of heart or mind” in Malawi (1998:187). Participants also reported that nsima is a primary source of mphamvu (strength), a central, complex category for strength and well-being.

The nutritional impacts of foods discussed by participants were often embodied ones, like giving strength or blood, which in turn enables one to live, function in everyday life, and prevent disease. Participants most often cited mphamvu (strength) as the function of a food or food group. When a food mphamvu zimatenga (gives strength), it means that the body gets energy, strength like the power to do work, builds the body, protects the body, ensures life, “diseases are less,” “the body is hardened,” and makes skin smooth. Cereals, and nsima in particular, one eats “to get energy” and fullness. As one participant explained, “to get full—it comes from stiff porridge from maize,” which is important because one “stays weak when one stays not full.” Englund writes that Malawians perceive nsima consumption, such as by pregnant women, as required for human growth and well-being (1999:144). Amayi Mvula explained that foods like maize, cassava, and rice “gives energy, strengthening the body. Body strength so that as a person you shouldn’t be weak, when working you should at least be a real person. Strengthening the bones. Yeah, getting full.” There is a connection between the centrality of fullness in Malawian cuisine and nutritional conceptions of the importance of getting strength and energy from food. The embodied effect of eating nsima in order to feel full, as is supported by conceptions of nutrition and social reproduction, could also be negative in that eating maize to the marginalization of other foods contributes to limited diet diversity and malnutrition. As the

Hayes-Conroys write, questions of food access and health relate to the cultural conceptions and social relations surrounding bodily affect and desire that influence food choices (2013:82, 87).

Food Access and Conceptions of Food Security

Farming was central to participant farmers' struggles to meet their needs, which an interaction with a conventional farmer highlighted. As we turned the corner to enter Abambo Chisi's yard from the narrow path that was lined with tall, crinkling maize, we saw him, his wife, and three children eating nsima and a vegetable ndiwo for lunch under the little bit of shade provided by the low roof of their pig house. The Chisi's were a young family living in Cluster A.

"Timalima" [We are farmers], Abambo Chisi called to us.

I learned that this relatively common greeting can be said when you come to someone's house and find them eating, and the opposite can be said when someone is not eating. The phrase expresses the idea that one accesses food through farming, which one is proud of because having enough food from farming connotes wealth.

Timalima points to the conceptual, practical, and material connections between farming and food access. As Abambo Phiri, a permaculture farmer in his mid-30s, said, "Being a farmer means not lacking." His wife, Amayi Phiri interjected, "Not lacking means having needs like food and other things, [like] money."⁴² Many participants, although not all, said that they lacked food, money, and necessities because they did not harvest enough food for consumption and sale. The material, physical, and embodied practices and routines of everyday life that surround food consumption and production are inextricably linked for smallholder farmers who continually work to sustain themselves and their family.

⁴² We conducted this interview in Chichewa in Cluster C on May 28, 2012.

Food Security

Smale writes that national self-sufficiency in maize became an issue for the colonial government after the Great Famine in 1948-49 and has been an important part of the government's social contract since independence (1995:822). According to the government, "achieving national food security has been one of the major objectives of agricultural policies adopted since independence," and "national food security is mainly defined in terms of access to maize, the main staple food" (MAFS and Ministry of Agriculture and Food Security 2011). While the government currently has policies and programs supporting crop diversification and improving household nutrition, few government resources have been put behind those programs (MOAFS 2011:50; OPC 2009) and focus remains on increasing maize production (MAFS and Ministry of Agriculture and Food Security 2011). Indeed, most global agricultural development and food security efforts focus on staple production despite the growing global double burden of under- and over-nutrition (DeClerck et al. 2011:S41; Kennedy, Nantel, and Shetty 2006).

There is no direct translation for food security in Chichewa. Following how participants



Figure 8. Permaculture Farmer Household (total of 2 adults and 7 children) with Food for One Day: White Maize Flour, Preserved Pumpkin Greens and Flowers
Photograph: Austin Dunn

talked about food access, we discussed the concept of food security in terms of having 'enough' food, as farmers often talked about food access and material resources as a dichotomy between having enough or not. We also discussed food access in terms of finding food because participants discussed food access as an active, continual process in

which they sought to harvest, buy, exchange, or receive food through gift or sharing. Farmers commonly defined being food secure as having enough maize for household consumption to last from one harvest to the next, which others have also found (Manyamba 2013:16, 20; Mandala 2006:40).

Some farmers described expansive meanings that having food means that they will not suffer and can have peace. One woman explained, “Food is life, if a person stays without food, you can’t have life, no. In our area here, we like pouring [maize] in a granary.... When you fill the granary, you say I have a lot of maize.” She did not feel that she had enough food. She said, “The way I harvest to me is little. Right now a lot of things are hard for me.”

Farmers also often said it is important to get food through farming rather than having to buy or beg for it. Participants identified having enough food as bringing health and strength. The FAO and participant farmers’ conceptions of food security did not contradict the FAO definition, however farmers’ conceptions identified cultural cuisine patterns and norms that specified what food is required to have enough food, to eat according to their food preferences, and be healthy.

Food Sources and Food Access

Farming was the primary source of food for the majority of participant households (35 HH, 81%) and buying food was their secondary food source (31 HH, 72%).⁴³ For the remaining households (8 HH, 19%), half of whom did not have inherited or privately owned agricultural land, buying food was the primary food source and farming was the secondary source.

Food purchases were a significant expenditure for households. On average, households reported buying 8.6 different food items (range of 2 to 16), such as sugar, tea, cooking oil, beans, rice, and dried fish. Households typically bought food in the nearest market, small grocery store, or in their villages from neighbors or traveling vendors. Using recorded market prices, it would

⁴³ The other secondary food sources were food for work (2 HH, 5%), work (1 HH, 2%), none (1 HH, 2%).

have cost MK 330 (\$2.10) for a family of six (participant HH average was 5.95) to make the nsima and ndiwo recipes in Figure 9 and Figure 10 for lunch and dinner, compared to conventional farmers' reported average annual agricultural expenses of \$0.47/day. Given that 56.6% of people in Lilongwe Rural District live below the national poverty line (National Statistical Office 2011), set at \$0.67/day (National Statistical Office 2012a:203), having to rely on purchasing food was unsustainable for households.

Exchanging, borrowing, and sharing food were other common sources of food that helped participants to meet their immediate food needs, such as to complete a meal or when they were unable to buy food. Sharing food has been shown to be critical in Malawi, according to De Waal and Whiteside who described a new variant famine in Malawi in 2001/02 during which social network resources were stretched so thin that a relatively minor drought led to famine (2003).

Gathering food from the wild by women near forests or on the margins of agricultural or village land (Morris 2007:15), was a minor source of food and usually used as a coping strategy. Adult household members also did short term ganyu agricultural work on other's fields in exchange for food. This strategy has the potential to reproduce hunger in the next year, because it often occurs during the main growing season and may take labor away from their own fields (Mandala 2005:126–127; Orr, Mwale, and Saiti-Chitsonga 2009:248).

Women were typically responsible for assessing the household food situation and knowing what they needed. In some households, men were ultimately responsible for making sure that the family had that food. Men were generally responsible for maize and purchased food because participants identified men as the household head, as the primary cash earners, and the one in charge of household expenses. In some households, women also bought food due to different gender relations within the household or because they were the sole household head.

Women, with the help of children, almost exclusively harvested ndiwo (Mandala 2005:224). Many people laughed when I asked if men harvest ndiwo and responded that they had never seen a man harvest ndiwo and that he would not know how. Englund writes that the distinction of the gendered wealth of maize is blurred in that while women have almost exclusive control over maize cooking and distribution, men and women attribute their wealth and well-being to maize (1999:144). I further found that while women had control over maize once in the household, men largely controlled supplemental maize purchases.

As is typical in Malawi, the participant households faced persistent food access problems due to impoverishment and compounding material, information, and environmental constraints to conventional farming.⁴⁴ Farmers had difficulty finding enough maize for nsima and enough fresh vegetables for ndiwo throughout the year. The seasonal availability of food is largely dependent on the farming cycle and previous years' harvest (Mandala 2005:77). Maize yields only lasted until the next harvest for 13 HH (31%) from the 2010 harvest and for 9 HH (23%) from the 2011 harvest. While some fresh vegetables and fruits become available during the rainy season, maize deficits and higher food prices cause the rainy season to also be the hungry or lean season in Malawi (WFP 2012:15–16). According to UN figures, the number of children admitted to nutrition and rehabilitation units closely follows annual maize price spikes in Malawi during the rainy season (UNDP 2012:44). Then, during the dry season, fruits become scarce and access to fresh vegetables becomes more difficult as they are available in only limited variety, quality, and quantities from markets, garden production, and preserved stocks. A majority of the farmers reported that they typically expected (24 HH, 83%) to experience hunger during the hungry season between December and March and particularly during February. In three food insecurity

⁴⁴ Data presented in this section includes both permaculture and conventional farmers.

survey rounds,⁴⁵ farmers on average worried more about running out of food during the hungry season and the beginning of the dry season($p < 0.05$),⁴⁶ but there was not a statistically significant seasonal difference in farmers' food insecurity scores. In 24-hour diet recall surveys, on average, farmers did have lower diet diversity scores during February and March/April compared to October-December ($p = 0.0099$).⁴⁷

While most farmers did not report varying entitlement to food based on gender, as has been found elsewhere in Malawi (Mandala 2005:223–224; Bezner Kerr 2005a:54), my observations and survey results indicated that food consumption varied by gender. Women, on average, had higher food insecurity scores ($p = 0.0000$), lower diet diversity scores ($p = 0.0000$), and consumed fewer meals ($p = 0.0000$) and snacks ($p = 0.0001$) than men.⁴⁸ However, we did not assess inter- versus intra-household entitlement or account for pregnancy or breastfeeding.

As a result of insufficient food access, monetary constraints to food purchasing, and a lack of crop diversity, most households could not eat what they were used to, had to engage in coping strategies, and were unable to eat what they would have preferred. Informal interactions and interview responses suggest that farmers' food choices were constrained by food access. At least once during the study, 36 HH (84%) were not able to eat what they were used to and had to eat less preferred foods or reduce food consumption. Of these, 28 HH (39%) altered breakfast,

⁴⁵ The food insecurity survey was conducted with farmers three times, once between October and December 2011, in February 2012, and in May 2012 to capture variation at different times in the agricultural cycle.

⁴⁶ Wilcoxon signed rank sum test result showed a statistically significant difference in worrying about running out of food between February ($p = 0.0180$, $z = -2.366$) and May ($p = 0.0236$, $z = -2.263$) compared to October-December.

⁴⁷ Wilcoxon signed rank sum test result showed a statistically significant difference in diet diversity scores between March/April ($p = 0.0099$, $z = -2.579$) compared to October-December.

⁴⁸ Wilcoxon signed rank sum test result showed a statistically significant difference between men's and women's food security ($p = 0.0000$, $z = -5.616$) and diet diversity scores ($p = 0.0000$, $z = -5.713$), and number of meals ($p = 0.0000$, $z = -5.727$) and snacks consumed ($p = 0.0001$, $z = -3.889$).

which was the most common meal impacted by food access problems due to its lesser importance as a meal and the expensive of breakfast foods like rice and sugar particularly during the national sugar shortage in 2012. Seventeen HH (24%) altered lunch or dinner because they lacked enough maize to make nsima, so some ate ndiwo on its own, or ate maize porridge which requires less flour to make than nsima, sweet potatoes, steamed pumpkin, or skipped the meal. Sixteen HH (22%) skipped a meal, most commonly breakfast.

Food Processing and Practices

Women are responsible for food processing, which is a skilled, physical, time-consuming, and labor-intensive activity (Mandala 2005:208). Girls often help with these tasks. In the participant villages, I often saw women sitting, legs outstretched, surrounded by piles of beans, greens, or maize kernels that they were steadily processing. One afternoon, I shucked maize with Amayi Tembo by twisting the cobs to remove the kernels and let the kernels accumulate on my skirt. Abambo Tembo saw us and told me that it was good that I learned to shuck maize because it is what it means to be a Malawian woman. After shelling maize, women and girls pound flour (ufa) by hand in a mortar and pestle or at a maize mill⁴⁹ into one of three types of flour – white, refined flour (ufa woyera), a powdery and an almost luminescent white flour (Mandala 2005:213); whole grain flour (mgayiwa), a coarser, tan and speckled brown flour⁵⁰; and grand mill flour, which takes elements from the other types, as one removes the bran but does not soak the kernels. In most households women preserved green leafy vegetables and sometimes other types of vegetables or meat to store, cook, and consume when the items are no

⁴⁹ In the study areas, maize mills were located about a ten minute to an hour walk away from villages. Given their relative proximity, most women carried buckets of maize on their heads to mills, rather than pounding it by hand. It cost approximately K100 (\$0.64) to MK 150 (\$0.95) per 20 liters to shell or grind grain at a maize mill.

⁵⁰ The same amount of kernels make a larger volume of mgayiwa, because the bran is not thrown away in the processing, while highly refined maize flour has a 65% extraction rate (Latham 1997; Smale 1995:823).

longer in season and fresh vegetables for ndiwo are scarce. Each household engages in food processing due to a lack of labor specialization and access to processed foods within subsistence farm communities. This can be particularly burdensome during times of high agricultural labor requirements and sickness.

Food storage, in granaries, sacks, baskets, pots, rooms, and rooftops, is an important component of the production process because households must try to live off one harvest for most of the year (Carr 1991:4). Stored food can be vulnerable to pest attacks, such as hybrid maize because its kernel is softer than local varieties as participants often pointed out. There is a risk of mycotoxins developing in maize and groundnuts during storage, which can be damaging for human health.⁵¹ In 2001, average exposure to mycotoxins “exceed[ed] the tolerable daily intake” in Malawi (McCann 2005:207).

Cooking and Serving Food

Cooking is a performance that requires technical skill and specialized knowledge (like agriculture), which is often women’s domain in sub-Saharan Africa, as it is in Malawi (McCann 2009:3). Women, often with the help of girls, typically cooked two to three meals a day depending on how many meals they were going to eat. Women, with the help of their children, must also wash dishes, draw water, and gather firewood. All households used firewood as their primary source of cooking fuel, sometimes supplemented by charcoal or dried maize cobs. Burning firewood in open fires contributes to deforestation in Malawi and respiratory problems (Oxfam International 2009:1; Bowie 2006:106; Fullerton et al. 2011).

⁵¹ Maize and groundnuts can develop *Aspergillus flavus*, a fungus that produces the mycotoxin aflatoxin, which “damages DNA in humans who ingest it and is the strongest known chemical liver carcinogen,” raising the risk of liver cancer, is synergistic with Hepatitis B and C, and possibly suppresses the immune system (McCann 2005:206).

Chisomo and I cooked two typical dishes with Amayi Tembo and her eldest daughter during the early afternoon. We cooked in their small kitchen building with fired brick walls and a grass thatch roof that was adjacent to their house and two large round granaries that stored dried maize. She cooked the nsima with water and maize flour in a pot set on three cooking stones and a small fire. As others also explained, Amayi Tembo’s daughter described learning how to make nsima as an experiential process. She said that through practice, she got used to making nsima and learned how much flour to add at the appropriate points to get the correct consistency for phala (maize-based porridge) and nsima using visual cues (pictured top right in Figure 9). Throughout, she fanned the flames to lick the side of the pot, producing biting smoke that gathered inside the charred kitchen walls and caused my eyes to sting and water and my nose to run. She then made patties using a chipande (oval spoon) to scoop the nsima out of the cooking pot and placed it on a plate (or serving bowl depending) and patted the top of the patty after laying it in the bowl to create smooth edges.



Nsima
(Serves about 2)
1 cup ufa (maize flour)
(MK 100 mgayiwa/1kg or
MK 150 ufa woyera/1kg)
2-3 cups water

Total cost: about MK 12
(\$0.07) to MK 18 (\$0.11)

Heat water in a pot until lukewarm. Add a little ufa, stirring well so there are no lumps. Boil gently to get smooth, milky consistency. Add the rest of the ufa a little at a time, stirring constantly until it becomes thick and smooth. Use chipande to form into patties. Serve with ndiwo.

Figure 9. How to Make Nsima and Nsima Patties for Serving with Ndiwo
Source: Recipe adapted from McCann 2009:45
Photograph: Austin Dunn (left), rest by author

We also made ndiwo from mustard greens with Amayi Tembo and her daughter, which they harvested from their garden the previous day. After boiling the greens, Amayi Tembo and her daughter discussed what to add to the mustard greens to give the dish flavor (see top right and bottom left pictures in Figure 10). Amayi said she could have it with anything, just salt, or tomatoes or groundnut flour, which are other common ways to make ndiwo. The daughter said that she could not eat it that day with just salt. They decided on a sauce of a little oil, onion, tomato, and salt. Cooking involves a process of negotiation and improvisation to accommodate family members' food preferences and make a delicious meal based on what ingredients are available that day.

They took the ndiwo and nsima in the house and Amayi distributed the food onto plates and bowls for each eating group (see Figure 11). Amayi Tembo said that she serves everyone the same portions; although she serves the kids' food onto separate plates because they fight otherwise and may miss eating while they are crying. The mustard greens and nsima fed nine

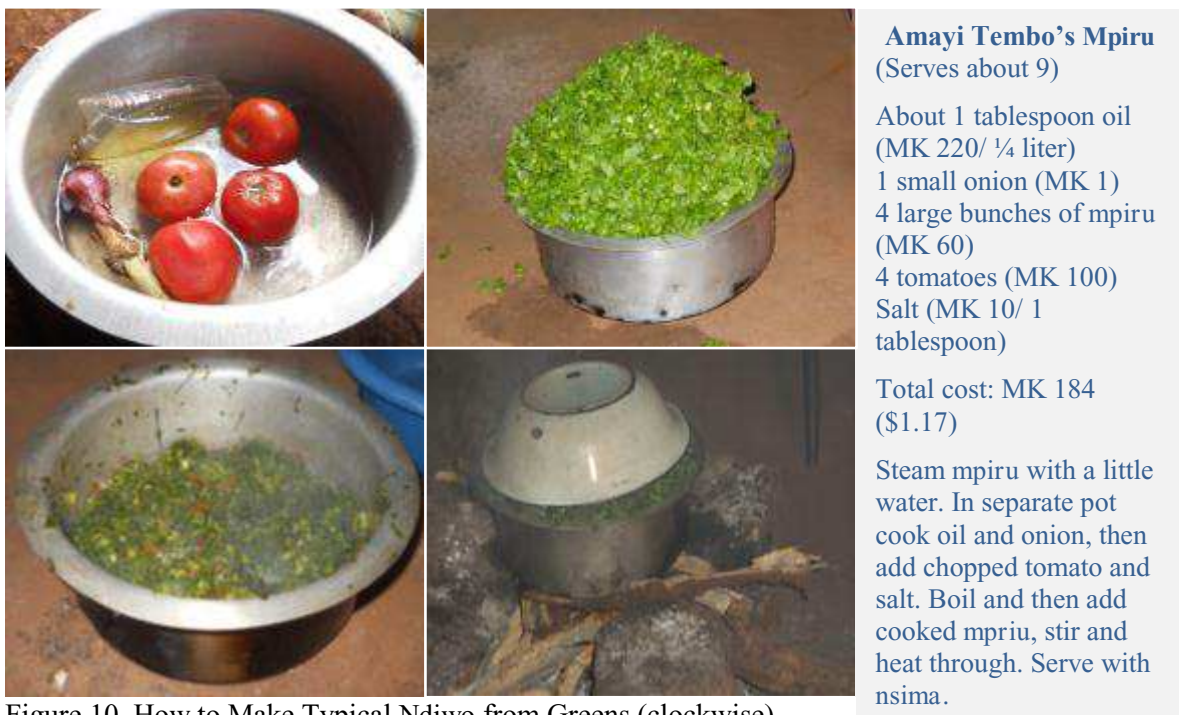


Figure 10. How to Make Typical Ndiwo from Greens (clockwise)



Figure 11. Amayi Tembo Served Lunch Portions for Children Coming Home from School in the Afternoon, While Setting the Rest Aside for Family Members Returning Later in the Day

people for lunch, and Amayi planned to serve the remaining mustard greens with additional ndiwo for dinner.

Women are responsible for dividing food at mealtime, which gives them certain flexibility and authority over food portions within broader gender constraints. Food divisions depended on the family's eating arrangements, children's needs, and what ndiwo was served. About half (17 HH, 53%)

reported that they typically eat in one group to eat together as part of being a family and showing each other love, or sometimes to help conserve food. If adults from other households were present, I observed that even a family that normally eats together often ate meals in multiple gender and age groups. The remaining households ate in multiple gender and age groups depending on the family composition and who was present for the meal. Several participants, who ate in separate groups, explained that they did so to ensure that family members showed respect to the father of the household, and because it was inappropriate for older children to eat with their opposite gender parent and could lead to incest. Participants often insisted that everyone ate the same ndiwo, however during this study and previous research in Malawi, I observed women serve men higher quantities and quality of ndiwo. Mandala writes that entitlement to ndiwo is based on age and gender in Malawi (2005:207–208, 223).

Food Consumption

As discussed in Chapter 2, maize was reported as a staple by the 1930s. According to colonial nutritionist Williamson, Malawians incorporated maize into cooking practices and developed a preference for maize nsima over nsima made from cassava, rice, millet, or sorghum in part because one stays fuller longer after eating and it has a smooth texture (1955:53, 79–80, 87, 111, 128). As McCann writes, maize has become naturalized in Malawi as many think maize has always been the staple crop and food, which obscures the economic and political roots of its diffusion (2009:140). For example, Amayi Mvula said that they are just used to eating nsima and that “it’s a tradition” that they eat nsima.

Very little scholarly work has been published on diet change in Malawi, particularly prior to colonialism. The Nyasaland Survey Papers, based on diet research conducted in 1938-39, provide some useful insights into how food consumption has changed. One of the main changes they reported is decreased access to meat, both livestock and wild game, and thus less meat consumption. By the 1930s, there were plants that were no longer grown, wild plants no longer eaten, and less food available. The Papers relate these changes to increased impoverishment from male emigration, and increased land and population pressure from immigration that led to closer settlements, less game, less edible wild plants, more difficult livestock management, and smaller gardens (Berry and Petty 1992:51, 223).

Food consumption changed from crop changes beginning hundreds of years before colonialism (see Chapter 2), and food consumption and preferences further changed with exposure to European diets. The Nyasaland Survey Papers reported in the late-1930s that canteens in towns and on roadsides were “popularising the cup of tea and scone type of diet” (Berry and Petty 1992:51). The Papers also reported that Malawians were imitating European

foods and growing European vegetables because they liked the taste, wanted to eat like Europeans in hopes that it would make them strong and healthy like Europeans, and to raise their prestige (Berry and Petty 1992:53). McCann writes that colonial rule also impacted food and cooking in Africa through “the unintended consequences by which ingredients, cooks, and ideas circulated under the radar of formal programs like mission schools and teacher training” (2009:28). As Mintz writes, as new foods are consumed, they “acquir[e] new meanings,” and are “gradually transformed from exotic treats into ordinary, everyday consumables” (1985:151), which occurred in Malawi with black tea and sugar, and ‘scones’ (leavened wheat rolls). In this process, Mintz explains that while those in power often retain control of access to new products, the products become endowed with “inside meaning” by new users making the consumption of new foods no longer an act of imitation or emulation (1985:152). McCann writes that the flows of goods, people, plants, capital, and ideas about cooking also shaped African food practices and diets over time (2009:25–28).

Older participants reported several food consumption changes that occurred during their lifetime, namely drinking tea, consuming sugar, cooking with oil, and distinct breakfast foods. A few participants reported that breakfast foods, as a distinct category from food eaten in the afternoon and evening, began under Kamuzu Banda. Before that time, people ate nsima and ndiwo for breakfast. Kamuzu encouraged women to cook phala (maize-based porridge) for their children so they would grow healthy and do well in school. One older woman said that Kamuzu encouraged these food changes along with encouraging people to plant cassava to sell to buy soap and to give one’s children to encourage them to be obedient. This one of many ways that Kamuzu encouraged Malawians to emulate Western culture to ostensibly modernize and develop the country. In addition, some women said that maize flour changed with the advent of maize

mills, because before that there was not a distinction between white and whole-wheat flour. The women said that instead they made refined white maize flour and added back varying amounts of the bran (gaga) while cooking depending on one’s nutritional and energy needs.

Here, I review typical food consumption patterns before later assessing how and what changed with permaculture use in Chapter 8. According to 24-hour diet recalls (see Chapter 8 for detail on measure) over nine months, 110 participants (74%) consumed three meals the previous day, 34 (23%) consumed two, and only four (3%) consumed one meal. About a third of households each did not eat any snacks, ate one snack, or two snacks during the day. As shown in Table 3, breakfast, lunch and dinner, and snack foods were distinct food categories. The only overlap was that participants ate different forms of maize in all three. Breakfast, the least important and most commonly skipped meal, most often consisted of a cup of weak, sugared, black tea (grown in Malawi) with powdered milk when available. Nsima was the staple of lunch and dinner. The base of most ndiwo was tomato, oil, and salt, to which women added different greens, fish, or meat. Pumpkin greens was the most common green eaten, followed by okra leaves. Women commonly added onion for flavor and groundnut flour for flavor and creaminess to ndiwo. Beans, dried fish, and goat were the most common proteins eaten. Access to snacks,

like those shown in Table 3, was very seasonal and fewer than half of the participants ate snacks. Participants primarily ate fruit, cassava, green maize, and steamed pumpkin as

Table 3. Foods Consumed by Conventional Farmers by Meal in 24-Hour Diet Recalls, n=95

%	Breakfast	Lunch & dinner	Snack
≥ 50%	Tea Sugar	Nsima Tomato Pumpkin greens Salt Oil	
18%-49%	Wheat bread Milk/powder in tea Phala	Beans Groundnut flour Okra leaves Dried fish Onion Goat	Green maize Pumpkin Mango Cassava Guava Banana

snacks or occasionally for breakfast.

Within the cuisine structure and taste preferences, the choice of what to cook and eat was shaped by what was available seasonally, what the family could afford, and had time to prepare (see selected food groups in Figure 12). Malawians typically define the hungry season by maize shortages during the rainy season, which coincides with peak agricultural labor demands (Mandala 2005:125–127). In February, at the height of the hungry season, fewer participants ate legumes and vitamin A rich-fruits, and more participants ate dark leafy greens and cereals other than maize due to seasonal food availability and monetary constraints (this does not speak to quantities consumed). In March and April, slightly fewer participants ate more expensive foods such as animal proteins, sugar, and tea. However, more participants ate vitamin A rich-vegetables and -tubers and legumes as they matured in the fields, so micronutrient intake was not necessarily worse throughout the hungry season.

The choice to eat ufa woyera (white, refined flour) or mgayiwa (whole grain flour) depended on money, weather, labor availability, energy requirements, and ndiwo. For instance,

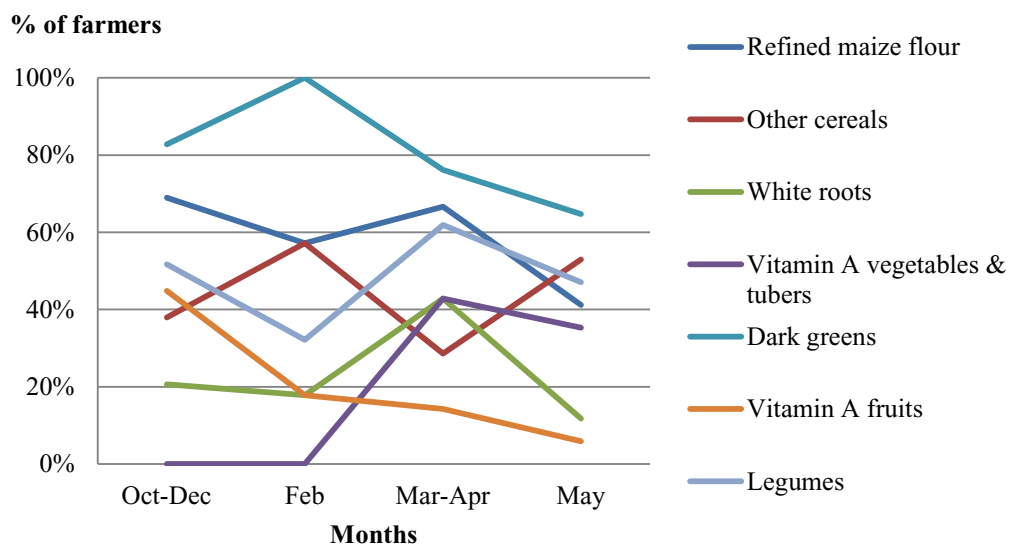


Figure 12. Food Group Consumption by Conventional Farmers by Month, CF=95

participants ate mgayiwa more often during the busiest times of the agricultural cycle when they needed extra caloric intake and had less food as fewer participants ate white maize flour from October to December and in May (shown in Figure 12). Many participants said the process of making ufa woyera removes much of the nutrients from the maize.⁵² Highly refined maize, like ufa woyera, is particularly deficient in B vitamins (Latham 1997). Some participants said that they make whole grain nsima when they do not have enough maize to make refined flour, have higher energy requirements that day, do not have time to make refined flour, or because they prefer it. Participants explained that ndiwo “chooses” the nsima, because different flavors and textures of ndiwo go with the different flavor and textures of nsima. Some said they thought white, refined maize nsima goes with more types of ndiwo and that they prefer it to whole grain maize nsima. For example, Amayi Mvula said that she learned that mgayiwa has more nutrients from permaculture education, but to her, ufa woyera seems better. A few participants preferred grand mill flour, which some identified as the flour type often eaten in town or by the wealthy. Refined flour requires more time and labor to make than other flours. Men further increase the difficulty in making ufa woyera when they decide to grow hybrid maize as farmers reported that more hybrid maize is lost in processing because the kernels are softer than local maize. Market prices for ufa woyera are also higher than mgayiwa.

Malnutrition

Rather than a result of laziness or rigid cultural taste, Malawians suffer from malnutrition within a broader system that constraints one’s access to food and medical care. Food choices and preferences do affect malnutrition, but primarily in regards to low diet diversity that results from

⁵² For 100g, whole grain maize flour has 353kcal, 9.3g protein, 3.8g fat, 10mg calcium, 0.30mg thiamine, 0.10mg riboflavin, 1.8mg niacin compared to refined maize flour with 368kcal, 9.4g protein, 1g fat, 3 mg calcium, 1.3mg iron, 0.26mg thiamine, 0.08mg riboflavin, and 1mg niacin (Latham 1997). I could not find the nutritional content of refined, soaked, and sun dried maize flour.

low agrobiodiversity and impoverishment. As discussed, taste and food preferences themselves are a result of structural constraints. It is through symbolic violence that Malawian health workers and farmers blame one's laziness for malnutrition. Malnutrition is serious in its own right and produces heightened risk to and severity of infectious diseases like HIV/AIDS and malaria (de Waal and Whiteside 2003; Gillespie and Kadiyala 2005; Mtika 2001; Rollins 2007; Himmelgreen and Romero-Daza 2008; Pinstруп-Andersen 2010:4–5, 15–16). As anthropologists have found elsewhere, structural violence produces heightened risk to and incidence of disease (Farmer 1992:xi, 253; Farmer 2005:40, 140; Singer 2009:151, 153; Singer 2008).

I observed that participants routinely fell ill during the study, particularly with malaria.⁵³ Some participants reported chronic diseases in their households including tuberculosis, asthma, diabetes, arthritis, and epilepsy.⁵⁴ Participants' often had inadequate access to medical care. Government health clinics were not always easily accessible and had few resources, little medication, and no physicians. The clinics refer severe cases or ones that they are unable to treat to a district hospital, which are better equipped, but face significant constraints (WHO 2014; Zere et al. 2007:76–78; Chirwa 2013:iii, 7–9). Malawi's health care and infrastructure is severely constrained by limited material resources and medical staff, which contributed to a context of structural violence. Participants also received some health care from traditional healers (*sing'anga*) of which there are several types (Morris 1996:66; Breugel 2001:246–248). Traditional healers were often more accessible than clinics.

In the area, people received treatment for malnutrition from biomedical clinics and traditional healers. While the prevalence for being underweight was 17% in the district in 2011,

⁵³ In the district, the most common reported illnesses are fever and malaria, followed by fewer reported incidents of diarrhea and sore throat and flu (National Statistical Office 2012a:43).

⁵⁴ Of those with chronic illnesses in the district, the most common are epilepsy, asthma, arthritis, chronic malaria, and TB and HIV (National Statistical Office 2012a:46).

the Cluster B health clinic only provided supplemental food to 234 children and 328 pregnant or lactating women, which was only 2.7% of the population the clinic served. The clinic in Cluster C did not provide any treatment for malnutrition because they said they lacked donor funding.

I observed that funerals were common in villages, particularly during the rainy season, which interrupted agricultural labor and required resource contributions. The top causes of death in Malawi are HIV/AIDS (25%), lower respiratory infections (12%), diarrheal diseases (8%), and malaria (8%) (CDC 2013:1). Malawi has a high under-5 mortality rate at 71 per 1,000 live births and a maternal mortality rate of 1 in 36 (UNICEF 2013).

Insufficient caloric and nutritional intake and exposure to disease was evident in children's bodies – in light brown hair, distended bellies, thin limbs, dusty patches of ringworm, and crusted sores on their legs. Of the 29 conventional and permaculture farmer HH we asked, 9 HH (31%) reported that at least one child had experienced malnutrition. Of these, 5 HH reported that one child had experienced malnutrition and 4 HH had two children who experienced malnutrition. In two of these households, a child died from malnutrition. This frequency was similar to Lilongwe Rural District as a whole according to census data showing that 23% of children under-5 were underweight in 2011. Forty-one percent of children under-5 are stunted in the district (National Statistical Office 2012a:183), however the health clinics in the study did not consistently measure children for stunting so participants often did not know if their children were stunted or not. Health clinics focused on acute malnutrition instead. Indeed, during my clinic observation and discussions with farmers, people rarely discussed stunting.

My observation of children in the study villages suggests that actual rates of malnutrition were higher than was reported by parents and health clinics in Clusters B and C, likely going undiagnosed. Physical signs of malnutrition that I saw in children were distended stomachs, light

brown or reddish or blond hair (which in some cases had lost some of its curl), and swollen cheeks or limbs. On rarer occasions, children with these physical symptoms were also apathetic and mostly unresponsive to stimulation. When asked, some parents did not know that these are signs of malnutrition. They explained that such physical changes were not a bad sign because other children in the village looked the same, or they had children whose bellies were also big or whose hair turned from black to light brown when they were younger, but they were fine now and do not have those characteristics anymore. Similarly, an Amayi told me that one child's belly was distended because he ate too much maize, not because he did not eat enough or was malnourished. Although perhaps she was broadly right and he eaten too much maize, as a lack of micronutrients from predominately eating maize is a major problem (WFP 2012:13–14, 23). As Scheper-Hughes observed in Brazil (1992:140, 174, 195, 363, 403), some participants explained away and obscured the existence of malnutrition, as its occurrence implicated household food access and care, the broader political-economic system, and participants' structural vulnerability.

Participants reported several causes of malnutrition. Most often, participants said lacking enough food causes malnutrition. This is in line with global food security and agricultural discourse that focuses on increasing caloric availability rather than nutritional content. A few conventional and permaculture farmers said that malnutrition results from a lack of diet diversity, not only insufficient food intake. Some participants identified multiple causes of malnutrition, and they could generally tell which type it was based how one responded to treatment. A few participants identified a type of malnutrition that is a disease, rather than a result of a lack of food. Some also said insufficient child spacing or not feeding children enough food after weaning causes malnutrition. Some participants identified another cause of malnutrition from an mdulo taboo caused in very young children by a parent who “walks around” or “brings wind”

into the house, which means to have sex with someone other than their spouse, often qualifying that it not as commonly believed today. This cause of malnutrition is an embodied result of social and sexual transgression (Breugel 2001:171–173, 180). Some children wore medicine tied on a string of beads worn around their waist to protect them from it. This local type of protective medicine is seen as protecting individuals from harm and is not typically associated with witchcraft (Morris 1996:52–53; Breugel 2001:181).

In the health clinics in the study area, health professionals often explained to me that malnutrition results because farmers are lazy and so have low yields, or are lazy and delay medical treatment. During informal interactions with Euro-Americans in the donor community in Lilongwe, whom were part of the same social circles as foreign Ulimi staff, I often heard individuals explain malnutrition as resulting from Malawian's inflexible food preferences and male negligence that caused farming problems and impoverishment. These types of explanations, however, deny the material and structural causes of these problems.

Parents generally found out that their child was malnourished when health assistants weighed them at an under-5 clinic at local health clinic. Health assistants enrolled children with low weight-to-age ratios in a supplemental food program.⁵⁵ During the weekly malnutrition clinics, staff referred children to the central hospital if they had a severe case of kwashiorkor or if they were unable to eat or keep down the food supplements. Based on participant observation, these were cases where the children had severe swelling that was tenderly covered by a cloth or blanket, could not eat at all, or seemed almost lifeless. Often at the Cluster B clinic, health workers chided parents if a child was not gaining weight and accused them of not trying to feed

⁵⁵ Children, underweight pregnant women, and lactating mothers with underweight, exclusively breastfed babies were given a fortified maize-soya blend and oil for making porridge. Under a therapeutic feeding program (TFP), the clinic gave severely malnourished children (determined by low upper-arm circumference) a weekly pile of metallic packets of Plumpy-nut, a fortified peanut butter designed for humanitarian emergencies.

their children consistently, feeding the therapeutic food to other household members, or selling the therapeutic food. The advice given to and questioning of parents was at times accusatory and did not provide the parent or the health worker with better information about the child's health. In a stark example, during a malnutrition clinic while explaining how to use the supplemental food, a head clinic worker repeatedly said to the women that they should not purposely make their children malnourished in order to receive supplemental food. The language that health workers used that blamed parents for child's malnutrition, slow recovery, or misuse of therapeutic food, obscured and depoliticized the causes and nature of malnutrition.

Occasionally lessons were given about malnutrition during the educational segment of the under-5 clinics (one of which I gave towards the end of the study). However, health staff did not educate parents about optional portion sizes of each food group to feed their children, but just told parents that children need to eat from all the food groups, according to the Malawian governments' six food groups (vegetables, fruits, legumes and nuts, animal food, fats, and staples). Further, the health staff generally did not give malnutrition lessons during the hungry season. A few staff explained to me that this was because all the advice they give to parents on what to feed their children like fruits and fish are not accessible at that time of year, so why would they tell parents about inaccessible strategies. Health workers who I spoke with were unsure of how to advise parents to access food if they did not have money or if there was limited food available in markets. Health workers in Cluster B also stopped holding weekly malnutrition clinics when the clinic ran out of therapeutic food supplements during the height of the hungry season.

There was a degree of medicalization and misrecognition of malnutrition at the clinics. Participants and health workers typically referred to malnutrition by the physical symptom of

kutupa (swelling) rather than kunyentchera (malnutrition). Health workers discussed malnutrition using biomedical language as something that they treated with therapeutic food, which they referred to as medicine (mankhwala). At the end of program, children who gained target weight were declared “cured” which was written in their health passports and the clinic registry. That I observed, health assistants hardly discussed with parents how children became malnourished, how to prevent it from happening again, or malnutrition’s long-term health and developmental impacts. While participants often said that malnourished children were more susceptible to disease, they generally did not know of long-term impacts of malnutrition. Following Scheper-Hughes (1992:202, 363), to discuss and openly acknowledge the brutal impacts of pervasive chronic malnutrition would be a scathing critique of Malawi’s agro-food and health care system. It would also have significant dissonant moral implications for familial care among farmers who had little ability to improve their family’s access to food and health care, which Scheper-Hughes discusses produces a “rejection of the ‘unthinkable’” among individuals and officials (1992:276).

Some traditional healers also diagnosed and treated malnutrition. Diagnosis and treatment can vary between different types of healers. Different healers also had varying relationships with local health centers so some readily referred or took patients to health centers, while others were more reluctant to do so. As mentioned earlier, traditional healers helped prevent, diagnose, and treat children who have malnutrition from a parent’s extramarital sex. They also identified diagnosing and treating a form of stunting caused by witchcraft. A few said that they treated children with malnutrition from a lack of food with homemade fortified porridge, advised the parents on better feeding practices, and tried to treat any other underlying health problems like diarrhea or malaria.

Malnutrition was both divorced from the broader structures that perpetuate it and from the children's and women's lives. As Scheper-Hughes writes about Brazil, "hunger is isolated and denied, and an individualized discourse on sickness comes to replace a more radical and socialized discourse on hunger" (1992:169). A sick body can be treated with medicine in isolation of other factors and "implicates no one," whereas a "hungry body exists as a potent critique of the society in which it exists" (Scheper-Hughes 1992:174). Clinic discourse and treatment isolated hunger from the broader power relations and the agro-food system, and placed it within the confines of individual failure. In declaring children cured, health workers severed malnutrition from the continual struggles of food shortages that most experienced. The conditions that produced malnutrition were preeminently normal; however, treatment and discourse represented malnutrition as something unusual. Food security, in the form of access to maize, is a highly politicized issue in Malawi and part of the government's social contract with its people. In contrast, the government largely situates malnutrition within the realm of public health discourse and treatment. A structural discourse of hunger and malnutrition would have significant national political ramifications. The normalization of malnutrition and obscured causes may inhibit addressing the problem.

I had difficulty confronting and understanding the malnutrition that people seemed to treat as commonplace or ignore. I quickly started to accept how participants downplayed malnutrition and accepted deaths as normal. I questioned myself because I have no medical training. I worried that I was misinterpreting physical symptoms. Who was I to ask or judge? I worried about imposing the common narratives of malnutrition, suffering, and death that exists in the media and much of academic work on sub-Saharan Africa. I was wary of imposing

Western stereotypes or interpretations about impoverishment on Malawi, where it is so easy to do so as one of the poorest countries in the world. In a research note, I wrote,

Focusing on the malnutrition and death felt like I maybe wasn't focusing on their humanity, on their life. I was supposed to be researching their food and farming practices – how they live out these things. I wasn't here to look at malnutrition and funerals. They kept sneaking up on us and presenting themselves, as something there in peoples' lives.

I came to feel like I could not keep brushing aside questions about malnutrition and suffering. I found it emotionally difficult to confront issues of malnutrition, illness, and death, particularly after my grandmother died, with whom I was very close. I did not resolve my conflicting feelings, but I tried to learn more about participants' perceptions of malnutrition and death.

Initially, I was unsure of the applicability of structural violence in the lives of the research participants (Farmer 1996; Scheper-Hughes 1992; Farmer 2005; Boff and Boff 2004)., particularly given my hesitations described above. However, I found that this was part of the participants' lives. Structural violence was evident in conditions of material deprivation and scarcity and embodied in adverse outcomes like malnutrition, disease, and death. Illness, death, and malnutrition were part of a broader system of structural violence that constrains capabilities and life chances and employs normalizing and depoliticizing discourses that blamed people's laziness, lack of adherence to treatment regimes, or were fatalistic or simply erased what was happening (Scheper-Hughes 1992:199, 202, 187).

Conclusion

In contrast to narratives in Malawi that suggest that food shortages, food preferences, and malnutrition result from laziness and rigid cultural practices, participants faced persistent food access constraints. Most participant households had to alter food choices based on food access and engaged in coping strategies during the study, while using improvisational and creative skills to try to cook delicious, filling food to meet their food preferences. Maize – as the staple food,

central to Malawian taste and cuisine, a filling food, and a key source of mphamvu – is naturalized as its origins have been obscured and the negative impacts of its overconsumption are often unrecognized. Malnutrition, as an embodied result of mal- and under-nutrition, is normalized as its physical signs often go unrecognized, its long-term impacts are often not discussed or unknown, and its occurrence is often seen as an individual rather a systemic problem. The problems of food insecurity and malnutrition highlight the importance of farming and crop choices for the health and well-being of participant households. I build on this chapter in Chapter 8 to show how food access changes from practicing permaculture resulted in food consumption, food security, and food practice changes.

CHAPTER 5

AGRICULTURAL LEARNING AND PERMACULTURE EDUCATION

Amayi and Abambo Mvula had a dispute with a chief over land their family inherited under customary land rights. Rather than pay for the land, they left and moved to a tobacco estate in Lilongwe Rural District in 1976 started by a white, British settler in 1920 (McCracken 2012:164–165, 170), which his descendants run today. The Mvulas were tenant farmers on the estate, so they farmed a portion of the land with maize and cash crops like tobacco and groundnuts, bought agricultural inputs from the estate, sold the cash crops to the estate at a low rate, and kept maize for consumption. The owners only allowed them to grow maize and certain cash crops, although the Mvulas tried to grow vegetables for consumption anyway. While living there for almost thirty years, Amayi and Abambo bore ten children, Amayi tilled the fields, and Abambo oversaw others working in the fields.

I sat outside their home with them while Amayi crocheted and Abambo lay on a mat next to us resting in the afternoon shade. She told me that while they lived at the estate, their first-born daughter, whom they relied on for support, passed away in a hospital after being sick with malaria for one week. Although her son-in-law survived a concurrent bout of malaria, the Mvulas took in their young son as his maternal grandparents.

Amayi Mvula recounted how their healthy, six year old grandchild suddenly went missing in 2008. He was later found on the estate dead. Amayi said it was a real blow to have him die at the age of six. She was supposed to take care of him, she said.

The Mvulas left the estate after their grandchild's death. They moved to a nearby village where Amayi's cousin was the village chief. As chief, he gave them land for a home in the

village, but he did not give them agricultural land. The grandchild's death and the subsequent move propelled the Mvulas into permaculture.

Bauleni started implementing permaculture in their yard in October of 2009 after learning about it from a friend and Everlasting Harvest, in an effort to address his family's food shortages caused by limited land access.

Bauleni explained to me that through chatting with a friend who worked with the Smith's and visiting Everlasting Harvest, he began to reflect critically on his family's farming practice. He said, "The way we were doing our farming, I saw that we were losing a lot of things like time, money, and seeds. But looking at the profit we were getting, it wasn't worth the work and the inputs we were putting in."⁵⁶ That was also the case when they were tenant farmers on the estate, as he explained that it was energy intensive to grow tobacco, which they had to sell at a low price.

"So by just seeing what my friend was doing, I thought that would, uh, be the right path for myself to pursue, so I just started doing something at my house without any training."

"Why did you decide to start it at your house?"

"The first thing was that, you know I'd been staying with my family... but I've been seeing lots of problems, like we've been sometimes going to bed without eating anything, been going to bed sometimes just eating vegetables only like okra and blackjack or amaranth. So it was so painful to me to see that we are lacking food, you know?"

"But but just visiting the [Smiths] I could just like, I could not understand how much food they were getting from just around the house, so that was my first inspiration to say 'wow, I could fight against that by just growing something around my house.' So that's why the first thing to plant was just maize you know, to supply food. Yeah."

⁵⁶ I conducted this interview in English at Ulimi on July 3, 2012.

Like many of the other permaculture farmers, Bauleni initially learned about permaculture through informal learning, observation, and imitation. His experiences growing cash crops conventionally and his family's problems shaped his evaluation of and interest in permaculture.

Bauleni told me that his understanding of permaculture changed as he implemented it and learned more. In 2009, he learned about permaculture by continuing to visit Everlasting Harvest and talking to the Smiths. In 2010, the director of Ulimi at the time visited his home and decided to pay his fees to attend a PDC at Ulimi, which Dan Smith taught.

Between 2009 and 2011, Bauleni diversified and intensified the permaculture practices he used. In 2009, with support from the Smiths and funding from GIZ, he built a composting toilet behind their home. After the course, he spent two years implementing permaculture at home and working as an apprentice and permaculture manager at Everlasting Harvest. In 2012, Ulimi hired Bauleni to work with Wilson to help manage the growth of Ulimi staff and outreach and training activities. Bauleni has also started working towards his diploma in permaculture, which is an award of professional excellence given by several permaculture organizations based on a work portfolio review (Permaculture Institute 2013).

I suggest that most participant farmers, like Bauleni, learned conventional agriculture and permaculture through social and individual learning from many of the same sources. Farmers contextualized and incorporated permaculture information within their existing agricultural knowledge and skills. Permaculture farmers learned varying amounts about the design system and permaculture practices depending on the learning sources to which they were exposed. Social learning and imitation within social networks was a particularly important part of permaculture learning and implementation for farmers. Ulimi and Everlasting Harvest were other

central permaculture learning sources, which faced particular challenges due the foreign origin of permaculture, local context, and incorporation within the development apparatus. Most commonly, permaculture farmers were motivated to adopt permaculture to get tangible benefits. Permaculture adoption was a multi-year process in which they slowly expanded permaculture practices while continuing processes of social and individual learning. In addition, farmers implemented permaculture in a risk adverse manner.

Agricultural Learning and Decision Making

An examination of farmers' technical and practical knowledge about farming, and the acquisition of that knowledge, is critical for understanding farming practices. Agricultural knowledge encompasses practical, embodied, technical, and symbolic knowledge, as several authors have written about in other contexts (Netting 1993:58; Batterbury 1996; Richards 1993:63; Ploeg 1993). Practical knowledge was central to participant farmers' learning, which anthropologist Gibson describes as the "implicit practical knowledge of everyday life" (2005:18) that is acquired through observation, imitation, practice, and "bodily engagement with tools and raw materials" (2005:19). What is referred to as traditional or indigenous ecological knowledge, local or folk knowledge, among other terms, is also practical knowledge (Morris 2010:1–2).

The participant farmers learned to farm through social and individual learning. McElreath, like some other anthropologists, categorizes social learning as learning that occurs through teaching or imitation (2004:309). Stone and McElreath categorize individual learning as "based on individual evaluations of payoffs from various practices" (Stone 2007:71), and "occurs when people... interact with their environment and adjust their behavior in light of new information" (McElreath 2004:309). Stone clarifies that, in practice, even "direct environmental observation... is likely to be interpreted or contextualized through a form of social learning," and

farmers “develo[p] the ability to perform with a technology under variable conditions,” through both social and individual learning (2007:72).

Gibson asserts that particular forms of knowledge interact, coexist, and remain available to people to draw on over time as is applicable given one’s experience and the local context (2007:4–5, 208). Anthropologists readily recognize this in relation to syncretic religious practice, biomedical and traditional healing systems, and discourses of power and morality (Taussig 1980:104–109; Smith 2008:100–102; Scheper-Hughes 1992:196–199; Comaroff and Comaroff 1999:283–284). So too, different forms of agricultural knowledge remained available to farmers as they learned new ones. Anthropologist Richards, who analyzes farming as social action, finds that in West Africa, farmers adjusted and improvised plans within unpredictable conditions (1993:67, 72). For example, a farmer may primarily use conventional agro-technical knowledge, but strategically turn to symbolic knowledge to predict rainfall during unusual weather patterns.

Crane, Roncoli, and Hoogenboom show that the application of agricultural knowledge is a process of negotiation, flexibility, and adaptation in which farmers are creative, technical, and socio-cultural actors (2011:179). Gladwin, an agricultural anthropologist, has theorized that farmers engage in a multi-stage decision making process in which they explicitly strategize and make decisions based on an intuitive set of feasible options (1980). In addition, social and power relations and environmental context shape farmers’ use of knowledge, decisions, and practices, as discussed by Fairhead and Leach in a review of political ecology literature on smallholder farming in sub-Saharan Africa (2005:87–88).

Conventional Agricultural Knowledge and Education

Participant farmers often referred to conventional agriculture as the farming of these days (malimidwe a masiku ano), or today’s or modern farming, which firmly situated these methods in

the present and indexed notions of progress and “development.” For example, one farmer referred to conventional farming, as “government farming,” which she said is a type of English agriculture that the government promotes. Some farmers identified particular technologies as having a foreign origin, such as hybrid seeds that some farmers said white people (azungu) brought to Malawi. Like many other words that refer to items and institutions of Western origin, fertilizer (feteleza) and hybrid (hayibridi) in Chichewa have English etymologies. Through such statements, these farmers positioned conventional agriculture as coming from European, Anglophone countries and saw current government agriculture policy as continuing to promote those agricultural techniques. Just as the British colonial government made a distinction between European and “African” agriculture in what is now Malawi, that distinction remains present in the minds of many of the participant farmers who made distinctions between “modern” agriculture and indigenous practices. This characterization of conventional agriculture often promotes its legitimacy to some Malawians; however, some participants and permaculture organization employees incorporated these outside origins in their portrayals of the inequality and injustice that they saw in the current agro-food system.

Participants broadly identified five key characteristic techniques used in conventional agriculture: (1) fertilizer; (2) ridges; (3) monocropping; (4) hybrid maize seeds; and (5) annual crops. Farmers commonly identified input use as a central characteristic of conventional farming. For example, as Abambo Phiri said, “if I did not have fertilizer, then I was not able to farm in the field.”⁵⁷ In statements like these, farmers often emphasized to us that the ability to farm – or at least to harvest – hinged on access to fertilizer. Some farmers, particularly permaculture farmers when comparing conventional agriculture and permaculture, also typically discussed the planting of and dependence on annual crops as a common feature of conventional agriculture. Farmers

⁵⁷ We conducted this interview in a mix of Chichewa and English on March 14, 2012 in Cluster C.

rarely identified specific crops as part of conventional farming. While farmers identified hybrid maize as coming from outside Malawi, they portrayed local maize as Malawian.

During interviews and focus groups, farmers often said that they primarily learned to farm from their parents. Farmers typically acquired practical agricultural knowledge through observation, imitation, and practice as children. I often observed infants tied to their mothers backs in fields, and children accompanying their parents or going with other children to help with field and garden tasks beginning around the ages of five to seven. A few farmers identified farming knowledge as implicit and innate, as when they stated that they are born knowing how to farm or inherit farming knowledge from their parents. Several participants explained that they purposefully teach their children to farm to prepare them for adulthood.

Public schooling, agricultural extension, agribusinesses, advertising, NGOs, and radio programs are sources of ideological knowledge that farmers discussed and that I saw and heard in the communities (see Figure 13). These sources primarily taught and promoted conventional technologies. Promoters of these technologies advocate the idea that successful farmers use “modern” technologies and are capitalist-oriented, which is rooted in a modernist, scientific view of agricultural and economic development and backed by powerful actors, money, and elite interests.

Farmers’ economic status, gender, social network, and the services available in their direct locality influenced their access to agricultural information. Conventional agriculture and environmental issues are part of primary and secondary public school curriculum (Government of Malawi 2010:89–90), although in most participant households (36 HH, 89%) neither spouse

was able to complete or pay⁵⁸ for twelve years of school. Government agricultural extension officers have low coverage so they primarily work with farmer cooperatives (Masangano and Mthinda 2012:21).⁵⁹ A higher portion of men (10 male farmers, 59%) than women (3 female farmers, 16%), over half of whom were members of the Ufulu Farming Club, reported receiving advice or help from agricultural extension workers. No participants in Cluster A reported access



Figure 13. Seed Co. Store at Trading Center in Cluster B (upper left); Seeds at Government Feed the Future Event (upper middle); Fertilizer Bags at Government Warehouse (upper right); Pannar Sponsored Gule Wamkulu Performance at Soccer Event in Cluster A and B (lower left); Cow pea and Hybrid Maize Demonstration Plots at Government Research Station Field Day (lower right)
Photograph: Austin Dunn (upper middle and right), rest by author

⁵⁸ Adult participants who were of school age prior to 1994 had to pay user fees to attend school, and while user fees were abolished in 1994, some households still find the cost of school uniforms, supplies, and exams to be prohibitive (World Bank 2009:162, 188).

⁵⁹ The current agricultural extension policy was passed in 2000 to improve access to quality extension services, decentralize the system, and enable the participation of other service providers, namely NGOs (Masangano and Mthinda 2012:8). In 2006/07, 18% of farmers in Lilongwe Rural District and in Malawi on average reported receiving extension services (National Statistical Office 2010:41).

to extension services. Only members of the Ufulu Farming Club and permaculture farmers in Cluster C said that they received agricultural training or support from NGOs, namely Ulimi and Everlasting Harvest.

Transnational agro-chemical seed companies are another source of agricultural information. For instance, they plant demonstration plots along roadsides with signs indicating which hybrid maize variety is growing there. Executives at Monsanto and Pioneer DuPont (which bought Pannar) told me during interviews that the core of their seed marketing strategy in Malawi is using side-by-side plots, demonstration plots, and field days. They also disclosed that the seed prices they offer in Malawi are among the lowest in the world, in part due to Malawians' low purchasing power and in part as a long-term strategy to build their local market share. A Pioneer executive also said that they provide seeds to NGOs like Care and World Vision, and a marketing executive at Monsanto said that they sell hybrid seeds through the national FISP voucher program, which he called a "great engine" for hybrid adoption in Malawi.⁶⁰

The radio is a relatively accessible source of farming information from many sources, although Manda found that access to radios is constrained by financial resources and gender, as husbands control the radio in some households (2011:62–65). Radios were one of the most commonly owned items among participants, with 27 HH (66%) owning at least one radio. As of 2011, there were 30 agricultural radio programs nationally that primarily broadcast in Chichewa and cover a range topics, such as agricultural techniques, land issues, food security, tobacco marketing, produce marketing, environmental issues, FISP, and farmer entertainment (Manda 2011). Since its founding in 2009, Farm Radio Malawi, funded by the Gates Foundation, has

⁶⁰ I conducted the following interviews over the phone: Monsanto global and Africa marketing executives on June 18, 2013; DuPont Pioneer marketing executive for Africa and director of Zambia office who also runs Malawi operations on September 12, 2013; DuPont Pioneer executives in plant genetics on June 13, 2013.

been a central organization in agricultural extension radio promoting the New Green Revolution in Africa. Several farmers said that the information discussed on the radio is not useful because they already know the information or the techniques discussed require inputs that they cannot access.

The number of people from whom participant farmers reported receiving farming advice or help was positively correlated with participants' reports of having support in their village (0.44, $p=0.005$). Twelve HH (32%) said that they do not go to anyone for help or advice about farming. Farmers reported receiving advice more often than material or labor assistance from others in their social network. Slightly more women did not go to anyone or went to family members compared to men, more of whom went to fellow members of Ufulu club, friends, or neighbors. Individuals' motivations and social relations shape knowledge sharing. Abambo Tembo said that while they share knowledge and skills with each other in Ufulu, sharing knowledge sometimes causes problems, such as jealousy. Englund writes that jealousy is part of "discourses and images that continually explore the moral dimensions of poverty and prosperity" in Malawi (2002:152). Sharing information can foster jealousy in others who perceive that person as having an unfair advantage or having gained that knowledge at the expense of others.

In a departure from knowledge gained from other sources, symbolic knowledge influenced farmers' conceptions of human agency in relation to the environment and the social relations of farming. Religious systems, both Christianity and Chewa religion, were integral to the participants lives.⁶¹ Participants weaved religion into explanations about farming activities

⁶¹ All but two households reported a religious affiliation, most commonly Presbyterian, Seventh Day Adventist, Jehovah's Witness, and Pentecostal Christian denominations. Only two households reported solely observing Chewa religion, however, many others employed syncretic religious practice by combining Chewa religion and Christianity. The *gule wamkulu* (great dance), a secret fraternal organization that is central to the Chewa religion (Kaspin 1993:34–35), is a source of symbolic farming knowledge. Through riddles, proverbs, and songs, the *gule wamkulu* characters (i.e. wild animals, ancestral spirits, colonial officers, fertilizer coupons, etc.) teach about

and problems to varying degrees. Farmers most commonly talked about God influencing rainfall, which in turn individuals tried to influence through prayer. As farmers perceive rainfall patterns as more unpredictable than in the past, some farmers said that God is the only one who knows when it will rain, which farmers often said when chatting about the late rains in 2011.

Participants told us that people can influence farming using magic or witchcraft, which anthropologists understand as a valid part of religious and moral systems (Comaroff and Comaroff 1999; Austen 1993; Evans-Pritchard 1976; Turner 1967). Based on ethnographic work in Lilongwe, Englund states that witchcraft is a part of life and the moral order, “mediate[ing] imagined limits to sociality on varying scales” (2007:296). In a focus group with male conventional farmers in Cluster B, the men explained that some people steal crops from their fields using magic, which they said one could only prevent through magic. Morris states that Malawians often view this knowledge about crop protection as distinct from agronomic knowledge (2010:3). In a focus group with female conventional farmers in Cluster C, women asserted that some people use witchcraft to kill a blood relation to have high maize yields. Symbolic knowledge coexisted with other types of agricultural knowledge, providing an explanatory framework and additional knowledge and strategies for farmers to draw on during problems and times of uncertainty.

In addition to social learning, farmers’ agricultural knowledge changed over time through individual learning by individually evaluating the results of agricultural practices. Several farmers explained that while the problems and outcomes they experienced the previous year

the importance of farming and hard work, the connection between food security and farming, and the impact of political-economic systems on farming (Kugoni Centre of Culture and Art 2012; Kaspin 1993:54–55).

sometimes changed their plans for the next growing seasons, their decisions were significantly influenced by current input access, labor availability, and weather.

These different sources of agricultural knowledge comprise the information environment in which farmers learn to farm and make agricultural decisions. Through social learning, farmers often learned about conventional agriculture from multiple sources. Glasson found that the continued promotion of Western agricultural practices in Malawi has contributed to the discrediting and loss of indigenous agricultural and land management practices (2010:155). This information frames the public discourse of the possible and best farming options, which helped determine what plans farmers choose to pursue. Further, available services, economic resources, and gender limited farmers' access to information.

Permaculture Knowledge and Learning

Permaculture farmers learned permaculture through some of the same processes and sources through which they learned conventional agriculture, namely imitation through social learning and NGO instruction. Permaculture farmers necessarily incorporated permaculture knowledge into their existing knowledge frameworks. Through permaculture education, farmers learned ideological knowledge about the permaculture design system and techniques, much of which aligns with information that Mollison and Holmgren outlined in their texts (see Chapter 3). Ulimi and Everlasting Harvest's permaculture education also operated under typical agricultural development assumptions, which, according to Davidson, include the assumption that having more knowledge is inherently better and "democratized knowledge leads to progress" (2010:213).

Permaculture farmers had varying exposure to permaculture. Ten permaculture farmer HH (63%) were first exposed to permaculture by seeing Everlasting Harvest's or Ulimi's

Table 4. Sources of Permaculture Education, n=16

Informal learning sources	%, HH	Formal learning sources	%, HH
NGO informal	94% (15)	NGO training	38% (6)
Relative	56% (9)	NGO job	31% (5)
Friend/neighbor	38% (6)	NGO program participant	19% (3)
Book	38% (6)		
Informal total	94% (15)	Formal total	56% (9)

demonstration sites. A friend or neighbor who practiced permaculture introduced three permaculture farmer HH (19%) to permaculture. In addition, one HH each was exposed to permaculture from the following sources: while working at an NGO with a permaculture program, at school, and from a government research station demonstration plot.⁶²

After initial exposure, permaculture farmers learned about permaculture from a variety of sources, which I broadly divided into informal and formal learning sources, as shown Table 4. On average, households had 2.9 learning sources (reflected in Table 4), because household members had multiple sources of permaculture education individually or collectively. Most permaculture farmers (15 PF HH, 94%) had at least one household member who informally learned about permaculture from Everlasting Harvest or Ulimi by observing their demonstrations and talking with employees. Sometimes permaculture organization employees did outreach visits to farmers’ houses to observe their permaculture practices and give advice. Just over a third of permaculture farmers (6 PF HH, 38%) learned from books that they borrowed from an NGO. While the books provided useful information, a few farmers said understanding the information presented in the books was challenging, especially because the books were in English.

Informal permaculture education occurred within farmers’ existing social networks. On average, permaculture farmers reported knowing 5.9 other people who practiced permaculture.

⁶² A national agricultural research station in partnership with Nippon International Cooperation for Community Development conducted a field trial in 2007-08 to compare permaculture and conventional farming treatments (Moses, Gomi, and Chilimba 2009). The research plots were open to the public and tours were given of the trial plots.

They discussed learning from others who practiced permaculture, particularly early adopters like Bauleni and Abambo Chalimba, by asking them for information and looking at their use of permaculture as examples. While farmers talked about learning from others, they did not reference imitating their neighbor's permaculture implementation. Through observation, I saw that permaculture farmers typically implemented similar permaculture practices with similar aesthetics as their neighbors. In Cluster C, permaculture farmers implemented permaculture in their yards, though with varying intensities, in much the same way as Bauleni and the few other early adopters in Everlasting Harvest's model village program. In Cluster B, the farmers in Ufulu who began to adopt permaculture towards the end of the study implemented it in their gardens and fields, and not in their yards, as Abambo Chalimba did who was the first to adopt permaculture in the area. Bauleni and Abambo Chalimba implemented permaculture in these two different ways based on demonstrations and instruction from Everlasting Harvest and Ulimi respectively. In addition, over three-quarters of permaculture farmers (13 PF HH, 81%) reported explaining or teaching permaculture to others. Half of permaculture farmers (8 PF HH, 50%) reported that at least one other person (average of 2.67) in their social network adopted permaculture after learning about it from them and seeing their garden. Several social scientists, including anthropologists, have found that this type of informal, social learning based on the observation, teaching, and imitation is often integral to how farmers adopt new agricultural techniques (Stone 2007:71; McElreath 2004:308–309; Rogers 2003:366–368; Henrich 2001; Ellison and Fudenberg 1993:612–623).

There was overlap between those who informally and formally learned about permaculture, as only one permaculture farmer HH (6%) solely received formal permaculture training. On average, those who learned about permaculture formally had 1.67 formal learning

sources. Formal learning occurred while permaculture farmers were program participants in Everlasting Harvest's model village or Ulimi's Ufulu cooperative program (6 PF HH, 38%), worked on a permaculture program as an NGO employee (5 PF HH, 31%), and during Ulimi group training courses (3 PF HH, 19%). Of these, one person earned a Permaculture Design Certificate, one was in the process of earning a certificate, and the rest received introductory level education.

All permaculture farmers learned about practices addressing land use, agrobiodiversity, soil and water conservation, and organic techniques. Those who had formal training or read permaculture books also learned about the permaculture ethics, nutrition, natural medicine, pest and livestock management, compost toilets, and environmental sustainability.

After unstructured learning and practicing permaculture, permaculture farmers described using permaculture design concepts like observing the environment, creating polycultures, detailed agricultural planning, conserving energy and resources, valuing diversity, and using multifunctional elements. I also observed and documented farmers' implementation of these design concepts through various practices (see Chapter 6).

For example, Josephy, a teenage permaculturalist who had no formal training, said that in his experience, the main difference between learning permaculture and conventional farming is that "in permaculture, we learn about the connections of all things," in nature, and "how all of them can survive," he said.

Permaculture farmers with more knowledge about the design system read permaculture books and/or learned through a formal source. From these sources, permaculture farmers explicitly learned particular permaculture design tools that aim to facilitate systems thinking and design. Most often farmers learned about guilds, followed by zones, and sector analysis. Zones

(see Chapter 3), sectors, and guilds are key design tools. The stated purpose of guilds is to help select, organize, and design polycultures to maximize cooperation between plants that perform functions for other plants or components of the guild (Mollison 1988:31, 62). Such functions include providing food for humans and the soil, groundcover, natural pest control, and nitrogen fixation (Hemenway 2009:149, 183–184, 192). Sector divisions categorize the external energies like sun and wind which enter the permaculture system to efficiently control and channel energy use (Mollison and Holmgren 1978:49, 57; Holmgren 2002:14; Mollison 1979:15).

The few permaculture farmers with formal training served as an accessible resource for others, like Bauleni and Abambo Chalimba in Cluster C and B respectively.

Amayi Sesani was an example of someone who engaged in social and individual learning. We talked with Amayi Sesani on a May morning. She stirred ndiwo of tiny dried fish, bubbling over a circular clay stove that enclosed thin crackling, burning sticks and dried maize cobs. A wide, shallow winnowing basket of hibiscus fruit lay in the sun to dry, which she cooks as a sour flavored ndiwo and to make magenta colored tea.

“I didn’t know permaculture, but [my husband] I found working on permaculture,” before they married, “and he explained that at his workplace they do this,” she said.

“I married him in 2010, so by the time he was teaching me I thought that it was a job that it can hurt you. ‘You say Permaculture? You do this and that? No, I can’t manage it’... I spoke on that because it was before I came to understand it fully, like when he was speaking, what did he mean?” she recalled.

She said that she continued to learn about permaculture from her husband who taught her from a permaculture book and from Everlasting Harvest employees like Bauleni. She said that after she learned more about permaculture she understood it as “not ending farming.”

During our conversation, a young neighbor came, entered the back door of the house and emerged carrying a pile of yellow passion fruit. Amayi Sesani was sharing her surplus passion fruit harvest from the vines that covered her home's grass thatch roof.

"Come nsima is available," Amayi Sesani said to her neighbor before she left.

"Before I understood it?" she continued. "I viewed it as an unprofitable farming. Can we be farming without ridges, just making beds, no fertilizer, what what? So, I thought it useless to me. So then, my head was opened when I saw the [permaculture] things done the first time, and saw that they were real."

Amayi Sesani formed a positive opinion of permaculture once she felt that she benefited from using it. In another interview, she told us, "Little by little, not even months passed by, that's when I realized that [permaculture] is a good thing to do because I wasn't buying tomatoes anymore."⁶³ While Amayi Sesani learned permaculture information through social learning, it was through individual evaluation that she decided the permaculture information was of use.

Permaculture Organization Education

A group of twenty-five male members of Ufulu Farming Club from Cluster B sat in a semi-circle on white, plastic lawn-chairs in Ulimi's open-air, circular, thatch roofed classroom. Ulimi held separate trainings for female Ufulu members because the group leadership thought it would be more appropriate and make the women more comfortable. It was a bright, hot day in November. Due to funding delays, Ulimi was not able to hold this training earlier so that the farmers could apply what they learned during the rainy season. Chisomo, Geoffrey, and I sat in the back of the classroom and observed the training. Wilson wrote "PERMACULTURE" in English on the blackboard and "permanent agriculture permanent culture" underneath. He began

⁶³ We conducted this interview in Chichewa in Cluster C on May 21, 2012.

the first of four days of training by explaining permaculture. He spoke in Chichewa, at times slipping into English, and said that permaculture is designing to make sure that people and nature can help each other. He emphasized the “permanent culture” component to highlight the interrelation between food security, farming, environmental problems, and everyday practices. As such, permaculture trainers at times emphasized farmers’ personal responsibility to improve their food security and local environments, which denied the structural causes of those problems.

The training broke for tea, bread, and guacamole. Wilson’s wife, Rachel, used the tea, snacks, and lunch served during trainings as an opportunity to explain the nutritional content of different foods and to introduce people to new foods or recipes. After tea, Wilson and the then assistant director of Ulimi, an American woman, taught about nutrition and soil basics, including a hands-on demonstration of making a compost pile.

During the next day of training, I followed as Wilson gave the group a tour of Ulimi’s demonstrations and led the group into the forest near Ulimi’s market garden demonstration. He asked with a hint of defiance in his voice, “Who farms in the forest? Who makes ridges there?”

“No one,” the farmers responded.

Wilson expounded on their response, emphasizing that no one farms there and no one makes ridges there. Yet in the forest, a large variety of plants and foods grow without human interference. In asking the farmers about the forest, Wilson sought to challenge the farmers’ thoughts and assumptions about conventional farming. Wilson and Bauleni often made this type of comparison between natural ecosystems and farmers’ agricultural practices as a first step when they tried to shift farmers’ thinking about farming, the environment, and everyday practices during trainings and demonstration tours. They also often encouraged farmers to identify and use available resources rather than purchasing inputs and food. Bauleni also

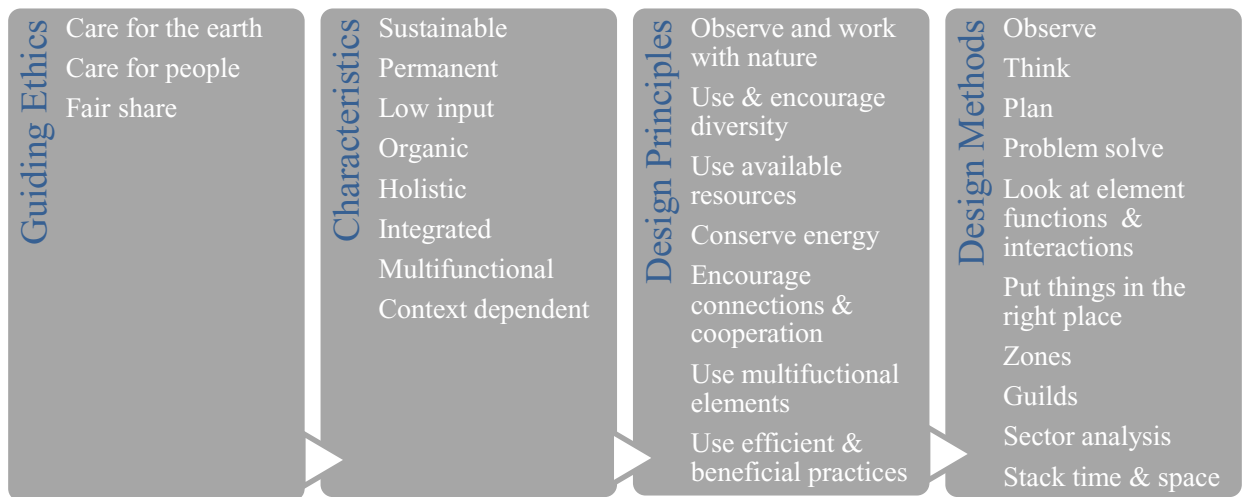


Figure 14. Permaculture Ethics, Characteristics, Design Principles and Methods Taught by Ulimi and Everlasting Harvest

referenced religion when he challenged everyday practices by extolling the creation of a Garden of Eden on earth through permaculture practices in comparison to the dry, smoky landscapes created by conventional practices that are reminiscent of hell.

In the Ufulu trainings, several other introductory trainings, and many demonstration tours at Ulimi and Everlasting Harvest, I observed that Ulimi and Everlasting Harvest staff taught farmers common characteristics of permaculture. Figure 14 summarizes what Ulimi and Everlasting Harvest taught and reflects the language they used to teach permaculture, which reflects slight variations from the semi-standard international curriculum established by Mollison due to local context and translation. They usually organized courses by topic and incorporated design principles and methods throughout courses. Trainings included demonstration tours and hands on activities such as intercropping and making swales, which are the combination of a ditch and mound dug on contour with the land to slow and catch water (see Figure 15).

Towards the end of the study, Geoffrey, Chisomo, and I worked with several staff members to plan and facilitate village trainings on permaculture and cooking and nutrition in each Cluster. We also asked participants what topics they wanted us to address in the trainings.



Figure 15. Farmer Permaculture Training at the Ulimi Centre Learning About Water (left); Using Beds in Staple Fields (upper right); How to Make a Compost Pile (bottom right)

Participants often asked us for help or advice about different food and farming problems that they faced. I often felt unsure of how to help participants while not appearing in favor of permaculture and not committing the organizations to things they were not going to do. After several months of consideration, I decided to hold half-day trainings as a way to give back by sharing information that we learned from farmers in the other Clusters and the organizations, and to connect farmers with Ulimi and Everlasting Harvest as a nearby resource. Periodically, I shared surplus seeds or cuttings from Ulimi with participants who asked, and just before leaving, I gave participants a bag of seeds from Ulimi's saved seed stock and indigenous seeds that I purchased in Lilongwe markets. In these ways, I contributed to the organizations' outreach and education efforts in the communities. I often felt torn by the need to act as an impartial observer, so these activities were a small way that I tried to redress my inaction and thank people for all the time and information they generously shared with me.

During trainings and tours, farmers typically asked numerous questions to clarify the information taught or ask for more information about a topic, though staff rarely had sufficient

time to answer all the farmers' questions. Farmers' often asked questions to clarify information that did not make sense to them given their experience, knowledge, or information they heard from other sources. Several Ulimi staff identified the fact that farmers received contradictory information from different sources as a challenge in permaculture training, because farmers did not always know who or what to believe. In addition, during hands-on activities and through questions, farmers repeatedly showed hesitation about applying their knowledge and skills to the permaculture techniques they were learning. Ulimi and Everlasting Harvest educated farmers about permaculture based on the underlying assumption that farmers needed to change how they farm, which staff explicitly reinforced with farmers. Like other development efforts, the permaculture trainings at times delegitimized farmers' agricultural knowledge as staff tried to motivate farmers to change and taught them new information. As a result, some farmers expressed uncertainty and hesitation about how to apply their existing knowledge to permaculture techniques like intercropping or green mulching. NGO discourse was at times used in classed and racially marked spaces on NGO land and in classes, where their discourse and activities were legitimated by people (often white, highly educated, and well-off), funding (which buys cars, computers, cell phones), and approaches from the global North. The Malawian staff in professional or technical positions (though not the staff in agricultural or cooking positions) also indexed these power markers in their dress and language, as Englund found in Malawi's civil society sector (2006:37, 44). The symbolic and actual power differentials of the permaculture organizations helped to legitimize permaculture and locate the organizations within the development sector.

Trainers reported and I observed some translation issues when trainers taught the design system and principles due to the local context and language. Ulimi and Everlasting Harvest

taught zones differently because staff had varying interpretations about the applicability of internationally used zone categories in Malawi. For instance, Bauleni and Wilson disagreed about whether zone one, as a home garden, was locally applicable since gardens in Malawi are usually located in low-lying, wetland areas (dambo) outside of villages. Other zone categories like food forests, contradict the Chewa forest category as an uncultivated space and realm of animals and ancestor spirits (Morris 1998:4–6). In Chapter 7, I discuss how this contributes to social stigma surrounding permaculture use. Because of these incongruences, different trainers taught farmers to apply permaculture on different pieces of land resulting in some farmers receiving conflicting messages about where to implement permaculture.

Often permaculture trainers, NGOs, and practitioners did not translate permaculture concepts like guild, zone, and sector into Chichewa. Instead, they usually gave the words a Chichewa prefix as is done with many English words introducing concepts originating from other countries (school, book, doctor, and computer, etc.), such as maguild or mazone. NGOs and farmers also did not translate the term permaculture itself, but pronounced it with a Chichewa accent like pemakacha. These terms always require explicit explanation though, as their use in permaculture is unique, even in English. The term guild for instance, has the opposite meaning in permaculture as it does in biology (Ferguson and Lovell 2013:18).

Language and literacy can be challenges in teaching permaculture. There are virtually no permaculture texts or resources available in Chichewa (one exception is Margaret's educational posters), which limits farmers ability to continue learning on their own. Limited literacy, particularly among women, can also be a barrier because it prohibits note taking during trainings. The translation of plant names between English and Chichewa was also a point of confusion in a few trainings I observed. This was in part because Ulimi was discussing some crops that are not

commonly grown or known in the area like broccoli and beets, which they introduced to encourage farmers to diversify crops for sale and consumption.

Another potential source of confusion, which I did not directly observe, is that the permaculture guild system is based on plant classifications that are different from Chewa folk plant classifications. Morris writes that there are three basic categories for plants in Chichewa: mtengo (trees and woody plants), maudzu (grass-like plants), and bowa (edible fungi) (1996:35). For instance, the Chichewa category for tree includes other useful wild plants like vines, creepers, and small herbs (Morris 1996:35–36). Permaculture guilds may be confusing because they are based on morphological categories like climbers or groundcover that do not have corresponding plant categories in Chichewa (Morris 1996:39).

Everlasting Harvest and Ulimi also faced challenges due to others perceptions and distrust of them. Some people in the area told us that they stayed away from the organizations entirely due to these perceptions. Other people said that they were wary of them initially, but have now come to understand what they are doing and trust them. For Everlasting Harvest, some people in the area said that they ignored or stayed away from the Smith's home, because they thought they were simply living according to their culture as white people, or because they did not know why the Smith's home looked as it did and thought that they may be hiding immoral things or actions. Several people said that the negative perception of Everlasting Harvest significantly diminished over time and most people now understood what they were doing.

For Ulimi, local uncertainty and distrust about their activities stemmed from people's experiences with other development NGOs, past government land appropriation, and the estate that owns Ulimi's land. For example, Abambo Chalimba said that for the first few years people did not engage with Ulimi because they thought it was like other development NGOs who came

to start projects but suddenly left before completing them or who kept donor funding for themselves instead of spending money on projects. A few farmers in Ufulu told us that their perception of Ulimi changed when they visited, saw the demonstrations, and saw Ulimi staff loading their pick-up truck with produce to sell in Lilongwe. Due to past removals for several government projects and building in the area, some people in the study area, including some participants, remained wary of NGO and government projects because their families or neighbors lost land or they feared the projects might result in more land appropriation. In addition, Ulimi was at times associated with the estate whose land they used. The surrounding villages and the estate had serious problems, because villagers regularly took deadwood or freshly cut wood to use as firewood or sell in town, which was particularly evident at dusk when I regularly saw a stream of women leaving the estate with bundles of wood balanced on their heads. I attended a heated meeting between estate staff and village chiefs that Ulimi facilitated in an effort to address the problems. Chiefs maintained that they had a right to cut trees and grass from the land as they had when the government owned the land. Estate employees claimed that they wanted to maintain the forest even though they allowed Pannar to fell trees for hybrid maize and soy seed replication. As others had told me, during the meeting they discussed an informal ticket system, whereby one was supposed to pay an estate security guard for a ticket to gain access to the forest for a day. However, at other times there were complaints that the guards beat, raped, or detained (and called the police) people who trespassed and cut trees. During my time there, Ulimi, the village leadership, and estate did not make progress on how to resolve these problems and the estate did not address the rape or abuse allegations. As such, this was a serious constraint to Ulimi's ability to work with communities and gain their trust, because they were sometimes associated with the estate and could not ensure the individual safety of program

participants.

Permaculture Adoption

Consistent with innovation-diffusion theory (Stone 2007:70; Rogers 2003:169), once permaculture farmers learned the innovation,⁶⁴ they entered the persuasion stage and formed an opinion of the innovation, and then evaluated it and decided whether to adopt it or not. Farmers had to understand permaculture and its goals before they would try it. It was important for farmers to learn the goals of permaculture, which often involved cultivating typically uncultivated land and using farming practices that seemed strange, made no sense, or challenged local cultural aesthetic and hygiene norms (see Chapter 7). Deciding to adopt new practices involves farmer evaluation of the technology and cost-benefit analysis (Wejnert 2002). As innovation-diffusion theory posits (Shennan and O'Brien 2010:200), permaculture farmers' made their adoption decision both through social learning and individual evaluations as part of individual learning. However, farmers' adoption decisions were not binary, divorced from agricultural practices or social relations, or simply cost-benefit analyses. Farmers evaluated permaculture within the local context, based on their personal experience and perceptions and often conditionally decided to adopt permaculture in order to test and further evaluate it.

While permaculture farmers described multiple motivations for adopting permaculture, farmers generally sought tangible benefits (see Figure 16). On average, farmers reported two motivations for trying permaculture. Nearly a third of permaculture farmers (5 PF HH, 31%) in part adopted it because they chose to be participants in Everlasting Harvest's model village program in which they practiced permaculture in exchange for living rent-free on the Everlasting

⁶⁴ According to Rogers, innovation, as opposed to invention, "is an idea practice, or object that is perceived as new by an individual or other unit of adoption" (2003:12).

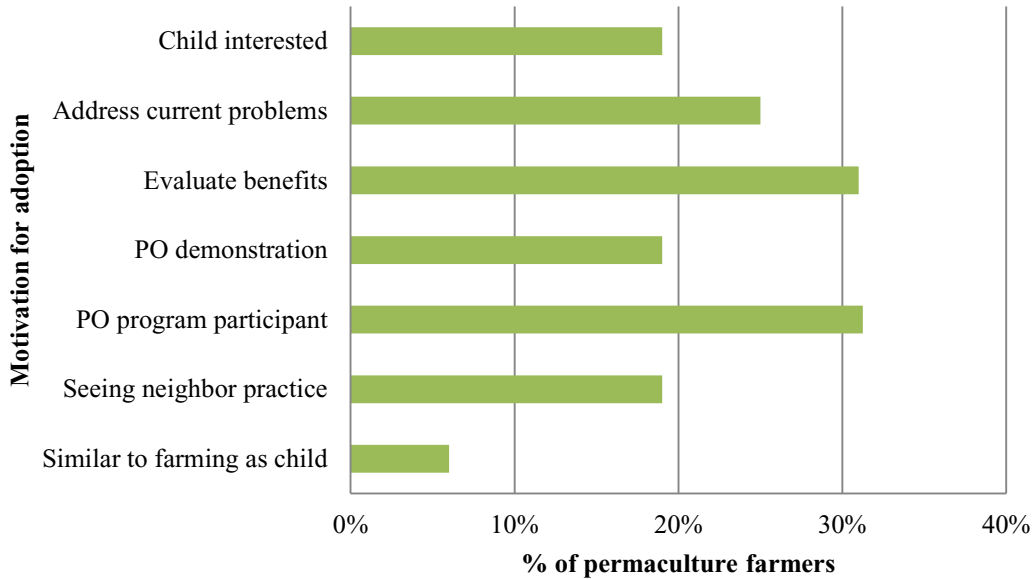


Figure 16. Motivations Reported for Adopting Permaculture, PF=16

Harvest’s land.⁶⁵ In Cluster C, where most of the permaculture farmers lived, farmers generally decided after observing the results of early adopters in their villages and then later tried it without the direct involvement of Everlasting Harvest. This is in line with studies that show that local demonstrations help farmers to evaluate new technologies, particularly when they are easily observable and at the early stages of local diffusion (Uphoff 2002:119; Rogers 2003:355).

A quarter (4 PF HH) wanted to adopt permaculture to address a household problem such as insufficient food access or high agricultural input costs. A few other households adopted permaculture because one of their male teenage sons was intent on trying it to help their family.

Josephy, for example, was one such earnest teenager. We talked with him in his yard one morning while he was not attending school because his family could not pay the school fees.

Josephy said that at the age of sixteen he first heard about permaculture. “At school... in agriculture there was a certain topic concerning the same permaculture. So our teacher took us to [Bauleni Mvula]. It’s when I started hearing permaculture information, until that my heart was

⁶⁵ While it was helpful for households not to have to pay rent, the savings were small at about MK 300 (\$1.95) a month.

touched. The same day we learned from him, is the same day I tried to make beds, after my heart was convinced about how permaculture is.”

“I was touched in my heart.... When I heard of permaculture, in my thoughts, I was thinking that if you can be doing permaculture, you can’t lack a lot of things at all. Like in permaculture, we get food and the place looks good, and we also protect our soil.” He also told us how he planted fruit trees like papaya and will be able to “start picking and selling [the fruit] to find money in permaculture,” once the trees produce fruit.⁶⁶

One difference from many innovation-diffusion study findings (Wejnert 2002:304; Henrich 2001; Stone 2007) is that I did not observe a prestige bias in permaculture adoption in that farmers did not try permaculture because wealthy or socially prestigious farmers used it. For example, the chief who lives next door to the Mvulas told me that he initially thought that what Bauleni was doing was not serious and would not have any impact. He said he even thought that Bauleni was going mad as evidenced by his implementation of permaculture practices. However, the chief said he changed his mind and decided that permaculture was helpful once he saw the Mvulas growing, harvesting, and eating greens grown in their yard. He said he realized that the Mvulas would not have to go to sleep hungry even if they did not have money to buy ndiwo. He said that at that point he was convinced enough about the utility of permaculture that he started to implement permaculture around his yard. In this example, the chief’s reaction to Bauleni’s initial use of permaculture exhibited the opposite of prestige bias.

A few permaculture farmers explicitly positioned their interest in and use of permaculture as part of a critique of the prevailing conventional agricultural system in Malawi. Some others, while not making such broad claims, positioned their interest in permaculture as arising from the failings of their current food and farming systems.

⁶⁶ We conducted this interview in Chichewa in Cluster C on February 7, 2012.

Farmers also tried to evaluate the benefits of permaculture claimed by permaculture organizations and practitioners. For example, Amayi Sesani explained, “Aah, we wanted to know, so we shouldn’t take a lie... We wanted to know wisdom, whether what’s been said is true or not true.”⁶⁷ Similarly, another farmer said, “we wanted to realize how permaculture works. So that’s why we started it.”⁶⁸

Agogo Chisale, at 81, was one of the oldest study participants. She said that she adopted permaculture because the permaculture practices she observed at a demonstration plot and her neighbors homes were similar to how she farmed as a child in the 1930s/40s but were later discouraged so they stopped using those practices. For her, permaculture validated how she used to farm such as intercropping, planting trees, and cultivating staples like sorghum, and finger millet, by “testifying” to the effectiveness and legitimacy of the practices. Rocha and Liberato writing about an indigenous community in Brazil (2013:598) and Dupuis writing about a Native American community in the United States (2014:107, 116), propose that some people saw permaculture use as a way to reestablish and strengthen their traditional indigenous knowledge and practices.

I did not find any clear household or personal characteristics that predisposed people to adopt permaculture. In a study of permaculture adoption in Malawi, Thornton found that age and acres of land owned was positively associated with permaculture adoption (2008:52). Participant farmers did not say that they were more comfortable doing things differently than others. However, in getting know participant farmers, I came to see that a few permaculture farmers did other things that were out of the ordinary, like challenging gender norms in their marriage, or being involved in a controversial government tree-planting project that others viewed with

⁶⁷ We conducted this interview in Chichewa in Cluster C on May 31, 2012.

⁶⁸ We conducted this interview in Chichewa in Cluster C on May 10, 2012.

Table 5. Factors Farmers Reported that Encouraged and Discouraged/Constrained Permaculture Adoption

Encouraged adoption	Discouraged / constrained adoption
<ul style="list-style-type: none"> • Advice and encouragement from permaculture organization employees and practitioners in social network • Learning permaculture practices • PO demonstrations • Seed sharing • Seeing others benefit • Seeing others in social network practice • Understanding the goals of permaculture 	<ul style="list-style-type: none"> • Concern about others stealing crops • Freely roaming livestock • Limited knowledge about permaculture and unusual crops • Limited land ownership • Limited time/labor • Opposition from family members • Seed access • Sickness and funerals • Social stigma about permaculture • Water scarcity

suspicion. Abambo Chalimba, for example, was often at the forefront of agricultural innovation in his area and was the first farmer in Cluster B to adopt permaculture after learning about it from Ulimi. While a willingness to be different, creativity, and land ownership may have facilitated adoption, particularly for the early adopters in an area, adoption was dependent on a variety of factors (Thornton 2008:52; Padel 2001). Farmers’ perceptions of permaculture, permaculture knowledge, support from practitioners and NGOs while adopting, problems facing farmers, the options and resources available to them was also influential. As Uphoff writes is typical with farmer technology adoption (2002:85), the combination of factors and local context was likely what was most important in shaping adoption.

In addition to social learning and evaluation, social and material support encouraged adoption (see Table 5). Receiving advice and encouragement from NGO employees and permaculture practitioners in one’s social network encouraged and helped farmers to adopt permaculture. For example, members of Ufulu reported that working together to implement new practices for the first time helped them to avoid errors and learn the new technique. Seed sharing from the NGOs and other practitioners, while in small amounts, helped farmers adopt permaculture through crop diversification.

Some constraints to permaculture adoption were specific to permaculture, while others were broader structural constraints. A number of farmers reported that social stigma and limited knowledge about permaculture practices discouraged and constrained farmer adoption. Livestock, which freely roam villages during the dry season, would eat garden crops and created a particular barrier. A few farmers described facing opposition from family members about practicing permaculture. While some permaculture practitioners saw water scarcity and livestock as constraints, other practitioners said they believed this was evidence of someone's limited knowledge about the permaculture practices that could overcome those constraints. Other constraints, namely sickness and funerals and limited access to labor, land, seeds, and water, have roots in systemic health problems and economic entitlements. Land access, encompassing land size and quality, proximity to the village and water sources, and tenure security, can inhibit farmers' interest in or ability to implement permaculture. Most participants with customary land characterized their land tenure as secure. However, extended families can decide to sever tenure after divorce or death of a spouse if one moved to their village after being married, as one female participant worried would happen after her husband suddenly died during the study (see Chapter 7 for more on constraints).

These constraints impacted farmers differently, as conventional farmers exposed to permaculture discussed during focus groups. Some said they were entirely discouraged from trying permaculture even though they recognized the benefits others received. Some said they were very interested in permaculture but unsure of how to proceed given the constraints. Other farmers in Ufulu who attended permaculture training at Ulimi were adamant about adopting permaculture because they thought the potential benefits outweighed the negatives.

Permaculture farmers implemented practices based on their agricultural knowledge and skills and their understandings of permaculture demonstrations. Farmers often began practicing permaculture on a very small scale while continuing their conventional production; for example, by first cultivating a vegetable bed in their yard, organically growing a fruit tree, starting a tree nursery, or growing tomatoes or maize organically in their garden. Some farmers started on a larger section of their yard, or part of their garden rather than just in one or two beds. Fourteen permaculture farmer HH (87.5%) first tried permaculture in their yard and the remaining two permaculture farmer HH (12.5%) initially tried it in their dimba (garden). Farmers primarily started in their yards because permaculture organizations encouraged them to start there to utilize the available land and resources and as a risk aversion strategy, which enabled them to try something new without altering the farming upon which their lives depend. It was logical and prudent for farmers to take a risk adverse and experimental attitude to permaculture adoption in case they experienced significant problems when implementing permaculture in all of their farming at once. Further, there is not a symbolic demarcation between agricultural land and the village, as there is between the bush/woodland and the village (Morris 1996:30, 32). In the study area, it was common for some trees to be growing in villages, for field cultivation to extend into village bounds during the rainy season, and for people to grow a few crops in their yards like papaya and loofa climbing on bathhouses. Therefore, while garden production occurs in floodplain or marshland (dambo), some crop cultivation in villages was not unprecedented.

The process of implementing permaculture was significantly based on imitation through social learning, as is typical with agricultural innovation adoption (Rogers 2003:18; Shennan and O'Brien 2010:102–103). However, permaculture farmers did not uncritically adopt agricultural changes because Ulimi or Everlasting Harvest recommended them or because or used by people

in their social network. Permaculture farmers made cautious evaluations through individual learning when deciding to adopt permaculture.

As shown in Figure 17, permaculture adoption is a process. Rather than a binary adoption model as is often described in innovation-diffusion literature (Shennan and O'Brien 2010:193–195; Rogers

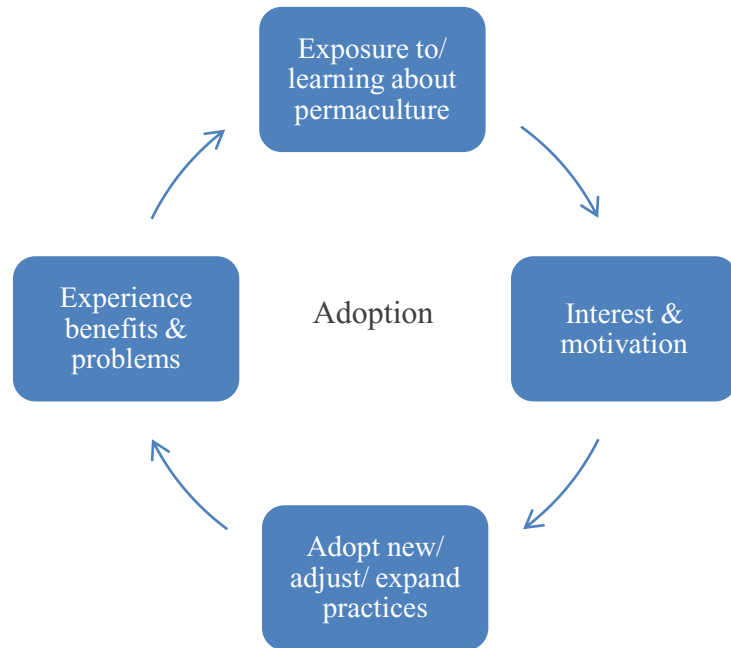


Figure 17. Permaculture Adoption Process

2003:193, 202–206), farmers continued the adoption process after initially adopting permaculture. As Ploeg writes, agricultural innovation involves a “highly complex reorganization of several farming routines,” including the agricultural calendar (1993:217). After trying something small, benefiting from the harvest after one growing cycle and learning from the experience, farmers generally incrementally expanded their permaculture use in the first and second years of adoption (see Figure 18). I observed and documented this incremental expansion of changes when I visited Everlasting Harvest in 2006, 2008, and 2010. Permaculture education initially involved social learning as discussed by Stone (2007), transitioning to more individual learning after initial permaculture adoption. Even permaculture farmers who practiced permaculture for five to eight years were expanding or planning to expand their permaculture practices. As permaculture farmers implemented permaculture practices and benefited from them, they often continued to learn about permaculture and became interested and motivated to adjust or expand their practices. A few farmers described a difference between hearing about

permaculture practices and coming to understanding them through practice, which points to the importance of experiential and individual learning. Farmers continued the processes of social and individual learning throughout.

Amayi Phiri explained how she and her husband began permaculture with a small garden at their home, while frying chitumbuwa (round soy and maize flour fritters) over a sizzling pot of oil to sell at the nearby market. She cooked over a small clay mbaula (stove) that she received from Everlasting Harvest, which conserves firewood use.

“At first, I thought of starting at the house to see – how it will be. I thought about it first of all. I wanted to make a proper decision,” she said.

“So did you start trying soon after deciding?” I asked.

“Yes. I started with a small garden. I planted vegetables.... We planted rape [a dark leafy green], then we added to plant maize. On the other part we planted cassava. There was eggplant also, tomato,” Amayi said. “Yes it actually changed because the cassava we at least ate a lot. Maize we also ate, beans also.”

She continued to explain how they added different crops in successive seasons. “We then added sunflower. We added [Irish] potatoes.” She said that they had a setback when they moved



Figure 18. Examples of Permaculture Farmers' Gardens from Initial Stages of Permaculture Adoption to Intensive Implementation

Photograph: Oliver Cripps (left), rest by author

a few years ago and had to implement permaculture again at their new house, although at a faster pace. She said that now, in their fifth year of using permaculture, “We are just continuing to care for things that we planted.”⁶⁹

The relatively slow adoption pace of permaculture relates to permaculture itself and expansion constraints. Based on natural systems and ecosystem functioning and services, permaculture systems take time to develop while plants grow and land regenerates. Farmers also build their skill in permaculture design and practices over time through experiential and social learning. In addition, farmers face constraints to permaculture adoption and expansion (see Chapter 7). Facing challenges did not stop the adoption process, but generally slowed adoption because farmers worked to successfully implement current practices, rather than expanding or trying new ones. In addition, the adoption process was incremental, in part because labor intensive nature of implementing agroecology techniques limited how much farmers could do at once, which has been found in other studies on agroecology adoption (De Shutter 2010:11).

Conclusion

The agricultural information that was available to farmers shaped farmers’ skills and decisions, which structured the options available to them. Much of the sources of conventional information reported by farmers came from Western Europe or North America, which today stems from donor, corporate, and government elite perspectives and interests, rather than that of farmers. The dissemination of permaculture in Malawi followed similar global flows as it originated in Australia and ex-pats from Europe and North America introduced it in Malawi. While the content of conventional farming and permaculture information differed, there was overlap of the information sources available to farmers and both involved social and individual

⁶⁹ We conducted this interview in Chichewa in Cluster C on March 8, 2012.

learning. Farmers learned about permaculture from multiple sources. Most permaculture farmers learned about permaculture from informal sources and just over half learned from formal sources, including NGO training. Farmers adopted permaculture over a multi-year process as they learned more about permaculture from social and experiential learning. In the next chapter, I explore how farmers applied conventional farming and permaculture knowledge.

CHAPTER 6

FARMING NSIMA: CONVENTIONAL AND PERMACULTURE FARMING PRACTICES

The visual aesthetics of the Mvula's home in Cluster C periodically struck me compared to other houses. When turning off the wide dirt road walking towards the Mvula's home, I passed a one-room teashop owned by the village chief and several rectangular, brick homes with smooth, brown swept yards and scattered towering trees. To enter the Mvula's yard I often ducked under a dripping clothesline flanked by trees under an enveloping canopy of vines. The Mvulas' left an oval patch of swept dirt directly in front of the house for sitting and eating meals. Bauleni significantly increased the agrobiodiversity in his yard from only maize and a few trees in 2009 to over 45 plant varieties in January of 2012.

Just as suddenly as one entered the Mvula's lush, tangled yard with swaths of shade and slightly cooler moist air, one reached the other side of their yard where a wall of shrubs and trees abruptly opened to a maize field covered in carefully formed lines of straight ridges, sparsely dotted with young trees.

The contrasting aesthetics of permaculture gardens and conventional fields in part reflected variations between farmers' land use, soil and water conservation practices, and agrobiodiversity. Permaculture farmers primarily added permaculture production alongside their existing conventional production. To mitigate risk, permaculture farmers typically implemented permaculture in their yards on previously uncultivated land. There was some overlap between the practices permaculture and conventional farmers and their agricultural decision-making. A combination of agroecology practices and use of the design system characterized permaculture use. In particular, permaculture farmers' practices differed from conventional farmers' practices by not burning organic matter, applying organic inputs, using water conservation techniques, growing more crop varieties, intercropping, farming during all seasons, and growing perennial

crops. The extent and intensity of permaculture farmer’s permaculture application primarily related to their use of the design system and intensity of practices used. High permaculture practitioners on average completed more years of school, received formal permaculture education, and learned from more permaculture sources. The focus of permaculture and conventional farmers’ agricultural plans differed. Permaculture farmers implemented more designs that are multifunctional and seemed to apply more systems thinking to farm plans than conventional farmers.

Farming Cycle

Weather patterns structure many rural activities such as agriculture, house repairs, and initiation rites, which creates a common yearly cyclical pattern and set of activities. Malawi has a sub-tropical climate although Lake Malawi, high altitudes, and westerly frontal systems from the South African coast moderate temperatures (Government of Malawi 2010:215). As shown in

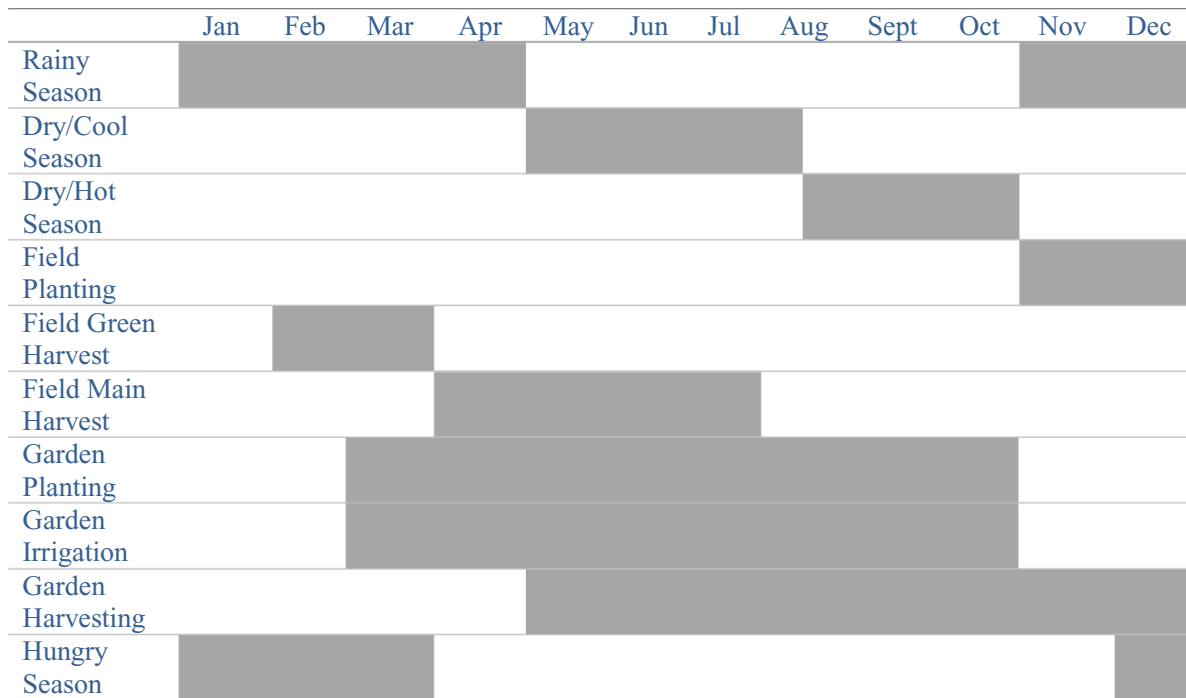


Figure 19. Seasonal Calendar for Lilongwe Rural District Based on Participant Responses and Secondary Sources (FEWS NET 2013; GFDRR 2011:3)

Figure 19, the rainy season is approximately from November to April, although there is yearly variation when the rains begin and end. The timing of the rains determines exactly when agricultural activities take place in a particular year. The dry season is divided into the cool season from May to mid-August and the hot season from mid-August to November (GFDRR 2011:3). Temperatures at different times of the year also structure the timing of daily activities to avoid the hottest periods during the day. Food production primarily occurs during the rainy season when farmers grow maize in rainfed fields (*minda*) on ridges with minimal intercropping of vegetables and legumes. The planting of maize marks the beginning of the rainy season and its harvest marks the end of the rains. Farmers grow vegetables used to make *ndiwo* in dry season gardens (*dimba*) in addition to maize.

The variability and unpredictability of rainfall poses challenges to farmers. The rains were late in 2011. November and December seemed punctured by worry, waiting, and false starts to the rains and wasted plantings. Some on the radio said they needed to return to ceremonies at rain shrines to help the rains come.⁷⁰ The government meteorologists would not offer a prediction of when the rains would begin. When I asked farmers when they thought the rains would start, they often said, “Ahh I don’t know, it’s unpredictable.”

The rains finally began in late December. Many farmers in Lilongwe Rural District spent Christmas Day planting maize interspersed with pumpkins and sometimes beans in their staple fields. By mid-January, I was struck by the landscape transformation – no longer brown and rust colored terrain, a fine layer of brown dust coating anything green, dry air, and searing sunlight. I felt as if in the rolling green hills of Ireland, as I coasted on my white and hot pink bike down the dirt road. Only this was Malawi, and instead of grass, the hills became covered with maize.

⁷⁰ Rain shrines are small huts that are part of Chewa traditional religion where people make ritual offerings to God and *mizimu* (ancestral spirits) to bring the rains (Breugel 2001:46–66).

Farmers relied on this water and captured it for their benefit, blanketing the landscape with their staple food in rows of short lime and moss green maize, spotted with forest green trees, and snaking brown paths that drew your eye through the terrain. However, all this water could be a destructive force – eroding the soil, flooding fields, flattening maize stalks, and constraining mobility by filling streams and cutting gullies of eroded soil in the land.

Land Access and Use

Malawi's land tenure system consists of customary, private, and public land (Øygaard et al. 2003:37; Milner 2005:47). Customary land lies under the authority of Traditional Authorities (TAs), which are the highest level of chief in Malawi today. The land and chief system is an invention and remnant of the British colonial Land Ordinance of 1951, which designated the three types of land tenure, and the colonial Native Authority Bill of 1933, which in part formalized indirect rule and placed chiefs in charge of land distribution (Peters and Kambewa 2007:448–450; Green 2011:149–150). TAs distribute land to group chiefs in their areas, who divide the land between resident families with varying equality. Families maintain rights over their land through matrilineal or patrilineal inheritance depending on the family and ethnic identity; however, chiefs or the government can take the land away and reallocate it. Individuals can own private land under a freehold or a leasehold title. The government uses public land that is neither customary nor private, such as forest reserves and game parks (Takane 2008:273–274).

In 2011 in the Central Region, 79% of plots were customary agricultural land and the rest were rented, purchased, or privately owned, the average plot size was 1.8 acres, and on average plots were 2.3 km from the household.⁷¹ Nationally, land holding size correlates with household

⁷¹ In the Central Region, 23.2% of plots are 0-1 acres, 37.2% of plots are 1-2 acres, 28.4% of plots are 2-4 acres, and 7.6% of plots are 4-6 acres (National Statistical Office 2012a:131).

wealth and the poor tend to have lower quality land. In many households, men and women own their own plots of land, as 30% of women and 40% of men exclusively own plots in the Central Region (National Statistical Office 2012a:132–134).

Most participants had customary agricultural land

inherited from the wife and/or husband’s parents. According to participant estimates, on average they had 2.86 acres (range 0 to 8.5 acres).⁷² On average, conventional farmers reported having more land than permaculture farmers did ($p=0.0002$).⁷³ This is in part because several permaculture farmers moved to Cluster C from elsewhere as adults in pursuit of job opportunities so they had to rent land. As shown in Table 6, 28 HH (68%) had one land ownership type (primarily inherited land), 11 HH (27%) had multiple types, and two HH (5%) had no agricultural land.⁷⁴

All conventional farmers (27 HH) cultivated fields (*minda*) on an average 1.86 field plots (range 1 to 5 plots). Seventy percent of conventional farmers (19 CF HH) cultivated a dry season garden (*dimba*) on an average of 1.26 plots, outside of villages on low-lying floodplain or marshland (*dambo*). The length of time that conventional farmers cultivated their gardens depended on the garden location, annual rainfall, and irrigation water sources.

Table 6. Agricultural Land, by Ownership Type, n=41

Agricultural Land	%, HH
Inherited only	53.7% (22)
Inherited & own	12.2% (5)
Inherited & rent	9.8% (4)
Inherited, own & rent	2.4% (1)
Own only	7.3% (3)
Own & rent	2.4% (1)
Rent only	7.3% (3)
None	4.9% (2)

⁷² Based on land size estimates provided by 31 HH. One HH was not included as an outlier because the male head was a chief and had twenty times the amount of land as the average participant.

⁷³ Wilcoxon signed rank sum test results showed a statistically significant difference between estimated agricultural land size between sample groups ($p=0.0002$, $z=-3.773$).

⁷⁴ According to Fisher’s exact test results, there was no statistically significant difference between permaculture and conventional farmer HH possession of inherited agricultural land ($p=0.08$), renting agricultural land ($p=0.383$), or owning agricultural land ($p=0.310$).

On average, permaculture farmers practiced permaculture for 3.02 years. Permaculture farmers typically used permaculture in their

Table 7. Permaculture Farmers' Use of Permaculture and Conventional Techniques by Location, PF=16

Permaculture techniques	%, HH	Conventional techniques	%, HH
Yard	88% (14)	Field	81% (13)
Field section	25% (4)	Garden	44% (7)
Garden	13% (2)	None	19% (3)

yards on previously uncultivated land (14 PF HH, 88%) (see Table 7). The permaculture farmers' application of permaculture in their yards took the common form of tropical subsistence home gardens that use mixed annual and perennial cropping, multipurpose crops, continuous cultivation, and household labor (Eyzaguirre and Linares 2004:2–4). Applying permaculture in their yards was a risk aversion strategy, because it allowed farmers to experiment with permaculture while maintaining their conventional production. The average yard size was 0.12 acres for six permaculture farmers whose yards we measured with a GPS. In addition, a few (4 PF HH, 25%) used it a section of a field, and two (2 PF HH, 13%) used it in a garden outside of villages. Only three permaculture farmers HH (19%) used permaculture in their yards for all of their farming and did not own or rent agricultural land. Most permaculture farmers (13 PF HH, 81%) continued to practice conventional farming in field(s) and nearly half (7 PF HH, 44%) in a garden.⁷⁵ As such, permaculture farmers added permaculture to their existing agricultural production instead of changing the farming practices on with their lives depend.

Agricultural Labor

Manual family labor is the primary source of agricultural labor for smallholder farmers. Women's labor has been central to farming historically, however their authority eroded during colonialism (Vaughan 1985). Men engage in agricultural production; however, they are more likely to engage in wage labor, decreasing the time and energy that they have to farm (Davison

⁷⁵ Data about permaculture farmers' conventional plots is not included in this chapter so as not to alter the conventional farming information.

1993:420). According to national census data, 94.1% of plots had female labor input and 85.2% had male input in the Central Region in 2011; however, only 42.5% of female owned plots had male labor. Nationally, wealth is associated with less female and child agricultural labor and more hired and exchange labor (National Statistical Office 2012a:136).

Participants often reported that male and female spouses equally work in fields, except in a few households in which the husbands reportedly worked more in the fields. Children helped with farm labor in some households, because some parents said that all family members have a responsibility to farm and it is imperative that children to learn to farm (see Chapter 5). Men and women also worked in gardens. However, some men said that garden production is a male job due to the commercial orientation of gardens and the physical labor required to clear marshland, which Englund also found elsewhere in the Central Region. Although, Englund notes that while men have historically been the primary cash income earners, vegetable production has only become an important source of cash income more recently (1999:154).

Household members' labor contributions to permaculture plots varied across households. Often both spouses contributed some labor. In a few households, teenage boys primarily tended the permaculture areas due to their interest in permaculture, or one spouse was predominately involved usually because they had more interest or permaculture training. Permaculture farmers did not report, nor did I observe, gender based labor divisions in permaculture production.

Conventional Agriculture versus Permaculture Practices

I used a quantitative rubric to help compare conventional and permaculture practices and determine permaculture farmers' level of permaculture practice. I based the rubric on Thornton's adopter assessment tool that was developed to assess permaculture adoption in Malawi (2008:81–82). I adapted the tool based on the content of observed trainings, the permaculture

practices participants used, and how those practices varied from conventional practices. I designed the tool to distinguish permaculture practices from locally common conventional practices, particularly since most farmers used some sustainable practices, and to assess farmers' level of permaculture practice relative to other permaculture farmers in the study. The tool does not measure the success of permaculture practices, best practices, or universally applicable practice levels. I decided on 57 items that assess farmers' intentional use of the design system, use of permaculture or agroecology farming practices, and changes to conventional farming with the intent to shift to permaculture (see Appendix A for rubric). A household received one point per item if they met the item criteria.⁷⁶

There was a statistically significant difference between the average conventional and permaculture farmers' scores ($p=0.0000$).⁷⁷ Conventional farmers used some of the same agricultural and resource management practices as permaculture farmers. Further, the design use categories fulfilled by the conventional farmers involved the conservation or improvement of the environment, channeling and catching water flow, recycling outputs in the system, and observing and considering three or more environmental factors. These overlaps point to similarities between conventional and permaculture farmers' agricultural practices, decision-making, and planning processes. Despite the similarities, there was a difference between the practices used and the extent of practices used between conventional and permaculture farmers.

⁷⁶ The scale was validated using Cronbach's alpha test, which measures the internal consistency of scales or the extent to which all items in a test or scale measure the same concept. The permaculture practice scale was found to be highly internally consistent ($\alpha=0.907$). The permaculture practice score was not correlated with physical capital, perceived assistance within their social network, household size, age of household head, or type of land ownership, showing that it does not function as a proxy measure of, or skewed by, these household characteristics and resource access.

⁷⁷ A Wilcoxon signed rank sum test showed a significant difference between the average permaculture farmer HH (mean score 36.64, $n=14$ PF HH) and conventional farmer HH (mean score 9.96, $n=24$ CF HH) scores ($p=0.0000$, $z=-5.376$).

Permaculture Practice Levels

I divided the permaculture farmers' level of permaculture practice into three groups of low, medium, and high based on their relative levels of practice.⁷⁸ I determined the levels of practice based on the distribution and clustering of the total scores and the score differences per rubric category. I used the level categories to attempt to differentiate between levels of permaculture practice based on their relative levels of practice based on the total practice score and the scores for the seven different rubric categories (see Table 8).

Eight permaculture farmer HH (57.2%) practiced permaculture at a high level compared to the other permaculture farmers (scores 40-46 on the practice rubric). Three permaculture farmer HH (21.4%) had a medium level of practice (scores 29-35), and another three permaculture farmer HH (21.4%) had a low level of practice (scores 20-26).

Table 8 shows the average points per rubric category for each level of practice. As can be seen, the high level is primarily differentiated by use of the design system and the extent to which permaculture practices were used. There are incremental differences between the three levels in use of soil and water conservation practices and pest and livestock management

Table 8. Practice Level Average Points per Rubric Category, PF=14, CF=24

Rubric categories (highest possible score per category)	High practitioner	Medium practitioner	Low practitioner	Conventional farmers
Design (13)	10.38	4	3.33	1
Extent of practice (13)	6.88	3.67	1.67	0.13
Soil & water conservation (12)	10.40	9.67	6.33	4.17
Agrobiodiversity (6)	6	6	5	1.46
Pest & livestock management (3)	2.13	1.67	1.33	0.42
Other resource use (7)	6	6	3	2
Changes to conventional (3)	1	0	1.33	0.42
Total average score (57)	43.50	32	23	9.96

⁷⁸ Two Permaculture farmer HH and three Conventional farmer HH were not scored because of incomplete data on their practices.

practices. Practices addressing agrobiodiversity were common to all levels. For the other resource use category, the difference is between the low level compared to high and medium. Changes to conventional were only seen in the high and low groups.

Several factors contributed to farmers' varying levels of permaculture practice, particularly those related to education (see Table 9). The amount of permaculture training that household members received affected the level of permaculture practice. In three-quarters of high practitioner households, one person received formal training, while the remaining quarter learned informally. Only one permaculture farmer received formal training in the medium and low levels. The practice scores were correlated with the number of permaculture learning sources (0.60, $p=0.024$), which may have facilitated learning and may reflect more access to permaculture information. The high practitioner household members, on average, learned about permaculture from more sources. For instance, in addition to informal and formal learning, over half of high practitioners had access to permaculture books. Thornton similarly found that adopters had exposure to permaculture from multiple sources (2008:53). High practitioners, on

Table 9. Permaculture Practice Level Factors, PF=14, CF=24

Adoption factors	High Practitioner	Medium Practitioner	Low Practitioner	Conventional farmers
% formal NGO training	75%	33%	33%	33%
% informal NGO training	100%	100%	67%	0%
Average # of learning sources	5	3	2.67	0.33
Average years of practice	3.75	3	1.08	0%
% inherited land	75%	33%	67%	88%
% owns land	13%	33%	33%	29%
% rents land	25%	0%	33%	21%
Highest years of education in HH	11.88	9	8.67	8.58
Highest years of education of HH head	7.75	9	7.33	5.75
Have support in community	81%	75%	67%	77%

average, practiced permaculture the longest as well, which supports the observation that farmers continued to expand practice over time. However, being a high practitioner was not dependent on the number of years of practice, particularly in comparison to the medium level.

The practice scores were also correlated with the years of education completed by the person with the highest education level in the household (0.75, $p=0.005$). A number of studies have identified schooling as an important component of farmer capacity and associated with farmer innovation (Chang 2009:493; Knight, Weir, and Woldehanna 2003:7–8). In Ethiopia, Knight, Weir, and Woldehanna found that schooling decreased farmers' risk aversion and encouraged agricultural technology adoption (2003:1–2, 19). Participants who completed more schooling may have more agricultural knowledge and more education may facilitate their ability to understand and apply permaculture practices, particularly the design system.

While farmers reported that limited land ownership (inherited or private) prevented them from expanding their permaculture practices and using it in rented fields and gardens, not all high practitioners had inherited or private land. Land size and type of ownership was not correlated with permaculture practice scores. While permaculture practice scores were not correlated with perceptions of assistance within their social network, more permaculture farmers per level incrementally reported feeling that they had support in the community, which may help them to feel comfortable taking the risk to do something different or to tolerate the gossip or mocking that can come with trying permaculture. Other factors, such as age of household heads, physical capital, household size, and employment did not correlate with permaculture practice scores.

The differences between the practices permaculture and conventional farmers used demonstrate that permaculture farmers were able to change their agricultural practices and use

the permaculture design system. In the following sections, I compare the agricultural practices that conventional and permaculture farmers used that addressed soil and water conservation, agrobiodiversity, and energy and material inputs. Note that in this chapter, I only discuss permaculture farmers' permaculture practices and not their use of conventional practices on conventional plots so as not to alter the conventional farming data and because permaculture farmers viewed permaculture as different from conventional agriculture.

Soil and Water Conservation

Conventional and permaculture farmers used many of the same practices that conserved the soil and water, as shown in Table 10. However, a higher portion of permaculture farmers used the soil and water conservation practices than conventional farmers, and conventional farmers applied some of the practices less intensively.

Permaculture and conventional farmers differed in the practices they used to prepare land for planting. When clearing the soil of crop debris and organic matter, just under half of conventional farmers (11 HH, 46%) did not burn the organic matter and tilled it into the soil, which is consistent with Bezner Kerr et al.'s findings (2007:451). In comparison, no permaculture farmers burned organic matter and instead kept organic matter for mulch and/or compost. While burning crop residue reduces the labor of clearing land and can add potassium to the soil and kill pests and crop diseases, it also can reduce soil microbial activity and biomass and worsen local air quality (Smil 1999:306; Bot and Benites 2005:12, 15, 17).

All of the conventional farmers made new ridges annually in fields and new beds in gardens to prepare for planting (see Figure 20). Ridges are labor intensive to construct and typically took conventional farmers one to four months to complete depending on the size of the land and the availability and pace of labor. Just over two-thirds of conventional farmers (17 CF



Figure 20. Field with Maize Growing on Ridges During the Rainy Season with a Few Pumpkins Intercropped (left), and Dry Season Garden Planted with a Few Types of Vegetables in Long Raised Beds (right)

HH, 68%) either left organic matter in the field to decompose, or typically piled organic matter like dried maize stalks and weeds in lines in the old paths and used a hoe to manually form the ridges over the organic matter.

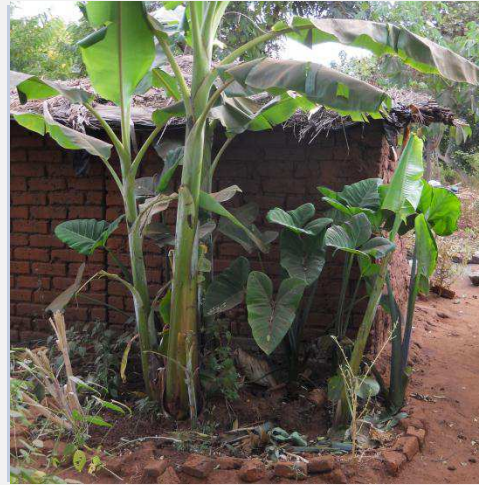
As a conventional farmer simply stated, maize grows better in ridges. Several conventional farmers explained that they construct ridges to make the soil soft and fresh so the maize roots can penetrate the soil and grow well. In addition, a tall, 48-year-old village chief explained that “It is like we’re changing [the ridges], that here we planted and the nutrients are finished, the maize we planted here is finished, so we want to make another [ridge]. That’s why we take manure and put and bring the other soil, so that the maize we are to plant here should be eating the manure we’ve put.”⁷⁹ Another farmer explained that ridges reduce the speed of water so the soil does not wash away and the water sinks into the soil.

⁷⁹ We conducted this interview in Chichewa in Cluster B on April 24, 2012.

Dish drying rack constructed with living tree poles. Excess water dripped onto plants below.



Crops growing in bed behind bath house to catch grey water.



Permanent beds with several crops intercropped including maize, cassava, and sweet potatoes.



Permanent beds surrounding a house, planted with crops like pumpkin, beans, lemon grass, and amaranth.



Figure 21. Examples of Permaculture Practices Used by Permaculture Farmers in Yards

Rather than constructing ridges, most permaculture farmers (12 HH, 86%) initially made permanent low- or no-till beds when implementing permaculture on a piece of land or redesigning an area (see examples in Figure 21). The planning, labor, and resource input was front loaded for permanent beds, because permaculture farmers intended to leave them for years. Permaculture farmers usually only spent a few days to a week making beds and preparing land for planting, because they primarily used permaculture on very small pieces of land. A few



Figure 22. Practices in Permaculture Farmer Yards: Tippy Tap Over Bed Intercropped Bed in Foreground (left); Banana Circle with Compost Pit in the Middle (right)

permaculture farmers constructed permanent beds on larger pieces of land in gardens and fields, which they said was initially time consuming, however, using beds helps to maximize land use and reduces labor in future years compared to ridging. Reduced- and no-till systems are typical components of sustainable agriculture, which several studies show help prevent soil erosion and degradation, encourage soil microbial diversity and activity, sequester carbon, and increase soil organic matter (Friedrich and Kassam 2012; Buck et al. 2004:35–36, 97; Zimmerer 2010:149).

Over two-thirds of permaculture farmers (10 PF HH, 71%) used one or more techniques to channel and catch water flow for agricultural use compared to a minority of conventional farmers (3 CF HH, 13%). These techniques included strategically placing and shaping garden beds and making swales⁸⁰ to slow and catch water flow.

More permaculture farmers applied organic inputs than conventional farmers did during land preparation to improve soil fertility. Just over half of conventional farmers applied animal manure (14 CF HH, 58%), most commonly in gardens, and a minority applied compost (2 CF HH, 8%). Manure application may be more common in gardens because gardens tend to be smaller than fields, so it is more feasible to transport manure and access enough manure for a

⁸⁰ A swale, or contour bund, is the combination of a ditch and mound(s) dug on contour with the land.

garden. In comparison, all but one permaculture farmer applied animal manure and/or compost to beds (13 PF HH, 93%), with ten permaculture farmer HH (71%) using manure and 12 permaculture farmer HH (86%) using compost. Most conventional and permaculture farmers used manure from their own livestock, although most farmers had limited access to livestock and therefore to manure.⁸¹ Those who used compost made it in piles with locally available material like kitchen scraps, leaves, and crop debris (see Figure 22). Compost and animal manure can be an effective alternative to synthetic fertilizers and can provide additional benefits, such as improving soil quality and moisture retention and lowering fossil energy inputs (IFOAM 2009:8–10; Pimentel et al. 2005). However, yields can be lower under organic production in the first few years after switching from conventional to organic inputs (Seufert, Ramankutty, and Foley 2012; Pimentel et al. 2005:575). A few permaculture farmers also applied human manure from composting latrines (4 PF HH, 29%), which is an ecological sanitation technique to recycle nutrients and help prevent sanitation and hygiene-associated illness by keeping pathogens from entering the immediate environment and groundwater (WHO 2006:4–5, 7; WaterAid 2011, 2–4).

All fields were rainfed, but farmers irrigated conventional gardens and permaculture yard and garden production. Farmers primarily irrigated during the dry season with cups or watering cans at least once or twice a week. Due to the differing location of plots, permaculture farmers used water from a borehole or well for yard cultivation, while most conventional farmers irrigated using water from hand-dug wells in their gardens or from a river. Most permaculture farmers (13 PF HH, 93%) also irrigated yards with greywater (wastewater from bathing, washing dishes, etc.), compared to a few conventional farmers (4 CF HH, 17%). Safe greywater use can

⁸¹ Nearly the same portion of conventional (73%, 19 CF HH) and permaculture farmers (72%, 13 CF HH) owned livestock, with households overall owning chickens most commonly (average 8.23 chickens), followed by goats (average 5.2 goats) and pigs (average 5.5 pigs).

Table 10. Core Permaculture Practices Used by Permaculture and Conventional Farmers by Primary Function, PF=14, CF=24

Soil & Water Conservation	PF (% , HH)	CF (% , HH)	Agro-biodiversity	PF (% , HH)	CF (% , HH)	Resource Use	PF (% , HH)	CF (% , HH)
No burning of organic matter	100% (14)	46% (11)	Grew perennials (non-tree)	100% (14)	63% (15)	Used local seed(s)	100% (14)	92% (22)
No-till weeding by hand	100% (14)	54% (13)	Intercropped	100% (14)	79% (19)	Makes compost	93% (13)	8% (2)
Irrigated with greywater	93% (13)	17% (4)	Left crop(s) that self-germinated	100% (14)	92% (22)	Organic inputs only	86% (12)	25% (6)
Applies compost	86% (12)	8% (2)	Cultivation during all seasons	93% (13)	42% (10)	Saved seed(s)	86% (12)	83% (20)
Mulched	86% (12)	8% (2)	Planted tree(s)	93% (13)	63% (15)	Created multifunctional design	71% (10)	8% (2)
Permanent low- or no-till beds	86% (12)	0% (0)	Grew crop(s) that deter pests	71% (10)	0% (0)	Used shared or traded seed(s)	71% (10)	58% (14)
Grew nitrogen fixing tree(s)	79% (11)	54% (13)						
Grew plant(s) to increase soil fertility	79% (11)	33% (8)						
Animal manure	71% (10)	58% (14)						
Channel & catch water flow	71% (10)	13% (3)						

help prevent water-related diseases, is available year-round, and reduces pressure on freshwater resources (WHO 2006:4–5, 8).

Weeding was labor intensive in conventional field production, as farmers typically removed weeds and used a hoe to enlarge the ridges over the weeds (called banding). In both conventional gardens and permaculture production, farmers weeded by hand as needed, rather than tilling the soil. Many permaculture farmers (12 PF HH, 86%) mitigated weed growth by mulching beds, which is supported by some studies (Buck et al. 2004:77, 90, 94; Alletto et al. 2010), compared to two conventional farmers HH (8%) (see Figure 22).

In addition, a larger portion of permaculture farmers grew leguminous, nitrogen-fixing trees (11 PF HH, 79%) compared to conventional farmers (13 CF HH, 54%). On average, the permaculture farmers grew marginally more varieties of leguminous trees (1.43) than conventional farmers (0.58) ($p=0.0006$).⁸² Planting nitrogen-fixing trees in a field or garden can improve soil fertility, help to retain water in the soil and prevent soil erosion, and provide firewood and building material (Beedy et al. 2012; Akinnifesi et al. 2010).

Most conventional and permaculture farmers grew legumes, but permaculture farmers grew more legume varieties (5.14) than conventional farmers (1.96) ($p=0.0000$). Over two-thirds of permaculture farmers reported growing plants in order to increase soil fertility (11 PF HH, 79%), compared to a third of conventional farmers (8 CF HH, 33%).⁸³ The fact that more permaculture farmers' reported growing plants to increase soil fertility than conventional farmers suggests a difference in decision-making and perhaps knowledge about the nitrogen-fixing properties of plants given that the same portion of conventional and permaculture farmers grew

⁸² Wilcoxon signed rank sum test showed a statistically significant difference between the average number of leguminous tree varieties grown by permaculture and conventional farmer HH ($p=0.0006$, $z=-3.448$).

⁸³ Wilcoxon signed rank sum test showed a statistically significant difference between the average number of legumes varieties grown by permaculture and conventional farmer HH ($p=0.0000$, $z=-5.216$).

legumes and just over half of conventional farmers grew leguminous trees. Other studies have found that the integration of legumes into cropping systems in Malawi can improve soil fertility and help produce a surplus for sale (Kamanga et al. 2009; Bezner Kerr and Chirwa 2004:446–447, 449; Snapp et al. 2002:164, 166–167, 170–171).

Agrobiodiversity

Farmers considered a number of factors when making decisions about what crops to grow. As others like Gladwin have found (1980:51), in consciously choosing between the feasible crop options, farmers often first evaluated physical and environmental factors like land size, rainfall, and soil fertility. Then, farmers determined which crops they could successfully grow based on their available resources and crops' agronomic, functional, and gastronomic characteristics, and market demand and value. Farmers reported that their knowledge about crops and access to seeds constrained their crop choices. For example, Agogo Chisale explained she did not know how to go about planting different crops, so she just stays and plants what she knows. Food access and preferences were important factors in deciding what crops to grow. For example, to decide if to plant crops in the field or garden, Abambo Katambala said, "We see how the weather is. Yeah, that this time is suitable to start planting these, these crops. When the rains have just started it's when we plant maize, tobacco, groundnuts, soya—we first see what helps us quickly like maize. We know we will have enough food so we first see that we should plant this."⁸⁴ Amayi Chalimba highlighted the relationship between staple production, food choices, and crop and food knowledge when she said that she makes nsima out of maize only because they do not know how to grow other staple crops. A few crops, like okra and amaranth in particular, germinate on their own and farmers may choose to leave them to grow.

⁸⁴ We conducted this interview in Chichewa in Cluster C on April 24, 2012.

In half of households, participants reported that gender shaped crop decisions based on gendered divisions of food responsibilities, access to and control of money, seed cost, crop value, and household composition. In 13 HH (37%) the wife and husband made crop decisions together, in 12 HH (34%) they made decisions about different types of crops, and in six HH (17%) the husband primarily or solely decided. In the seven HH (20%) women primarily decided, because they were widows, divorced, or their husband was away working in South Africa. In households where spouses divided crop decisions, men generally decided on staple crops like maize, cash crops like tobacco, and seeds that must be purchased like hybrid maize. Women decided on crops planted with saved seeds and ndiwo foods like legumes, greens, and pumpkins.

Abambo Katambala explained, “We discuss with [my wife] and myself.”

“Is there anything that you decide by yourself and anything that she decides by herself?” I asked.

“Yes, there is, yes!” he responded. “Like I’ve said that let’s plant tobacco here, then [my wife] say says do let’s do groundnuts. Yes, there is, yeah, like planting pumpkins, relish.... because she knows the difficulty of relish so quickly since she cooks relish.”

He continued talking about growing soya. “Myself, I see when we [grow soya]”

“It gives us money,” interjected Abambo’s friend who was sitting with us.

“It gives us money,” repeated Abambo. “But also as a body strengthening food.... Soya protects some other things like bringing healthy bodies like in children... because it has oil.”⁸⁵

A few farmers get advice from outside of their family on crop choices, like Abambo Banda who said that he consults a friend who is an agriculture extension officer who advises him about different seeds like Pannar and Seed Co. seeds. Farmers’ knowledge of crops influences what they choose to plant as well.

⁸⁵ We conducted this interview in Chichewa in Cluster C on April 24, 2012.

In field production, conventional farmers typically said that they were primarily concerned with growing enough maize to last for the year. For garden production, a number of conventional farmers said that making money from selling garden crops was an important goal. Almost half of conventional farmers with gardens purchased farming inputs primarily using revenue from garden crop sales.

Permaculture farmers considered the above criteria when making crop selections, but included other factors as well. Some permaculture farmers chose different types of crops to stagger harvests. As one woman said, “There is a need to plant more because while I am harvesting these crops I should have other crops growing.” Permaculture farmers discussed choosing crops that were appropriate for specific spaces within land parcels depending on land use and quality, water access, and crop agronomic characteristics. Further, some permaculture farmers said that they chose crops to serve different functions like adding soil fertility or aerating the soil when designing permaculture plant guilds.

Research participants grew crops that were consistent with crop cultivation trends in Malawi. In a farming questionnaire, we asked farmers to list the crops that they grew. The conventional farmers grew an average of 5.33 crop varieties in their fields (range of 3 to 8 crops) and an average of 8.6 crop varieties in their gardens (range of 4 to 14 crop varieties). In comparison, permaculture farmers grew an average of 31.86 crops (range of 15 to 49 crops varieties) in their permaculture yards and/or gardens. Farmers may have underestimated the number of crops grown, particularly for the permaculture farmers growing dozens of varieties. Despite the wealth of indigenous African crops, few of the crops commonly grown by farmers (see Table 11) are of African origin (Carney and Rosomoff 2009), reflecting the Mesoamerican origin of Malawi’s main crops (McCann 2005:166).

Table 11. Crops Grown by $\geq 50\%$ Permaculture Farmers vs. Conventional Farmers by Location and Type, PF=14, CF=24

Agricultural system & location	Grains	Tubers	Legumes	Vegetables	Fruits	Other
Permaculture production (yards, gardens, and fields)	Hybrid maize	Air potato Cassava Coco yam Sweet potato Yam	Bean Lima bean Pigeon pea Soya Sunflower	Amaranth Blackjack Hibiscus Hot pepper Mustard greens Okra Pumpkin Tomato	Banana Guava Mango Mexican apple Orange Papaya	
Conventional fields	Hybrid maize		Groundnuts	Pumpkin		
Conventional gardens	Hybrid maize	Sweet potato		Mustard greens Pumpkin Rape Tomato	Banana Guava Mango	Sugar cane

While permaculture farmers grew more diverse crops than conventional farmers did, all participant farmers grew maize and half grew hybrid maize (see Table 11). Permaculture farmers largely remained dependent on maize as they cultivated it in permaculture production and primarily retained conventional plots. Some participants reported growing maize to the exclusion of other crops even while standing in their field among other crops, which speaks to the central, commonsense place of maize in field production. Farmers relayed that they grew hybrid maize, because it has higher yields and particularly because it matures faster than local maize so it will mature despite changing rainfall patterns and shorter growing seasons.

Today, hybrid maize production is encouraged by transnational agribusinesses and the government. Often small retail shops owned by companies like Seed Co. and Pannar sell little else than hybrid maize. The government also encourages hybrid maize production, particularly with the Farm Input Subsidy Programme (FISP) coupon package. Indeed, one study found that FISP increased the amount of land planted with maize (Chibwana and Fisher 2011:3). This corresponds to an increase in the portion of those getting a very high share of food from maize in

the Northern and Central Regions since 2004. In the Central Region, 57% of the population got 75% of caloric energy from staples in 2012 compared to 43% in 2004 (WFP 2012:13).

Farmers reported that they still grew local maize because the seeds are free, it does not need a lot of fertilizer to do well, and it tastes sweeter when it is fresh than hybrid maize. In addition, local flint maize has a harder kernel than hybrid dent maize, so it is not easily eaten by weevils, does not lose as much of the kernel when the bran is separated, and does not require as much flour to make nsima as when using flour from hybrid maize. As a result, participants often sold hybrid maize first and kept local maize for consumption. One permaculture farmer described how he used to like hybrid seeds, before learning about permaculture. They could throw away the local seeds he said, and use what the azungu (European/white people) came with. Through permaculture, they learned their local seeds are very good, he said. Abambo Tembo said that they call hybrid maize seeds cha chizungu (of European/white people). While maize itself became normalized as the staple crop in Malawi, participant farmers identified hybrid maize as coming from outside of Malawi.

In addition to variation in farmers' decision-making, cultivation during all seasons and intercropping helped permaculture farmers grow more crops varieties. As shown in Table 10,



Figure 23. Maize as Far as the Eye Can See Near Cluster A

almost all permaculture farmers (13 PF HH, 93%) cultivated crops during all seasons, compared to fewer than half of conventional farmers (10 CF HH, 42%) (see Chapter 8 on impacts). While a majority of conventional farmers

intercropped (19 CF HH, 79%), most often in fields, on average they only intercropped 2.37 crop varieties in fields and 3.13 crop varieties in gardens. Intercropping was limited because some farmers thought that crops could not do well if they were intercropped or densely intercropped, some farmers lacked seeds to intercrop, and others thought that they did not have enough information on how to intercrop successfully.

All permaculture farmers intercropped and reported intercropping more densely than before adopting permaculture. The number of crops in each bed varied, but many permaculture farmers intercropped upwards of five crops per bed.

Permaculture farmers further supported agrobiodiversity by choosing to grow crops with the aim of increasing multi-functionality and efficiency. For instance, most permaculture farmers (13 PF HH, 93%) planted trees compared to 63% of conventional farmers (15 CF HH). The permaculture farmers also planted three times more tree varieties (6.36 varieties) than conventional farmers (2.08 varieties) ($p=0.0000$).⁸⁶ In addition, all permaculture farmers grew perennial crops other than trees, such as cassava, pigeon peas, and lima beans, at an average of 9.07 perennials, compared to 63% of conventional farmers (15 CF HH) who grew an average of one non-tree perennial ($p=0.0000$).⁸⁷ Perennial plants grow for many years, store carbon in vegetation and the soil, and when combined with annual crops can strengthen the eco-functionality and productivity of farming systems (IFOAM 2009:11). For example, Abambo Chalimba explained how to apply mixed perennial cropping in a field, as he was doing in a section of his field as part of his plan to transition the whole field to permaculture. “In a person’s

⁸⁶ Hansen et al. found that marriage patterns may influence tree planting, because men who move to their wife’s village lose land rights in the case of spousal death or divorce so men may be disinclined to plant trees on his wife’s family’s land (2005).

⁸⁷ Wilcoxon signed rank sum test showed a statistically significant difference between the average number of tree varieties planted ($p=0.0000$, $z=-4.923$) and average number of non-tree perennial crops varieties grown ($p=0.0000$, $z=-5.095$) by permaculture and conventional farmers.

field one makes a swale to keep water. In the swale, there are trees to hold the soil. Food trees, natural trees. Inside the field, there should be some different plants. But it should be edible. For example there can be papaws, there can be pigeon peas, there can be sunflower, oranges, different crops,” he said.⁸⁸

Permaculture farmers left more crops to grow on their own at an average of four; compared to an average of 2.67 for conventional farmers ($p=0.0000$). Allowing crops to grow that germinated on their own took advantage of natural systems and did not require accessing or planting seeds such as leguminous trees and amaranth. Over two-thirds of permaculture farmers (10 PF HH, 71%) grew plants to deter pests (average of 2.5 plants) like lemongrass and marigolds, while no conventional farmers did so, often not knowing which plants have pesticidal properties ($p=0.0455$).⁸⁹ Growing toxic and insect repellent plants has been documented as a traditional, non-toxic, low-cost traditional management alternative to pesticides that some farmers in Malawi and Zambia use (Nyirenda et al. 2011).

Input Use and Farm Economics

The permaculture and conventional farmers applied different types of agricultural inputs and used resources differently. Farmers purchased fertilizer and seeds from markets, private distributors, or ADMARC. Farmers reported that at times it was difficult to access inputs in a timely manner due to time and labor constraints and because depots often ran out of inputs at the beginning of the rainy season. In conventional fields, over two-thirds of conventional farmers (19 CF HH, 73%) applied synthetic fertilizer in their fields to increase production, and the remaining conventional farmers did not apply fertilizer because they could not afford to purchase

⁸⁸ We conducted this interview in Chichewa in Cluster B on May 18, 2012.

⁸⁹ Wilcoxon signed rank sum test results were statistically significant between the average number of crops varieties left to grow ($p=0.0000$, $z=-5.357$), and growing plants to deter pests ($p=0.0455$, $z=2.00$) by PFs and CFs.

it. Slightly over a quarter of farmers applied fertilizer (one type or a mix) only once in January because they could not afford enough fertilizer for two applications, while nearly three-quarters applied fertilizer twice. Of those who used fertilizer, on average, they reported applying 145kg of fertilizer (i.e. Calcium Ammonium Nitrate (CAN), 23:21:0, or 21:60:0 (Chitowe)) in their fields (approximately 38kg/acre⁹⁰).⁹¹ In conventional gardens, over-two thirds of conventional farmers (14 CF HH, 78%) also applied fertilizer, at a reported average of 54kg. It is important to note that not all farmers knew how much fertilizer they used so these may be an over or underestimates of fertilizer use. One permaculture farmer HH (7%) applied fertilizer in their permaculture plot.

In conventional fields, no conventional farmers used herbicides or pesticides. In fields, they primarily left pests like termites alone even if they were a problem, because farmers often said that they did not know what to do about the pests or could not afford pesticides. However, in gardens, just over half of conventional farmers (10 CF HH, 59%) applied small quantities of synthetic pesticides. Pesticide use may be more common in gardens because some farmers reported having more problems with pests on garden crops, such as tomatoes and cabbages, than on field crops. Many farmers said that money was a constraint to buying pesticides. One permaculture farmer HH (7%) used pesticide in their garden (not the same farmer who used fertilizer).

Overall, most permaculture farmers used all organic inputs (12 PF HH, 86%) in permaculture production by choice, compared to a quarter of conventional farmers (6 CF HH, 25%) who used all organic inputs because they could not afford synthetic inputs. This difference

⁹⁰ This is based on data from 12 HH that provided field size estimates and quantities of fertilizer use.

⁹¹ These figures are above the national average application of 17kg/acre, but well below the government recommended application level of 65kg/acre (MAFS 2007:5).

affected the amount of money that conventional and permaculture farmers spent on agricultural inputs and has implications for their market dependence.

Farmers purchased seeds from friends, market vendors, ADMARC, and agribusinesses. All conventional farmers (26 CF HH, 100%) and all but one permaculture farmer (15 PF HH, 94%) bought some seed. Agogo Chisale said that farmers started to buy seeds during Kamuzu's rule "because people had means to find money and find seeds. But long ago, they kept for themselves... in the colonial times, parents used to keep" seeds. Most participant farmers planted both local⁹² and hybrid seeds. However, permaculture farmers planted more local seeds as a proportion of total seeds planted (average of 61% local seeds) compared to conventional farmers (average of 54% local seeds) ($p=0.0099$).⁹³ All permaculture farmers used some saved seeds (average of 11.77) compared to 83% of conventional farmers (20 CF HH) (average of 3.43). More permaculture farmers used seeds that they received through a gift, sharing, or trading (11 PF HH, 79%) at average of 12.9 seed types than conventional farmers (14 CF HH, 58%) at an average of 1.5 seed types. The only material resources given to permaculture farmers by Ulimi and Everlasting Harvest were surplus seeds and nursery plants such as non-maize staples, medicinal plants, and uncommon vegetables and fruits.

Conventional farmers' primary seed purchases were hybrid maize seed. In 2006/07, census data found that in Lilongwe Rural, 64% of households bought hybrid maize seed and 25% bought local maize seed (National Statistical Office 2010:33). Households often purchased hybrid seeds if they could afford to, although they often saved and grew hybrid seeds for multiple seasons with diminishing yields. Farmers often saved local from the previous harvest.

⁹² Farmers do not necessarily mean indigenous when they say local seeds, rather it often means that local farmers control the seed source (Heisey and Smale 1995).

⁹³ Wilcoxon signed rank sum test results were statistically significant between the average proportion of local seeds used by permaculture ($p=0.0099$, $z=-2.580$).

The use of hybrid maize seed has increased with FISP and from promotion and advertising from the seed sector, reaching 45% of maize cultivated area (IFPRI 2013b:2; Chinsinga 2011b:60).

Resource use also varied in that most permaculture farmers (13 PF HH, 93%) made compost out of food waste, crop debris, and excess organic matter, compared to only two conventional farmers HH (8%). Over two-thirds of permaculture farmers (10 PF HH, 71%) also tried to capitalize on available resources by creating multifunctional designs, compared to two conventional farmers HH (8%). Multifunctional designs included creating beds behind bath houses to grow food, using and managing greywater, or constructing a swale on contour with the land planted with diverse crops to slow and catch water, prevent erosion, and grow food (see examples in Figure 20).

Gender relations influenced conventional agricultural input purchasing decisions. In just under half of permaculture and conventional households (11 HH, 42%), the wife and husband discussed fertilizer purchases before making a decision, however a few women said that while they discuss it with their husband, they never disagree with their husband. In just over a third of households (9 HH, 35%) the husband decided about input purchases on his own because he was seen as the head of the household as the man or he earned the most money in the household, among other reasons. As with planting decisions, the only women (7 HH, 27%) who made input decisions on their own were widows, divorced, or their husbands were working in South Africa. Bezner Kerr contends that men almost always make fertilizer purchasing decisions (2005a:71) and are more likely to control new technological inputs in Malawi given pervasive gender inequality (2012:224).

The amount of money that farmers invested in and made from farming varied. The following input costs do not control for land size and may include reporting errors since most

farmers do not keep financial records.⁹⁴ Including hired labor costs, conventional farmers spent an average of MK 27,000 (\$172) on farming input costs in one year, including both field and garden expenses (range of MK 160 (\$1.20) to MK 139,000 (\$885)).⁹⁵ As shown in Figure 24, the primary expense was fertilizer (purchased by 19 CF HH, 76%), followed by hired labor (purchased by 9 CF HH, 36%), seeds (purchased by 23 CF HH, 92%), and other costs like pesticides, herbicides, and transporting manure (purchased by 8 CF HH, 32%).⁹⁶

Fertilizer costs varied depending on the fertilizer type, the time and location of purchase, and if the farmer purchased it using a FISP coupon. As in the district as a whole (National Statistical Office 2012b:120), about one third of conventional farmers 2011/2012 received a coupon from FISP, however all but one got either fertilizer or seeds instead of the full subsidy package.⁹⁷ Farmers purchased most fertilizer and seeds at the average market price of MK 6,800 (\$43) per 50 kg bag of fertilizer and MK 2,000 (\$13) for 5 kg hybrid maize.

⁹⁴ For participants who reported the quantity of inputs purchased but could not remember the price, I used the average reported input prices in the expense calculations.

⁹⁵ These expenses are similar to 2007 national average per capita expenditure of \$122 for small-scale (<1.85 acres) farms and \$130 for medium-scale farms (1.85-7.4 acres), particularly since input costs have risen since then (Diao et al. 2012:249–250).

⁹⁶ On average, conventional farmers spent more on field inputs (MK 23,000 (\$146)) than garden inputs (MK 6,000 (\$38)), although farmers spent similar portion on input types for field and garden cultivation. Based on data from 18 conventional farmers HH (72%) who gave field size estimates, total field input costs were approximately MK 7,800 (\$50) per acre. Not enough farmers gave garden size estimates to make a similar estimate of garden costs per acre.

⁹⁷ Under the FISP, a 50 kg bag of fertilizer was MK 500 (\$3.18), and 5 kg of hybrid or OPV maize seeds were either free or MK 100 (\$0.64) which represents over a 90% subsidy based on the input prices reported by farmers. Legume seeds were free using the coupons when they were available. The full subsidy package is two fertilizer coupons for 50 kg of two types of fertilizer, and one seed coupon for 5 kg of hybrid or OPV maize, soya, or groundnut seeds. However, most did not get the full package in part because the FISP budget was cut in 2011 due to an economic crisis and foreign aid suspension (MAFS 2009:6; IRIN 2011).

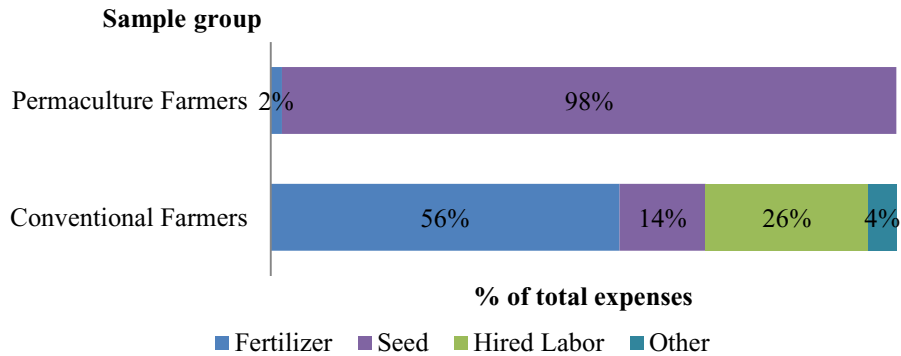


Figure 24. Distribution of Average Annual Input Expenses for Permaculture versus Conventional Farmers, PF=14, CF=25

Farmers could not always remember how much they spent on agricultural inputs, earned from crop sales, or the quantities of crops sold. The 21 conventional farmer HH that reported crop revenue and input data made an average profit of MK 12,000 (\$76) in 2011 (approximately MK 3,000 (\$19) per acre⁹⁸), with considerable variation (range of MK -107,000 (-\$682) to MK 288,000 (\$1,834)).⁹⁹

Permaculture farmers spent an average of MK 1,700 (\$11) on farming inputs for permaculture production in one year (range of MK 0 to MK 12,000 (\$76)). The low input cost was in part because permaculture yard gardens were often an eighth of an acre or smaller. One low practitioner permaculture farmers who had recently implemented permaculture spent over twice the amount on inputs as the rest of the permaculture farmers. The input cost allocation was different as the permaculture farmers almost entirely spend money buying seeds, unlike the conventional farmers for whom fertilizer was the largest input expense (see Figure 24).

Permaculture farmers did not hire labor for their permaculture gardens because of their small size

⁹⁸ Based on 16 conventional farmer HH that provided land size estimates, input costs, and crop revenue.

⁹⁹ For participants who could not remember the selling price of crops, but provided quantities sold, average reported prices were used in revenue calculation.

and the labor demands were more spread out over the year and required different knowledge than conventional farming. Permaculture farmers did not report gendered seed purchases.

Permaculture Farmers' Use of Design System

Farmers used the design system to varying degrees based on their knowledge of the system, of permaculture practices, and available resources. To implement, maintain, and adapt small-scale permaculture systems, farmers had to understand how different elements of the environment are interdependent, how that affects their farming, and how their livelihoods and farming practices are interrelated. All participant farmers engaged in some systems thinking, as farming necessarily involves some level of systems thinking (Snapp and Pound 2008:28). Conventional farmers often considered environmental and livelihood factors, however their agricultural planning focused on obtaining fertilizer and seeds. Without having to purchase fertilizer in particular, permaculture farmers could focus plans on other aspects of their farming design and system.

Permaculture design often begins with observing and considering the environmental factors that impact farming like weather, topography, and soil characteristics. Then, design typically involves thought and creativity to analyze one's context and resources and then determine how to best farm given their situation. A key part of permaculture design is analysis of the relationships between different elements in a system and characteristics analysis to determine how to use available resources most efficiently and effectively. While most permaculture farmers discussed permaculture design in terms of planning as they did when discussing conventional farming activities, a few who were exposed to English permaculture books primarily, referred to it as madesign. The permaculture farmers typically demonstrated applying more systems thinking than conventional farmers, although the degree to which permaculture farmers used

systems thinking and analysis varied and was reflected in the extent to which they used the design system. Figure 25 shows the common permaculture design principles and design tools that the permaculture farmers applied. Resource recycling within the system was the only principle applied by all permaculture farmers. Over 60% of permaculture farmers aimed to conserve or improve the environment using permaculture practices, put plants in the right place, channeled and caught water flow, observed and considered multiple environmental factors, and created a multifunctional design. Fifty percent of permaculture farmers used guild and zone design tools.

All but one permaculture farmer who received formal training scored the highest in using the design system on the practice rubric. Josephy, a teenager in Cluster C, was the only person with a high design score who did not have formal training. Josephy read permaculture books and learned from Bauleni Mvula as a friend through chatting, observation, and informal learning.

I asked Josephy, “How do you use the permaculture design system when making a plan

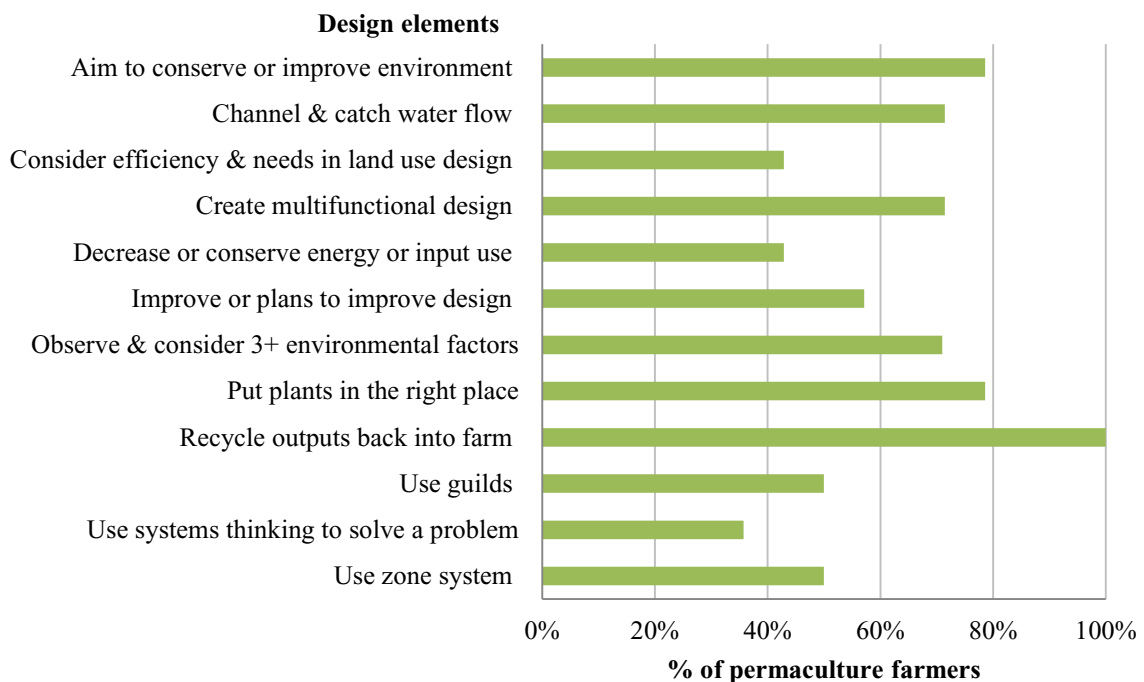


Figure 25. Design Elements Used, PF=14

for your garden?”

“We can say that before we start permaculture, we see first the sector license or what comes to the plot like the sun, wind, water flow, slope or highland. We check such things,” he explained, referring to sector analysis.

“Yes, so after observing, it’s when you start your design. Before you start your design, you first draw the map and then draw the design.”

“How do you use zones and guilds?” I inquired, since I knew he learned about them from reading permaculture books and talking with Bauleni.

“This guild we can say it’s like a bed, so we can put a guild in a zone. So there are things to put in the guild, like there can be a supporter, groundcover, climber, digger, then we know this is a complete guild,” he said.

The point of this, he explained, is “We make sure to put plants in right places. Not just putting anywhere like here the grass can grow and surpass the house. So it can’t be good. But everything in the right place. That’s why in permaculture we talk of zones, zone one, zone two, zone three, up to zone five.”

In comparison to forests, he added, “You can’t put the unnecessary bush like that one, but you put [plants] that will help.”

He continued, “In permaculture we don’t plant... at one time, they’ll be ready at one time, no. But we do things in a stacking mode right.... So that way you find the garden still looking green at all times. In all seasons of the year you get a certain benefit, you find food, you find medicine,” he observed.¹⁰⁰

For example, Josephy designed a garden bed behind his and his neighbor’s bathhouses that he planted using the guild guidelines, to redirect the greywater away from the adjacent open

¹⁰⁰ We conducted this interview in Chichewa in Cluster C on February 7, 2012.

well to improve the safety of their drinking water (see Figure 26). He said that they stopped having stomach problems after he implemented the design.

Josephy applied central permaculture design principles despite not having attended classes or trainings in permaculture. In his case, his friendship and guidance from Bauleni Mvula was his primary source of permaculture education. Further, with Bauleni and a few friends in the village, including one teenage boy whose

household was part of the study, they had a club

where they worked together to crochet items out of salvaged plastic bags and bought chickens to raise for egg sales. Amayi Mvula worked on crocheting with them, frequently looping plastic strips with a crocheting needle to make a rug or blanket. Towards the end of the study, when Bauleni was hired by Ulimi, Josephy, along with a few other teenage boys from their village, stayed with Bauleni at Ulimi some weekends to further their hands-on education of permaculture.

Abambo Phiri's household also had a high design score. Abambo Phiri had formal training in permaculture while working for NICCO on a permaculture project they had. The project is no longer running and so he does not work for them anymore. He continued his practice of permaculture after that time and remains committed to using permaculture.

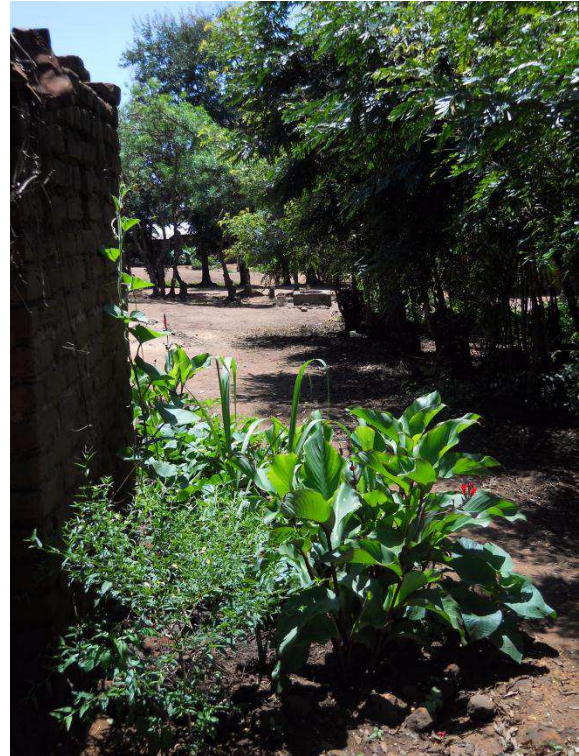


Figure 26. Bed Josephy Constructed Behind Bath Houses (foreground) to Keep Water Out of Open Well (background)

We sat with Abambo Phiri on the narrow split tree trunk benches that lined the small, square shaded structure he built using live cassava trees as the corner poles. This was one of their multifunctional designs as the cassava trees acted as support poles, its leaves provided food and shade, and plastic bottles that he cut in half and hung on the sides of the structure provided a place for their chickens to perch and drink water. Like a few other permaculture farmers in the village, on one side of the structure they constructed a dish rack, again using the cassava tree trunks as support poles. A bed was mulched with dry maize husks and water dripped from the dishes onto plants growing below like amaranth, beans, and air potato that climbed up the cassava tree. In his explanations to me about the design system, he showed how people could focus on different aspects of the design system given its flexibility and somewhat vague principles (see Figure 27).

Rephrasing a question about how he uses the design system, Chisomo asked, “The designs we learn in permaculture, you have done that right? How do you use them?”

“Oh, the designs the fact that we already made them when we were starting yes. So... to us it’s just planting, pouring manure then weeding, eehe.”

“What makes them permanent?” I asked, as Abambo Phiri often referred to the permanence of his designs.

“Those guilds,” he responded. “That is how we learned, that we are not allowed to keep digging, changing those designs. If we have made a design it should be permanent.”

“Why should they be permanent?” I asked.

“That’s how we learned, that permaculture says that it hates digging the soil because it’s like you are making it exposed to direct sunlight. Therefore—micro-organism which are alive, which makes ehh, they also do breathe, so when they breathe, it helps that the soil should stay

alive. Therefore we keep saying that when we expose the micro-organisms, the soil can die. So it will be compacted. When it's compacted, it is difficult for the plant to be ah, to do well.”



Figure 27. Abambo Phiri, a Permaculture Farmer, Explains a Garden Bed Design to Maximize Land Use
Photograph: Austin Dunn

Abambo Phiri had also learned about zones. He said, “Ehe, permaculture zone one starts at the house like this,

where there is water nearby. Yeah so that one—yeah um zone two is also saying that water is nearby that you can also be what—maybe irrigating with the water, ehe, sure. Then, ah, zone three as of now we don't have,” as zone three is used in a field. “Zone three depends on rains, it depends only on rains, rainfed area.”¹⁰¹

Altering land use, crop placement, and resource use was part of expanding permaculture practices and changing designs over time. For example, Amayi Sesani continued to change the guilds in her yard to decrease the amount of watering she had to do. “We also consider how the water is flowing, yeah, and now the water was stagnant this side and this side,” she said pointing to those parts of her yard.

“And when we saw that the water is stagnant this side, it was simple. It needed designs to where the water is not sinking in order to make use of the water and not let it run away. That's when we made these designs as you can see them, because that side was so muddy,” she explained, referring to both the designs and beds she made. She said that she also changed where she grew certain crops in her yard to where they would grow better and be aesthetically pleasing.

¹⁰¹ We conducted this interview in Chichewa in Cluster C on March 8, 2012.

“So, I want to change a bit now, but I am failing to change because of goats. They are troubling me, as you can see the cassava greens there, they are destroyed,” she said as she gestured to them.¹⁰²

Other times, Amayi Sesani also pointed to the nature of permaculture as a design system, when describing how learning about permaculture changed her thought process and approach to gardening. Rather than only learning a set of new techniques or a technology package, Amayi Sesani learned strategies for analyzing and altering her household farming system. She was able to use permaculture design tools to somewhat reduce the labor input needed to grow crops although she still faced problems because of freely roaming livestock like other permaculture and conventional farmers.

Although on a small scale, Josephy, Abambo Phiri, and Amayi Sesani used permaculture to help them analyze particular farming problems and devise a feasible way to maximize resource use, improve their agricultural production, and address the problem they identified.

Conclusion

Permaculture farmers were able to change their agricultural practices and implement permaculture despite an information, market, and policy environment that promotes and supports conventional farming. Permaculture farmers implemented practices and designs to varying degrees, which was often related to household members years of schooling, level of permaculture education, and years of permaculture use. Permaculture farmers’ practices involved more than adopting a new farming practice like using manure, tree planting, or intercropping beans with maize, as some other sustainable agricultural development programs in Malawi focus on. They used the skills-based permaculture system to alter agricultural, resource, and land

¹⁰² We conducted this interview in Chichewa in Cluster C on May 31, 2012.

management practices, in addition to applying a degree of systems thinking by using the design system. As I discuss in Chapters 7 and 8, these techniques enabled permaculture farmers to address some constraints, although only to a point, and farmers continue to face constraints to permaculture practice.

CHAPTER 7

VULNERABILITY AND ADAPATIVE CAPACITY IN PERMACULTURE AND CONVENTIONAL FARMING SYSTEMS

Bauleni and his mother, Amayi Mvula, had divergent experiences of the benefits and vulnerabilities associated with permaculture use. Bauleni reported that by using permaculture his family is “growing a lot of things for the home consumption and uh you know small things for sale... So we are, we are getting money plus we are getting food, not just food, but a variety of foods.” Further, Bauleni experienced personal change that other permaculture farmers did not report. He said “permaculture is just part of my life,” and “changed the way I think... changed the way I grow things, changed the way I eat, and changed the way I judged on things.” As a result of his intensive practice and study of permaculture, he gained full-time, wage employment from Everlasting Harvest initially and then from Ulimi.

In contrast, Amayi Mvula repeatedly expressed worry about trying to find enough money to buy land in the area given increasing land prices and concern about new government land alienation. Despite their relatively intensive practice of permaculture and their position as local models for permaculture, Amayi often described their use of permaculture on 0.15 acres as a foundation. She said that they needed two acres of their own land to be free and to be able to implement permaculture enough to provide all their food needs and to secure land for her children’s future. She perceived their land access as tenuous, because her father’s cousins owned the land they were living on so she said they could take it back any time if they decide they want to. Amayi Mvula described their financial stability and well-being as dependent on purchasing land, which they could not afford to do at the time, although Bauleni’s new job at Ulimi would help. While they intensively cultivated the land around their house using permaculture

techniques and raised chickens and bees, Amayi Mvula said that she still expected to experience hunger in January and December, because they could not grow enough food on 0.15 acres to sustain eight family members.

Bauleni and Amayi Mvula's differing perspectives are an example of how context, personal perceptions, and household situations influenced farmers' experiences of vulnerability and permaculture benefits. Permaculture and conventional farmers experienced "layered vulnerabilities" (Saxton 2013:61) and constraints to agricultural production. The agriculture systems that farmers used enabled them to address vulnerability in different ways. While permaculture farmers experienced a number of agricultural constraints both generally and specifically with regard to permaculture, permaculture education and application helped farmers expand their adaptive and improvisational capacities to a degree to contend with vulnerability.

A number of permaculture farmers reported agricultural, environmental, and livelihood benefits from practicing permaculture. In particular, permaculture farmers overall reduced their dependence on purchased farm inputs, and thereby, their dependence on fossil fuels and transnational agribusiness. In addition, all permaculture farmers increased their agrobiodiversity since implementing permaculture and they grew crops during all seasons. These benefits related to the particular ways that the farmers' implemented permaculture and the broader context. The constraints to permaculture production that farmers faced were rooted in vulnerability and broader health, livelihood, and climate change problems and limited entitlements to land, water, and capital.

Farming Problems and Vulnerability

Farmers reported a range of intersecting material, economic, information, environmental, and health problems that contributed to agricultural problems and impacted farmers'

vulnerability, capabilities, and access to resources (see Figure 28). As Babu and Sanyal also found (2007:2), farmers reported that agricultural problems adversely effected their well-being, health, and wealth, which contributes to a damaging cycle of food insecurity and impoverishment. Environmental, material, and information constraints limited conventional and permaculture farmers’ agricultural productivity. Conventional farming is resource intensive, can make crops more susceptible to pests and diseases, and contributes to environmental degradation and climate change which lower yields (Pye-Smith 2011; Matson et al. 1997:507; Altieri and Nicholls 2003). While using permaculture helped farmers address some problems, such as access to money and information, permaculture farmers often faced many of the same challenges as conventional farmers (see Table 12).

We sat outside a village headman’s (mfumu) home overlooking much of Cluster A from

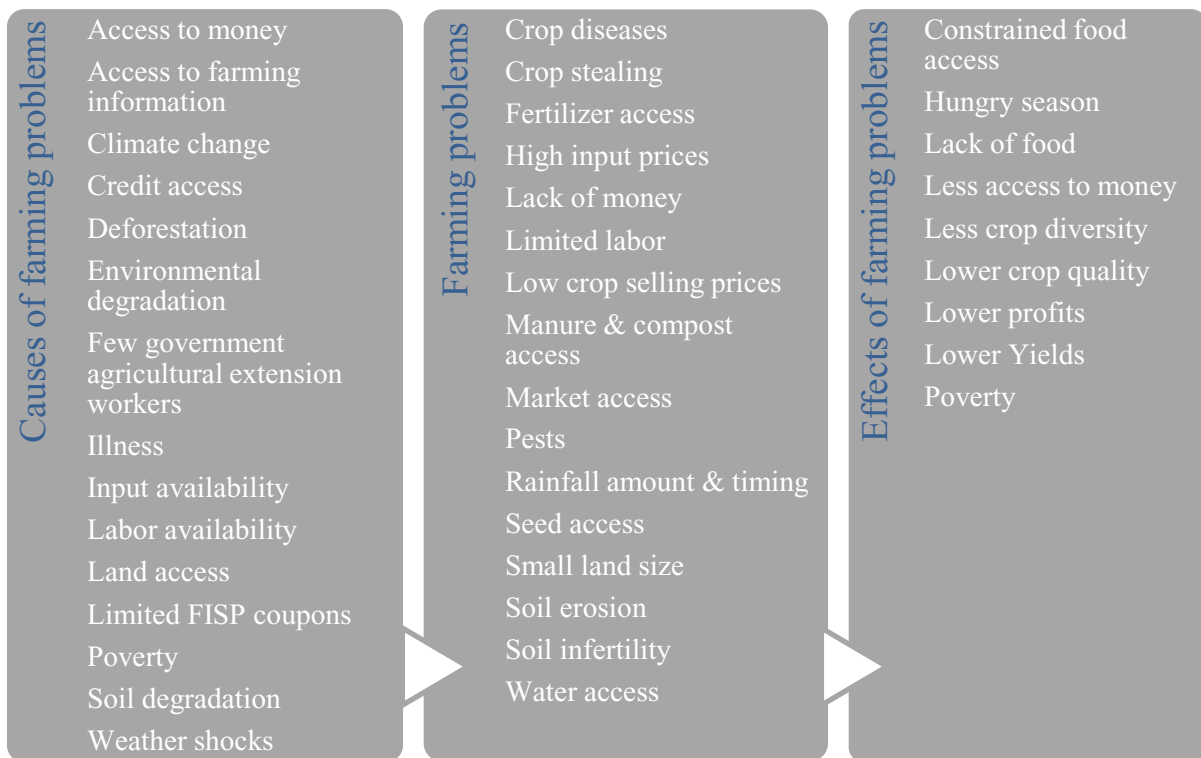


Figure 28. Farming Problems and the Causes and Effects Reported by Conventional Farmers

the hilltop. He was 55 and had recently had a limb amputated from cancer or an infection – the hospital was unclear. We asked him about the history of the area and current problems.

He described many problems that he sees in the area. He said that the most serious problems are when someone does not have food and when the village drinking water source runs dry. He asserted that in order to make sure that one has enough food one needs to be eager and have a plan to find food. In the past, he said that they grew maize and harvested well without needing to use inputs like fertilizer or manure. He said that because there were a lot more trees in the past, there was no soil erosion and the air quality was better. The landscape was so overgrown, he said that they would throw stones from the village to call the spirits in the forest, which is the realm of ancestor spirits, but now, graveyards are clearly distinguishable¹⁰³ (see Figure 29). When they were children, he said that they ate a lot of meat because livestock and wildlife, such as buffalo, elephants, and warthogs, were more prevalent than they are today. He continued that they also ate a number of wild, indigenous foods collected from forests and



Figure 29. Deforestation Shown by the Remaining Tree Clusters Being Graveyards and Smoky Haze from Burning Farmland and Forests During the Dry Season

uncultivated land like monkey fruit, masuku (loquat), nthudza (*Flacourtia indica*), mpama (large yams), and mushrooms, among others, many of which are no longer available in the wild.

Things have really changed, he posited. To him, this change hinged on deforestation, which he thought caused

¹⁰³ Graveyards, as sacred groves, are the proper location for graves and the realm of ancestral spirits (Breugel 2001:105–106).

the animals to disappear. He started to notice this change as a boy during Kamuzu Banda’s time when a brick factory in Lilongwe cut trees in the area.

The village headman pointed to the intersecting problems of deforestation, environmental degradation, agricultural problems, food and water access, and resource extraction. Conventional and permaculture farmers had to contend with such compounding problems and their impacts.

We used a card sorting ranking exercise with farmers to help learn about how they perceive the severity of problems that limit crop yields and crop diversity, although not specifically for conventional or permaculture production. Farmers ordered cards with pictures and labels according to the severity of the problem, set aside the items that were not problems for them, and explained their choices. Based on preliminary research and pretesting, we decided to ask farmers to rank the following problems: access to money, pests/crop diseases, rainfall/water access, lack of soil fertility, lack of seeds, shortage of land, lack of information, soil erosion (only for yield ranking), and lack of market access to sell crops (only for diversity ranking). I summarize the commonly reported problems in Table 12. In the remainder of this section, I discuss these challenges and the farmers’ perceptions of them. In this chapter, I say that a farmer reported a problem if it was one of their top three concerns, reflecting the fact that farmers

Table 12. Agricultural Problems Reported by Conventional and Permaculture Farmers in Ranking Exercise

	Common problems for CFs and PFs	Problems reported by higher portion of CFs	Problems reported by higher portion of PFs
Yield constraints	Land access Pests/crop diseases Rainfall/water access Soil infertility	Information about new techniques Soil erosion Money access	Seed access Land access
Crop diversity constraints	Information access Seed access Pests/crop diseases Rainfall/water access Seed access Soil infertility	Market access to sell crops Money access	Land access

identified facing a compounding set of problems and precise rankings were somewhat inconsistent.

Environment

The processes of deforestation and the extensification and intensification of land use have caused environmental degradation, such as soil fertility and biodiversity loss and soil erosion. These processes primarily began with agricultural changes, resource exploitation, land alienation, and cash crop production during colonialism (Kalipeni and Feder 1999:41–42; Sanchez 2002; Oxfam International 2009). In the Kasungu-Lilongwe Livelihood zone, chronic hazards include two to three week dry spells during the growing season, waterlogging, and soil erosion and periodic hazards include serious drought once in ten years (Malawi Vulnerability Assessment Committee 2005:39). Repeated droughts and dry spells pose significant challenges to Malawian’s farmers. However, as Davis cautions, weather and climatic facts gain importance within particular production systems, environmental contexts, and social relations (2002:18–19).

Farmers reported that the beginning and end of the rainy season now varies year to year, which some farmers attributed to climate change. A government agriculture advisor told me, “climate change is a monster that’s come to challenge farmers.”¹⁰⁴ The year-to-year variability in rainfall has made long-term trends and their relation to climate change difficult to determine. Between 1960-2006 there was a mean annual temperature increase of 0.9°C and increasing frequency in temperature extremes in Malawi (GFDRR 2011:3–4). Rainfall can also be erratic with damaging dry spells as occurred during the 2011/2012 rainy season. Malawi is typically vulnerable to dry spells, seasonal droughts, intense rainfall, and floods, which have worsened in

¹⁰⁴ I conducted this interview in English in Lilongwe on June 24, 2012.

frequency and intensity in the last twenty years and will likely continue to worsen with climate change (GFDRR 2011:6–7; Pauw and Seventer 2010:1; Chidanti-Malunga 2011:1043).

About a third of conventional and permaculture farmers ranked rainfall and water access as a top three constraint to both yields and crop diversity. Farmers stated that poor rainfall during the rainy season not only affects farming in the rainy season, but also shortens dry season garden production because hand dug wells used for irrigation dry up faster. A few permaculture farmers reported that poor rainfall and limited water for irrigation during the dry season constrained their current permaculture use.

About half of the conventional (10 CF HH, 56%) and permaculture farmers (7 PF HH, 54%) ranked soil infertility as a top three problem that limits yields, while fewer farmers ranked it as a main problem for crop diversity (5 CF HH, 28% and 3 PF HH, 23%). Male and female permaculture farmers equally ranked soil fertility as a yield constraint. In comparison, two-thirds of female conventional farmers ranked soil infertility as a top yield constraint compared to a third of male conventional farmers. This difference may reflect men's primary decision-making power about fertilizer purchases and the fact that conventional farmers primarily relied on fertilizer to improve soil fertility.

Permaculture farmers' typically ranked the soil fertility where they practiced permaculture higher than conventional farmers ranked their agricultural land. Over two-thirds of permaculture farmers (10 PF HH, 71%) gave their permaculture plot a positive soil fertility ranking, 21% (3 PF HH) said it was of neutral quality, and 7% (1 PF HH) gave a negative ranking. In contrast, just over half of conventional farmers (13 CF HH, 52%) gave their land a positive ranking, 32% (8 CF HH) said it was of neutral quality, and 28% (7 CF HH) gave a negative ranking. Further, just over half of permaculture farmers (8 PF HH, 57%) reported that

the soil fertility in their permaculture plot had incrementally improved since adopting permaculture (three years prior on average) and none reported that it got worse, compared to two conventional farmers HH who said their soil fertility improved over the previous five years (13%). A few permaculture farmers also said that their yields increased after being poor in the first year with the improved soil fertility. For example, one permaculture farmer said that he saw a great change because in the first year, the maize did not grow well, but then the maize grew so well that other people did not believe that it was local maize. It was a significant improvement that the soil in yards transformed from hardpan soil to what permaculture farmers' categorized as good soil fertility in the span of a few years. In comparison, only two conventional farmer HH (13%) reported that their soil fertility improved, three conventional farmer HH (19%) reported it got worse, and over two-thirds (11 CF HH, 69%) reported no change.

Over two-thirds of conventional farmers (17 CF HH, 71%) said that soil erosion on their agricultural land is a problem. In comparison, one permaculture farmer HH (7%) said that soil erosion is a problem on their permaculture plots. Although many farmers used permaculture in their yards, soil erosion is typically a problem in villages as it erodes house foundations and creates gullies. Conventional farmers typically addressed soil erosion by forming different types of ridges like strategically placed large ridges, box rides, ridges on contour or swales, and a few planted vetiver grass (*Vetiveria zizanioides*). Permaculture farmers learned and used other skills that can help prevent and reduce soil erosion and increase water infiltration, such as agroforestry, low- to no-tillage, and mulching. I repeatedly saw this in Cluster C after a heavy downpour in the rainy season – water would soak into the soil around permaculture farmers' home within an hour or two, whereas several inches of water would remain standing around adjacent homes. For instance, one permaculture farmer explained that she knew that water flows quickly around her

home so she designed waterways in her yard to prevent soil erosion. Another permaculture farmer applied what he learned at Ulimi trainings to decrease soil erosion by making swales, beds on contour with a homemade A-frame, planting trees, and applying compost.

The primary environmental constraint to current permaculture practice cited by six permaculture farmer HH (40%) was the presence of unmanaged livestock in villages, which can rapidly decimate a garden. A few farmers said that in the past, boys were responsible for herding livestock during the day, but now boys attend school so livestock generally roam freely. Livestock was not a problem for conventional farmers because they did not farm in villages, livestock often do not range far enough to reach their gardens, and farmers tie up livestock during the rainy season to prevent crop damage. In part due to this issue, there is disagreement among Ulimi staff about whether or not they should teach farmers to implement permaculture in their yards within villages. Although farmers can exclude livestock with a fence, the materials needed to build fences can be expensive. Further, as Bezner Kerr also found in northern Malawi (2005a:68), building fences is customarily a male task which created further barriers for women who wanted to build a fence around their yards. A few permaculture farmers planted trees and shrubs to form part of live fences; however, the plants take time to mature before they will function as a fence.

Both conventional and permaculture farmers had to contend with environmental degradation and environmental shocks from climate change. Whereas conventional farmers often coped with climate change by growing hybrid maize, permaculture farmers had a few additional strategies to deal with vulnerability and problems resulting from climate change. Six permaculture farmer HH (40%) reported that using permaculture helped them deal with poor rainfall and changing rainfall patterns. Several of the practices helped farmers mitigate the late

rains and dry spells in 2011/12 and still harvest well in their permaculture plots, whereas the drought-like conditions decreased “maize production by as much as 40 per cent in some areas” of the country (UN News 2012).

Abambo Phiri explained the benefits he sees from using permaculture practices. He said, “In permaculture gardens and fields there is enough moisture as a result of the manure,” which can help increase the water-holding capacity of soil, “and you also yield a lot because you also plant different crops so when they do well you at least harvest.”

He compared this to conventional production in which, “The moisture goes away quickly, sometimes you only harvest the one crop you’ve planted one and if it fails.... If that the rains are scarce there is still moisture, it is kept because of the mulching– whereas on the other [conventional], moisture runs out quickly because you don’t do mulching.”¹⁰⁵

Another permaculture farmer and village chief illustrated the relevance he thought permaculture has for his community given climate change. He said, “If you do the [conventional] farming that is done at the fields, this old farming, you can’t yield at all... In the near future, we will not yield–yeah.” He emphasized that by using permaculture, he benefits from his labor, whereas in conventional production he does not always yield well and so feels as if he does not benefit from his labor.

“This [permaculture] one is doing very well, yeah... even if you can grow one acre, two acres, it can work.” He further contrasted how maize grown conventionally in ridges does not grow well because the roots cannot penetrate hard soil, whereas the maize he grows using permaculture techniques grows well.

¹⁰⁵ We conducted this interview in Chichewa in Cluster C on March 14, 2012.

A number of studies support the benefits permaculture farmers reported from practices that they commonly used. For instance, no-till management and agroforestry can help prevent soil erosion and improve soil structure, soil fertility, and crops' drought resistance by increasing soil's organic matter and water infiltration and holding capacity (Zimmerer 2010:149; Milder, Majanen, and Scherr 2011:22–23; Pye-Smith 2011:17–18). Mulching is a free, low labor, multifunctional practice that helps retain water in the soil, soak up heavy rainfall, moderate soil temperature, add soil fertility, build organic matter in the soil, and prevent soil erosion (Buck et al. 2004:77, 90, 94; Alletto et al. 2010). Using compost and mulch can help improve soil fertility by increasing soil organic matter, which is critical for nutrient release, soil structure, and water holding capacity (Matson et al. 1997:506; Gruhn, Goletti, and Yudelman 2000:4; Palm et al. 2007). Studies in Malawi have shown that integrating legumes (Kamanga et al. 2009; Bezner Kerr and Chirwa 2004:446–447, 449; Snapp et al. 2002:164, 166–167, 170–171) and leguminous nitrogen-fixing trees (Beedy et al. 2012; Akinnifesi et al. 2010) into cropping systems can improve soil fertility.

In addition, a field trial at a Malawian government research station that compared permaculture to conventional practices documents and explains some of the benefits that permaculture farmers reported.¹⁰⁶ The study found that the permaculture plots had higher soil pH values and more organic matter (from 100% to 200% depending on the permaculture plot) compared to conventional treatments. The permaculture treatment with water harvesting had the highest total crop yields in monetary value (MK 514,395/ha), followed by the permaculture

¹⁰⁶ One permaculture treatment intercropped maize, groundnuts, beans, soybeans, sweet potatoes, pumpkins and cucumbers planted in flat beds with *faidebia albida*, papaya, and mango trees planted in between alleys not planted with maize, and added manure. The other permaculture treatment included swales and pot holes for water harvesting with those crops with added manure. In the conventional treatments, maize, beans, soybeans, groundnuts, *tephrosia vogelli*, *gliricidia sepium* and/or cassava were grown alone or intercropped (maximum of 3 crops intercropped) with and/or without fertilizer (Moses, Gomi, and Chilimba 2009:44–46).

flatbed treatment (MK 447,180/ha). Overall, the study concluded that the permaculture treatments were better for soil fertility, income, and diversifying crop production per unit area (Moses, Gomi, and Chilimba 2009:48–52).

Livelihoods and Resource Access

Most commonly, conventional (13 CF HH, 72%) and permaculture farmers (8 PF HH, 82%) ranked money as a top three crop yield constraint. Conventional farmers used money to mitigate farming problems and constraints like soil infertility, pests, and crop diseases and limited access to labor, land, seeds, and water. As one conventional farmer explained, everything is possible with money. As with other resources, farmers often talked about “finding” inputs, which indexed accessibility as it meant the availability of inputs, access to money, and the ability to go buy them. Conventional farmers emphasized the necessity of investing money in farming. For instance, one older female conventional farmer explained that she did not apply inputs in her field the previous year, and as a result, “this year there is a big hunger situation.” In fact, some conventional farmers we worked with were interested in permaculture because they wanted to learn how to successfully farm without fertilizer because they could not afford it. Permaculture farmers also identified money as a constraint to crop yields in part because of seed costs and because most still purchased fertilizer for conventional maize field production. However, fewer permaculture farmers (4 PF HH, 31%) identified money access as a problem for crop diversity than conventional farmers (13 CF HH, 72%), potentially because of lower permaculture input costs and because all permaculture farmers reported that they were able to increase their crop diversity since starting permaculture.

Access to money is a cyclical problem because the amount of money available to be invested in farming can shape profits and how much is available to invest in farming the next

year, which is exacerbated by high input costs, as others have found (Mloza-Banda, Kaudzu, and Benesi 2010:13). For example, Abambo Tembo commented that as his family has grown, he has to spend more money buying soap, clothes, and other necessities for the family, so they have less money to purchase inputs and therefore harvest less. In 2010/2011, 40.5% of Lilongwe Rural households faced food shortages, and of those, 66% of the shortages were because households could not afford to buy enough inputs (National Statistical Office 2012a:200). One farmer explained that if one does not have fertilizer or manure, it is just a waste working in the field. Conventional farmers primarily used fertilizer to address soil infertility; however, fertilizer access was a continual problem. The cost of fertilizer has increased significantly in recent years due to rising oil prices (Holden and Lunduka 2010:8). There is very little access to credit, though the government introduced a Farm Input Loan Programme in 2013 to address this problem for those not eligible for the FISP (Ndoza 2013).¹⁰⁷ As Bezner Kerr argues, farmers' references to the problem of lacking fertilizer indexes an overlapping set of vulnerabilities and constraints rooted in unequal entitlements to money, land, and labor (2005a:64, 67).

Fewer permaculture farmers than conventional farmers identified market access to sell crops as a problem, which may be because they did not need to sell as many crops to afford inputs the next season, the proximity of markets to the villages, or because some had more diverse crops to sell. Many conventional farmers lamented the difficulty of selling crops when everyone else at the market also tries to sell the same crops.

Conventional and permaculture farmers gave different rankings for how seed access limits crop yields. Reflecting the cost and diversity of seeds used in permaculture, over half of permaculture farmers (8 PF HH, 62%) ranked seed access as a top three problem, compared to

¹⁰⁷ As of 2006/7, only 3% of small scale farming households received credit (National Statistical Office 2010:6).

less than a quarter of conventional farmers (4 CF HH, 22%). Seeds can be expensive and seed variety was limited in local markets, which constrained seed access for permaculture farmers who tried to plant more diverse crops than conventional farmers did. Others have found that cereals other than maize and legumes are rarely available at agro-dealers in Malawi (Bezner Kerr 2012; Chinsinga, Mangani, and Mvula 2011).

More permaculture farmers identified land access as a problem for crop diversity than conventional farmers, likely because permaculture farmers had less agricultural land. Perhaps in light of higher land constraints, over half of permaculture farmers (9 PF HH, 60%) reported that it was beneficial that they could cultivate in small yards using permaculture. Land access is a broad structural constraint. While permaculture practices can help farmers to cultivate available land more intensively, it did not address farmers' access or entitlement to land.

For permaculture production specifically, a few permaculture farmers reported that the initial labor and resource input required to establish permaculture was challenging, particularly on land that was not cultivated and had dry hardpan soil from continual sweeping. Permaculture farmers faced material constraints to their current permaculture practice depending on their resources and particular situation. The most common material constraints farmers faced to current practice were land access – either small land holdings or not owning land and therefore having to rent. In addition, access to inputs was a constraint, namely to diverse seeds, manure and/or compost, transport for manure/compost, and materials to build fences to keep out livestock. Limited cash availability was a constraint to accessing those inputs, demonstrating that available capital affects permaculture use to a degree, particularly for seeds. The seed costs suggests that the seed sharing among permaculture farmers and between NGOs and farmers is likely beneficial. Seed access is a critical area to pay attention to as a constraint to permaculture

adoption and expansion as the primary or sole monetary expense, and managing these costs are likely critical for scaling up permaculture implementation.

Seven permaculture farmer HH (47%) said that they planned to expand their permaculture practice where they were currently practicing it or to include additional land, such as a garden or field. Those households reported material constraints to permaculture expansion. Permaculture farmers said that renting a garden or field was a constraint due to seasonal renting periods and the long-term investment of permaculture practices like tree planting which increase land value. In addition, landlords may take rented land back after being paid if land quality is improved or they may disapprove of the practices farmers. Several permaculture farmers saw the labor, manure, and seed quantities required to implement permaculture in a large field as a constraint.

The livelihood benefits reported by permaculture farmers stemmed from agricultural and environmental benefits, and resource conservation and reduction. Two-thirds of permaculture farmers (10 PF HH, 67%) said that they spent less money buying food since starting permaculture due to improved food access from permaculture production. Permaculture was also a source of income for some permaculture farmers (7 PF HH, 47%) who earned money by selling crops from permaculture production, a few of whom (5 PF HH, 33%) reported earning more money than they had prior to practicing permaculture. A few permaculture farmers (3 PF HH, 20%) said that they saved money because their permaculture yard production allowed them to stop renting a garden (dimba).

For example, Abambo Chalimba succinctly explained, “Myself I have seen a change, firstly I grow ndiwo to eat at my house without applying fertilizer. Two, when the crops multiply

I go with it to the market... And also harvesting and keeping some seeds.” He said, “That’s what I’ve started to change in my life.”¹⁰⁸

As discussed in Chapter 6, on average, permaculture farmers spent a fraction of what conventional farmers spent on inputs. Six permaculture farmer HH (40%) reported that they saved money by buying less agricultural inputs like fertilizer and seeds, while the rest of the permaculture farmers did not report a change. In addition, since starting permaculture, about half of permaculture farmers (8 PF HH, 53%) applied some permaculture practices in their conventional production and reduced their fertilizer use. On average, permaculture farmers spent 41% less on their conventional production (average of MK 16,000 (\$102)) than conventional farmers.¹⁰⁹

The relationship between household physical capital and input costs was different for conventional and permaculture farmers. Permaculture farmers’ reported permaculture and conventional input expenses were not correlated (0.31, $p=0.409$) with household physical capital, whereas reported conventional input expenses were strongly and positively correlated with household physical capital (0.82, $p=0.000$) for conventional farmers. In combination with permaculture farmer reports, this suggests that permaculture farmers’ input use, and thus available agricultural techniques, was less dependent on access to money and long-term economic status than for conventional farmers. For example, Amayi Sesani explained, “in these fields as old ways of [conventional] farming, they need fertilizer. As of now they are saying, ‘no the soil is depleted,’ they need the fertilizer... And now, fertilizer is expensive. A person like I

¹⁰⁸ We conducted this interview in Chichewa in Cluster B on March 18, 2012.

¹⁰⁹ Based on 10 permaculture farmers HH who reported input costs for conventional field and garden production.

cannot manage. While this [permaculture] type... we only need the place to make manure, or these things we are putting as mulching, they are things that also help.”

She said that the crops they plant, “grow very well, and we don’t bother ourselves to find fertilizer, or whatsoever, they grow well. While in the field there are a lot of inputs needed.”¹¹⁰

Gender plays a role in farmers’ perceived constraints, especially with regard to financial matters. Male permaculture and conventional farmers largely agreed that money was a primary constraint to their yields, followed by access to seeds and soil fertility, whereas women ranked seed, money, and land access as key problems. For problems limiting crop diversity, all but one man ranked money as a top three problem, followed by land access, seed access, and rainfall, whereas over two-thirds of women ranked seed access as a top three problem, followed by money access and information about diversifying. Men’s cross cutting concern with money likely reflects their general responsibility to earn money and their decision making power about farm inputs purchases and use.

Overall, permaculture farmers reduced their dependence on the market, agribusiness, and fossil fuels for external inputs, which has been seen elsewhere in Africa with the use of agroecology practices that improved soil fertility (De Shutter 2010:9–10). This is counter to the trend in which Edelman states that peasants today have “multiple and intensified involvements in the market” (2005:336). In a context of increasing transnational market linkages and multinational agribusiness engagement in sub-Saharan Africa, permaculture farmers were able to source organic inputs outside of the market and grow more of their own food. While permaculture farmers still engaged with the market, they were able to somewhat decrease their dependence on market purchases for agricultural inputs and food. The change in agricultural purchases may have gender implications because women had limited decision making power

¹¹⁰ We conducted this interview in Chichewa in Cluster C on May 21, 2012.

about purchasing inputs but more cooperatively made other agricultural decisions. Permaculture farmers did not report that gender relations influenced permaculture decisions. Given the limited input purchases and market orientation of permaculture, women may be able to exert more agency in permaculture production.

Crop Health and Diversity

Conventional farmers did not identify low crop diversity itself as a problem; however, they did disclose the resulting limited harvests and vulnerability of crops to environmental shocks, crop diseases, pests, and few harvests as problems. As discussed in Chapter 4, low crop diversity contributes to low diet diversity, which contributes to malnutrition, because farmers heavily rely on their own agricultural production for food consumption. In part because of low crop diversity and limited food imports, there are few varieties of fruits, vegetables, grains, and tubers available in village and trading center markets.

The permaculture farmers reported agricultural benefits that resulted from growing more varieties of crops, intercropping, and using soil and water conservation techniques. As shown in Table 13, all permaculture farmers reported growing more diverse crops than before practicing permaculture. About half of permaculture farmers (8 PF HH, 53%) reported that it was beneficial that harvests were staggered during the year using permaculture practices. Six permaculture farmers HH (40%) also reported high crop yields using permaculture.

Josephy discussed some of these benefits on a sunny morning with a hot breeze in the rainy season. He asserted, “In permaculture we mix the crop, the disease that can attack sweet potato leaves isn’t the same that attacks tomato.”

Josephy continued to explain that the crops he grows in his permaculture garden are healthy, compared to crops grown with fertilizer. He said, “The fertilizer is said to kill the

organisms that helps the soil to breathe, to drink water. So when the organisms are dead, know that the soil is not penetrated. So then you should realize that the soil will be hard. Whereas we do put manure, in which there are a lot of organisms that eat the decomposing matters there, making crops' food.”¹¹¹

Intercropping in permaculture gardens results in higher agrobiodiversity, which for this study, includes diversity both within and between species, because for crop diversity, the “diversity within species is at least as important as diversity between species” (FAO 2005:2), particularly in regards to food security (Pinstrup-Andersen 2010). As stated in Chapter 6, permaculture farmers grew three times more crop varieties on average than conventional farmers grew in their fields and gardens combined (p=0.000).¹¹² As Figure 30 shows, permaculture farmers grew a higher number of crop varieties in each food group than conventional farmers (p≤0.0002).¹¹³ Permaculture farmers grew over twice the number of vegetables and legumes,

Table 13. Agricultural, Environmental, and Livelihood Benefits Reported by Permaculture Farmers in Interviews, PF=15

Agricultural benefits	%, HH	Environmental benefits	%, HH	Livelihood benefits	%, HH
Higher crop diversity	100% (15)	Improve soil fertility	60% (9)	Spend less money buying food	67% (10)
Cultivate small piece of land	60% (9)	Deal with changing climate	40% (6)	Use less fertilizer overall	53% (8)
Harvest at different times	53% (8)	Soil and crops retain water	33% (5)	Make money selling crops	47% (7)
Harvest a lot	40% (6)			Save money on farm inputs	40% (6)
Crops healthy	33% (5)			Less labor required	33% (5)
				Make more money	33% (5)
				Did not need to rent garden	20% (3)

¹¹¹ We conducted this interview in Chichewa in Cluster C on February 7, 2012.

¹¹² The agrobiodiversity difference between permaculture farmers' permaculture gardens and conventional farmers' fields and gardens was found to be statistically significant by a Wilcoxon signed rank sum test (p=0.0000, z=-5.306).

¹¹³ Wilcoxon signed rank sum test results showed a statistically significant difference between the number of crop varieties grown by PFs and CFs (p≤0.0002).

nearly four times the number of fruits, and six times the number roots and tubers. Permaculture farmers also grew statistically significantly more ($p=0.0000$) starchy staples, dark green vegetables, vitamin A rich fruits and vegetables, other fruits and vegetables, and legumes.¹¹⁴

Though an often-overlooked ecosystem service, increased crop diversity across different food groups can increase the capacity of the farming system to meet nutritional needs. According to Remans et al. and DeClerck et al., increased crop diversity can also be an indication of increased functional diversity, which has been found to correlate with species richness and improve some areas of nutritional intake depending on the crop composition (Remans et al. 2011:2, 5–6; DeClerck et al. 2011:S42–S43). Indeed, for conventional and permaculture farmers, agrobiodiversity was correlated ($p\leq 0.05$) with average diet diversity scores (0.54), average number of snacks consumed (0.59), and average consumption of dark leafy greens (0.38), vitamin A rich vegetables and fruits (0.48), other fruits and vegetables (0.34), and legumes (0.36).¹¹⁵

Amayi Banda described the permaculture garden surrounding her home and the multiple uses she gets from different crops, such as the 194 crops we counted in three beds.

“A permaculture garden looks good, just as it is looking here. Because there is millet, pigeon peas, trees like vetiver, cassava, soya, hibiscus, maize is in here, groundnuts is in here. It’s very interesting,” she said, her voice hoarse from a cough.

She continued, “It’s interesting in that some crops are not edible, like trees are not edible, but we use them as wood. The leaves we take and mix with other trash and make compost

¹¹⁴ Wilcoxon signed rank sum test results showed a statistically significant difference between average the number of starchy staples ($p=0.0000$, $z=-5.340$), dark green vegetables ($p=0.0000$, $z=-5.316$), vitamin A rich fruits and vegetables ($p=0.0000$, $z=-5.349$), other fruits and vegetables ($p=0.0000$, $z=-5.011$), and legumes ($p=0.0000$, $z=-5.253$) grown by PFs and CFs.

¹¹⁵ The correlations between agrobiodiversity and these diet indicators were statistically significant ($p\leq 0.05$).

manure. Crops that we eat like soya we mill and make porridge, [corn muffins], and for cooking, like millet we winnow, soak and mill the flour and make nsima. Groundnuts we dig, when they are dry we pound and put in relish.”

Amayi Sesani also described how the increased agrobiodiversity differentiates permaculture and conventional practices and affects their harvests. “If we only grow maize... it means you can only harvest the maize.... Whereas in permaculture, you’ll come with groundnuts, soya, beans and maize... So we yield–different yields from the anyhow [conventional] farming,” she explained.¹¹⁶

Agrobiodiversity and intercropping can help manage crop diseases, lower pest density, encourage beneficial insects, lessen soil degradation and erosion, and stabilize production (Zimmerer 2010; Pinstrup-Andersen 2010; Buck et al. 2004; Matson et al. 1997). By

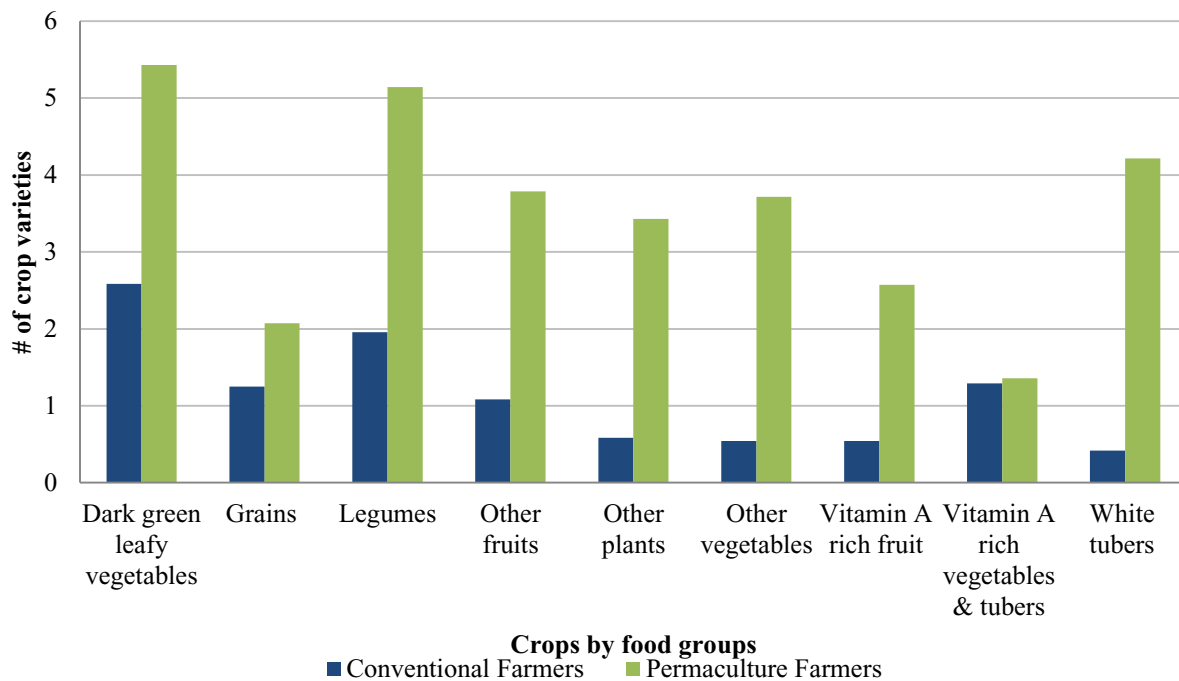


Figure 30. Agrobiodiversity in Conventional Fields and Gardens Compared to Permaculture Gardens by Food Group, PF=14, CF=24

Note: Other Plants includes herbs, leguminous trees, medicinal and fiber plants

¹¹⁶ We conducted this interview in Chichewa in Cluster C on May 3, 2012.

intercropping and constructing polycultures, permaculture farmers capitalized on the diverse functions and products provided by individual plants and the mutually beneficial interactions between plants (Buck et al. 2004:135; DeClerck et al. 2011:S44–S45; Perfecto and Vandermeer 2008:178, 184–188).

More broadly, biodiversity is a vital source of raw materials needed for human existence (Nazarea 1998). However, biodiversity loss has been recognized since the 1980s (Maffi 2001) and agrobiodiversity and crop choices have become increasingly limited globally due to “the homogenizing effect of development,” and “the hegemony of monoculture and capitalism” (Nazarea 1998:9). While permaculture farmers did not substantially move towards cultivating indigenous crops, they proportionally grew more crops of African origin and fewer hybrid seed varieties than conventional farmers did, although the difference is not statistically significant. Of the crops grown by at least half of farmers, 24% of those grown by permaculture farmers were of African origin (amaranth, okra, pigeon pea, air potato, hibiscus, and yam) compared to none for conventional farmers. At least a quarter of permaculture farmers grew other crops of African origin like millet, sorghum, bambara groundnut, mphonda (*Lagenaria siceraria*), limanda (*Hibiscus acetosella*), and chikanyanga (*Cucumis anguria*).

Skills and Information

Farmers generally had limited access to farming information; however, permaculture organizations and education provided an additional resources and skills for some farmers (see Chapter 5). Just over a third of conventional farmers (7 CF HH, 39%) identified a lack of information about new farming methods as a main crop yield constraint, compared to one permaculture farmer HH (8%). Few conventional farmers had access to agricultural extension services and primarily relied on their existing knowledge, information within their social

network, and the radio. One 31-year old male conventional farmer said that the radio is his only source of farming advice. He said that he does not have much interest in the information broadcasted on the radio and often forgets what is said, because the information requires inputs that he cannot access. As one conventional farmer said, there are no farming messages hence no other options. Limited available information constrains the feasible options available to farmers to respond to problems. Amayi Nkhoma, a conventional farmer said that access to information would help her to solve many problems, like how to farm without using fertilizer because fertilizer is hard to access. Therefore, she said she was interested to see the harvest from her son's bed of organically grown sunflowers, because her son was learning about permaculture from other boys in Cluster C.¹¹⁷

Permaculture farmers had access to information from Ulimi and Everlasting Harvest, and permaculture education gave farmers access to additional information and tools that they could use to increase crop yields. In part, permaculture and conventional farmers had different perspectives on information access because permaculture farmers perceived permaculture information as more accessible than conventional techniques that required access to capital.

Despite access to permaculture information, a similar portion of conventional farmers (7 CF HH, 39%) and permaculture farmers (4 PF HH, 31%) ranked access to information as a top three constraint to increasing crop diversity. One conventional farmer said that they do not get information on how to diversify crops, which he needs because he does not know the planting spacing for other crops or how to grow them. Some farmers said that permaculture education provided them with information about diversifying crops. For example, after receiving introductory permaculture training at Ulimi as an Ufulu member, one conventional farmer said

¹¹⁷ The son made this bed mid-way through the study, however the household remained in the conventional farmer sample group because they did not identify as using permaculture, their use of permaculture had not extended from the son's organic sunflower bed, and they had not harvested from the bed by the end of the study.

she lets some indigenous trees grow on her land because they are going extinct. She said that before she did not plant indigenous trees like msangu (*Faidherbia albida* or Winter Thorn) and masabma mfumu (*Azelia quanzensis* or Pod Mahogany) because she did not get seeds for them because she is lazy. She then qualified that she did not know those were leguminous nitrogen-fixing trees like acacias. Alternatively, one medium permaculture practitioner explained that despite learning permaculture, his crop diversity was limited because he did not have enough information about intercropping or what crops will persist in droughts and dry spells. During permaculture trainings, intercropping was a common topic of confusion and uncertainty for farmers who were unaccustomed to intercropping and often taught that it will lower crop yields. In addition, it was challenging for some farmers to both grow new crops and successfully intercrop them.

The limited resources and information, as well as conflicting information, constrained farmers' ability to deal with farming problems, which is increasingly required to cope with environmental degradation and climate change. Amayi Nkhoma pointed out that one's ability to solve problems depends on the challenges one faces and the information one gets. In part, environmental degradation, climate change, and land pressure has made different kinds of agricultural and environmental knowledge salient. Farmers said that they needed to intervene in areas that they have not always needed to, like tree planting and improving soil fertility. Farmers reported that a generation ago, soil fertility was not a problem and one did not need to use inputs and hybrid seeds to harvest well. In addition, significant human capital loss results from high mortality rates and reduced intergenerational agricultural knowledge transfer in Malawi (Alumira, Kambewa, and Binauli 2005). The population is generally young, with 44% of the population under the age of 15 (National Statistical Office 2012b:16) and life expectancy at birth

is 47.4 years for men and 50.6 years for women (National Statistical Office 2011:vii).¹¹⁸

Therefore, there are fewer experienced farmers with knowledge of indigenous plants, farming techniques, and environmental management practices that Malawians used historically. Bauleni often cited limited indigenous knowledge from elders as a constraint to permaculture practice. In addition, some types of knowledge, like extensive wild plant identification and root uses, are protected expert knowledge of traditional healers rather than common knowledge (Morris 1996).

Despite the colonial and Malawian governments' long-standing concern over environmental degradation, farmers are facing a worse situation today than they were twenty or forty years go. Environmental problems are acute, as is Malawi's vulnerability to climate change and shocks. In this context, limited access to information about different farming techniques curtails farmers' ability to adapt to changing conditions, deal with problems, and increase yields without resorting to purchased inputs. Another conventional farmer said that farmers should be advised about what to do when the rains are poor and what crops to plant given changing rainfall patterns; however, he said that no one advises farmers about these issues. Another permaculture farmer emphasized that it is especially a problem today when farmers cannot afford a radio and therefore do not hear agricultural information because of climate change. Josephy asserted that permaculture information differed from the agricultural information he typically heard because it "explain[ed] about dealing with the problem" of climate change, which other messages about climate change did not."¹¹⁹

Some farmers expressed confusion and uncertainty about what to do about particular farming topics because of contradictory information received from different sources. For

¹¹⁸ Life expectancy rose in the 1960s-1980s and then began to decline in 1989 due to HIV/AIDS, economic decline with SAPs, and poor governance and later began to improve after 2004 with new health initiatives according to Matchaya (Matchaya 2007).

¹¹⁹ We conducted this interview in Chichewa in Cluster C on February 7, 2012.

instance, one conventional farmer said she did not know how fertilizer affects her soil. She said that in her experience, fertilizer increases soil fertility, but these days she hears that fertilizer burns and damages soil. Another participant said that at Ulimi she heard that fertilizer was bad for the soil, but when she applies fertilizer, it helps her harvest a lot of maize. The information she learned at Ulimi contradicted her personal experience and individual learning. For some participants, there was an imbalance between individual and social learning, which was compounded by limited and skewed access to information, devaluation of farmer knowledge, and increasing environmental degradation and unpredictability.

In discussing what they learned during permaculture trainings, permaculture farmers often mentioned topics and techniques that they did not learn as a part of conventional farming. One permaculture farmer said that in agriculture they did not learn to deter pests with flowers and other crops or prevent soil erosion. A conventional farmer in Ufulu said that before attending trainings at Ulimi, she had never received information about new farming practices, could not access information about intercropping, and did not know how to make compost. Another conventional farmer in Ufulu said that before Ulimi's trainings, she did not get any information about how to grow different crops and she did not know that manure makes maize green and produce well like fertilizer. Abambo Tembo explained that before going to Ulimi, he did certain things out of ignorance like burning crop debris. He also had not received information about crop diversification; otherwise, he could have diversified his crops he said.

While permaculture provided farmers with an additional source of information, some farmers reported difficulty in applying permaculture knowledge and that they still did not have enough information. A few permaculture farmers reported that it was difficult to create permaculture designs for the first time. Some farmers turned to a permaculture practitioner in

their social network or an NGO employee for help creating designs. As farmers learned more about permaculture, some said it typically became easier for them to create and alter designs. Agogo Chisale, a low permaculture practitioner with informal education, said she did not know how to restore soil fertility because she could not afford to attend permaculture training as she wanted to. Permaculture farmers did not explicitly identify information as a current constraint, but rather as a constraint to permaculture expansion (see Table 14). However, as discussed in Chapter 6, formal permaculture training and access to multiple permaculture information sources helped farmers to implement permaculture more intensively and extensively.

Access to permaculture information was a constraint to permaculture expansion and increased the risk of using permaculture in case farmers did not have sufficient information to implement permaculture on a larger scale successfully. During interviews and focus groups, a few farmers also expressed skepticism about whether or not permaculture practices, such as organic production and intercropping, could work on a larger scale like in a one or two acre field. Knowledge and resource constraints inhibited farmers' confidence in and ability to innovate and try different practices, as Stone similarly found among cotton farmers in India (2007:73). In a context of material deprivation, food insecurity, and frequent illness, farmers were cautious and often did not want to try to innovate without being confident that they had the all the information and resources that they needed to be successful. The results of farming are too important to their lives and livelihoods and their time and resources too constrained to risk a failed innovation. While their vulnerability spurred many farmers' interest in permaculture, it was also in light of such vulnerability that permaculture use could be fraught with risk.

There is a degree of self-deprecation in farmers' reference to their lack of farming knowledge, ignorance, lack of progress, and laziness. In a context of pervasive development

discourse and a history of dictatorship during which Kamuzu Banda enforced discipline and obedience (McCracken 2012:433), farmers often lacked confidence in their agricultural and environmental knowledge. Several farmers said that they do not consider themselves successful farmers because they did not harvest enough food to avoid hunger and provide for all of their family's needs. They commonly expressed success or failure as a dichotomy – in conditions of scarcity, one either had enough and was success or did not have enough and failed. Farmers often focused on their own perceived shortcomings when explaining this failure, such as their supposed limited skill, laziness, or lack of commitment to farming. Often when I pressed farmers for further explanation in response to these types of explanations, farmers conceded reasons based on information and material constraints. For example, one conventional farmer in Cluster C said that she did not use compost because she is lazy. After I asked several follow up questions, she explained that she does make compost at home every year, but every year, she fails to find enough money to rent a truck to transport the compost to her field. Examples like this both point to the importance of access to information, as she said she learned to make compost at home and did not know she could make it with organic matter in her field, and raises caution to probe farmers' claims about lacking knowledge to ascertain the barriers they face.

Social Stigma and Permaculture

When Everlasting Harvest first introduced permaculture in Cluster C, the early adopting permaculture farmers said that they faced social stigma for practicing permaculture. Not only did the permaculture farmers farm in a way that was unfamiliar to community members, but aesthetically, permaculture practices in yards challenged cultural norms of a clean and cared for home in which the ground around the yard is ordinarily swept bare. For example, some permaculture farmers said others thought were going crazy or “doing some insane things

[because] they saw as if it was worthless,” it is dirty, or “bringing the bush at the home.” A few village members said they initially thought those who practiced permaculture could be witches, but one woman explained that others suspected witchcraft because they did not know what permaculture was.

With Agogo Chisale, we discussed how people who were unfamiliar with permaculture perceived it in Cluster C. She said initially, to others, “it seems like it’s unhygienic. Now they say ‘ah ah, these are real things’ because they are seeing that it is good. They are seeing benefits now,” she explained.

“To one who does not know, it’s like a graveyard,” she commented about yards overgrown with foliage. “But to one who knows that they are beneficial things, they don’t say that, no,” she said.¹²⁰ Agogo Chisale’s comments echoed other permaculture farmers’ sentiment that the social stigma surrounding permaculture practice was largely due to their neighbors not understanding what they were doing and waiting for evidence of its impacts.

When talking about permaculture constraints, participants did not focus on the social stigma they experienced and often did not provide much detail about it. However, Amayi Banda, a permaculture farmer living in Everlasting Harvest’s model village, openly told us about the social stigma she experienced practicing permaculture.

“When [others] see it, there are... two groups actually. Some are happy with it, that I do permaculture, and it helped me on the part of relish, but also the potatoes.... Some are not happy with it as I said, since a lot of biting animals stay there,” she explained.

She said that those people do not “disturb” her permaculture practice, but “they do mock us saying, ‘would a person have bushes around the house like this?’” In such ways, people insinuated that her home was dirty and that she was lazy, acting like someone without a home.

¹²⁰ We conducted this interview in Chichewa in Cluster C on June 27, 2012.

She confided that it does bother her when others mock her, but it does not keep her from using permaculture, because “they themselves come and beg for ndiwo.” She also said that others admire her and view her permaculture garden as something that they would like to have as well.

She explained that it even took some time for her to be okay with how her house looked while using permaculture. “Myself was changed because of our neighbor,” who is also in the model village. “So this neighbor is the one who encouraged me a lot.”

Like Agogo Chisale, Amayi Banda pointed to the stigma that arose from her neighbors’ misunderstanding of permaculture. She further pointed to stigma arising from others skepticism about the efficacy of permaculture techniques, such as organic production that they said would lead to poverty. In addition, she brought up how permaculture practices challenge aesthetic norms of a hygienic, clean home and thereby a clean, healthy family. Sweeping bare ground of all stray debris and trash is a daily ritual in Malawian villages and is reinforced by school curriculum (see Figure 31) and at health clinics as a way to promote good hygiene and health. Colonial officers initially promoted particular forms of hygiene and cleanliness as an integral part of biomedical experimentation and implementation (Tilley 2011:172). McClintock points to the use of soap and cleanliness as a form of social discipline, as “domestic ritual became a

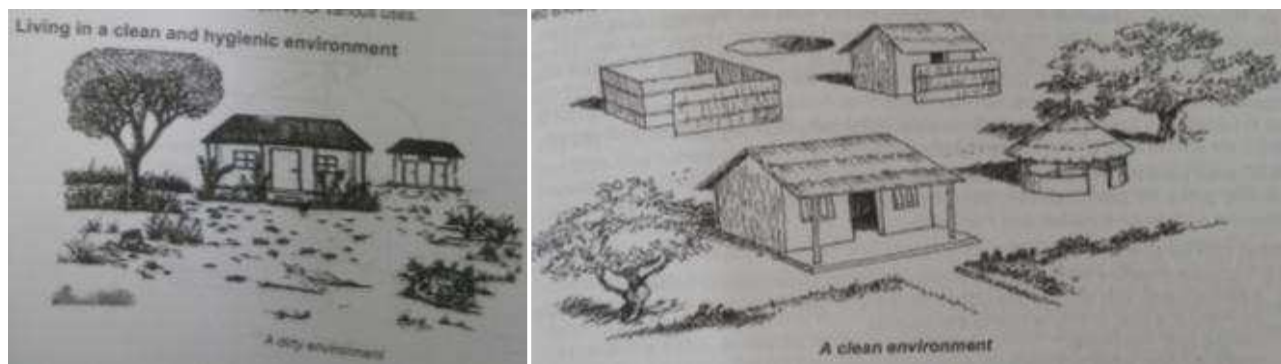


Figure 31. Pictures From a Home Economics Textbook Used in Secondary School Showing a Dirty Home (unswept, plants growing around home) vs. a Clean Environment (swept, no plants next to home)
Source: Lemani Evelyn. “Home Economics in Malawi: A Junior Secondary Course, Book 1”

technology of discipline and dispossession” (1995:226). For example, during colonialism, Social Welfare Officers set up Women’s Rural Institutes as village women’s groups that encouraged “the role of the ‘respectable’ women in the home” (Vaughan 1987:154). These groups instructed women on domestic cleaning routines including “sweep[ing] the courtyard daily” (The Nyasaland Times 1943:6).

The aesthetics of permaculture homes can also raise questions and distrust in a context where participants in Cluster C reported increasing crime and witchcraft accusations. As Agogo Chisale pointed out, forests are associated with graveyards today because most remaining forests in the area surround graveyards. Trees and overgrowth around a home can prompt suspicions that they are hiding something, including practicing witchcraft. In focus groups, participants debated why one could garner suspicion for having trees and overgrowth around one’s home. The participants left the conversation asserting that it is a matter of perspective, one’s beliefs about witchcraft, and one’s social relations. Permaculture farmers may have started to experience less stigma not only because others began to understand permaculture, but also because their social relations with others did not change. As witchcraft in Malawi (Englund 2007) and stigma is “a language of human relations” as Scheper-Hughes writes (1992:374).



Figure 32. Typical Village Home (left) Compared to the Mvulas’ Home Who Were High Permaculture Practitioners (right)

Permaculture farmers reported that while social stigma diminished overall as more households adopted permaculture and there was a general awareness about the methods and goals of permaculture, social stigma was still a constraint for them. Permaculture farmers engaged in awareness raising in their communities to ease stigma against their own adoption of permaculture and to encourage others to adopt permaculture practices in their gardens. As one farmer stated, he explains to people in his community what he is doing, and “when they understand they actually do [it] at their homes.” In two small village clusters, after a few individuals were willing to go against the grain and initially adopted permaculture, people in the villages began to learn about it, after which more households adopted it, which decreased the stigma of permaculture, further encouraging others to try it.

Limits of Permaculture

Permaculture farmers reported facing social challenges and material, environmental, and information constraints when specifically implementing permaculture as shown in Table 14. These constraints are similar to those farmers have faced adopting agroecology and conservation agriculture in sub-Saharan Africa (Snapp et al. 2002; Milder, Majanen, and Scherr 2011; De Shutter 2010:11). The constraints and challenges varied somewhat between phases of initial

	Initial	%, HH	Current	%, HH	Expansion	%, HH
Material constraints	Labor & resource input	13% (2)	Land access	27% (4)	Rent land	33% (5)
			Input access	27% (4)	Labor access	27% (4)
			Lack money	20% (3)	Input access	27% (4)
			Water access	13% (2)		
Social constraints	Social stigma	27% (4)	Social stigma	40% (6)		
	Family conflict	13% (2)				
Environmental constraints			Livestock	40% (6)		
			Rainfall	13% (2)		
Information constraints	Difficult to make designs	13% (2)			Skepticism	13% (2)

adoption, current practice, and future expansion of permaculture. Initially, farmers reported facing material, social, and information constraints. They stated these initial constraints lessened as they established permaculture, family members saw the benefits of it, and neighbors began to understand it. Then, while practicing, they reported increased material constraints and environmental constraints became a problem. Future expansion, they explained, was limited primarily by material constraints and secondarily by information constraints, but not by environmental or social constraints. As others have found, conversion to organic farming and agroecology is knowledge intensive as it involves farming system change (Padel 2001:56; De Shutter 2010:17).

While permaculture farmers could address some material constraints with further education on permaculture strategies and techniques, others are deeply rooted in broader structural constraints. The material and environmental constraints speak to broader challenges that farmers face related to health, livelihoods, and climate change and their entitlements to land, water, and money. The scope of impact of smallholders' permaculture use was primarily limited to the household level because using permaculture did not address other critical determinants of their livelihoods and wellbeing that are constrained by inequality with and limited access to the political, economic, healthcare, and education systems.

Building Adaptive Capacity

Although there were limits to the impact that farmers could affect using permaculture on a small household level, I suggest that permaculture education and practice helped to improve farmers' adaptive or improvisational capacity to a degree. As Almas and Campbell describe, the lens of adaptive capacity frames the shocks, problems, and vulnerabilities of agro-food systems as an integral component of their dynamics (2012:298). Farming always involves risk and

vulnerability, thus farmers strategize, adapt, and innovate as they can within their particular contexts (Ploeg 1993:209–210). Permaculture allowed farmers to adapt in particular ways, from which they reported experiencing benefits.

Mandala writes that peasant production in Malawi continually involves risk taking and risk avoidance (2005:186–187). Farmers grow multiple crops and cultivate multiple land parcels in different microclimates to try to avoid risk and stagger harvests. Mandala particularly points to gardens as a site of risk avoidance because it involves more diverse cropping and staggered harvests than fields (2005:187, 190). I similarly found that conventional garden production was more diverse and staggered through the dry season. Permaculture gardens in yards fulfilled a similar function, as a diverse, risk adverse strategy that built on farmers existing production systems.

Further, permaculture farmers incorporated information and skills from permaculture education into their agricultural strategies, which expanded their adaptive capacity. As anthropologist Richards discusses about agriculture in West Africa, the “sequential adjustment to unpredictable conditions” is central to farming (1993:67). Richards asserts that farmers’ ability to engage in sequential adjustment and “flexible performance requires options to be kept open” (1993:75). Crane, Roncoli, and Hoogenboom write that part of farmers’ agency depends on one’s “creative improvisation and real-time management” in response to variable conditions, problems, and shocks (2011:180). Following geographer Watts, I understand adaptive capacity as farmers’ ability to deploy strategies and flexibly respond to problems and shocks (1983:13, 430).

Permaculture education and skills training enhanced farmers’ existing capacity and farming strategies, because it helped expand their ability to flexibly respond or improvise in the face of systematic vulnerability and shocks. Vincent et al. assert that improved adaptive

strategies reduce one's vulnerability so that the consequences of problems are mitigated in the future (2011:42). Sustainable adaptive strategies stand in contrast to coping strategies used by many conventional farmers, such as using hybrid seeds or asset stripping, or simply being unable to do anything about pests or poor rainfall. Farmers were able to implement many permaculture practices over time because they could use locally available and accessible resources. Based on farmers' reports, their ability to use permaculture information and practices helped deal with agricultural, environmental, and livelihood problems, which resulted in some improvements in those areas (see Table 13). More broadly, as discussed in Chapter 6, a few permaculture farmers said that permaculture education helped to open their thinking about farming and their sense of what is possible in farming. For example, Amayi Sesani said, "Oh there are some [lessons] that as we are learning they open our minds, whereas some are things we just discuss." Permaculture lessons she said, "opened wisdom a lot." Another conventional farming who attended a permaculture training said that "with your teachings we are now open in our minds," because the permaculture trainers discussed different farming options and strategies than she had heard of before. Scott writes that impoverished peasants "face a situation that very sharply restricts their real options," and in the face of such restrictions peasants must adjust and react as best they can (Scott 1985). In this way, permaculture education and skills helped, ever so slightly, to expand the real options available to farmers and expand their adaptive and improvisational capacities to confront their daily struggles.

Other studies have found similar benefits from farmers' use of permaculture and agroecology practices. The permaculture practices used by farmers are elements of integrated agricultural landscape management, which in some other countries has resulted in "adaptation and mitigation goals along with improvements in livelihoods, productivity, and other ecosystem

services” (Scherr, Shames, and Friedman 2012:13). Further, permaculture uses agroecology practices which for resource-poor farmers has “improve[ed] resilience to climate change” by “cushion[ing] the negative impacts” of weather-related events (De Shutter 2010:12). Eyzaguirre and Linares write that it is the “structural complexity” of home garden agroecosystems that provide the basis for their resilience (Eyzaguirre and Linares 2004:7). Evaluations of agroecology use in low-income countries have also shown that its use can improve natural, social, and human capital (Pretty 2008:456). In addition, an evaluation of a permaculture community garden project in Johannesburg found that the project enhanced participants’ human capital through skills development (Wills, Chinemana, and Rudolph 2009:38–40). Over time, the economic, health, and environmental impacts of practicing permaculture may help to support households’ livelihood activities and improve their ability to deal with farming and environmental problems in the future.

However, the impact of permaculture education on adaptive strategies is contingent on the broader context as well as the goals and mechanisms of permaculture implementation. As Watts writes, adaptive strategies are “embedded in the social relations of production, in the historically specific form of the relation between nature and society” (1983:89). As such, the broader context shapes the benefits and limits of permaculture use. Further, geographer Schroeder, in his analysis of agroforestry projects in the Gambia, contends that the impacts of agroforestry significantly depend on “the form of agroforestry” and the social and political-ecological relations embedded and implicated in agroforestry production (1999:129). The impact and implications of agricultural technologies for farmers depends on the commercial exchange value of crops, land use and rights, resource control, and the actors involved. Schroeder argues that one needs to look beyond managerial or technical classifications of agriculture systems,

because, for example, farmers can use agroforestry to further indigenous knowledge, biodiversity, and state resistance, or, to further mono-cropping, commodification, and the privatization of resources (1999:125–129). Therefore, permaculture proved to be useful to permaculture farmers in part because they learned it as a way to incorporate different techniques and information into their livelihood strategies, which they could apply as they saw fit. While permaculture organizations encouraged farmers to focus on household food production, the organizations did not direct farmers to apply permaculture in service of particular goals like market engagement or as part of other work, land, or business development schemes.

Conclusion

All farmers faced a compounding set of farming problems that negatively affected their livelihoods and well-being. Conventional farmers primarily had access to conventional inputs and information on conventional techniques. Conventional farmers had limited ability to apply conventional techniques given their cost and conventional techniques did not improve their farm system in the long term. Permaculture farmers faced the same overall problems as conventional farmers, however, permaculture education and practices expanded farmers' skills and available strategies to contend with some constraints and improvise in response to problems. Permaculture farmers also faced social challenges and material, environmental, and knowledge constraints when implementing permaculture. However, farmers were able to use permaculture practices in a way that provided them with agricultural, environmental, and livelihood benefits.

CHAPTER 8

FOOD SECURITY, DIET, AND HEALTH AMONG CONVENTIONAL VERSUS PERMACULTURE FARMERS

Despite the permaculture expansion constraints Amayi Mvula disclosed, as discussed in Chapter 7, she also reported experiencing improvements in household food access, diet, and health. She said that from her son Bauleni, she learned she could cook different foods together to make ndiwo, to eat different foods, to eat larger portions of ndiwo, and to think more about the nutritional diversity of meals. She learned about new foods, such as shushu (chayote) and passion fruit, that she was able to access after growing them. She also began to eat other plants that she knew about but did not eat, such as cocoyam, chilazi (yam), and air potatoes.

Amayi Mvula attributed her family's food consumption changes to her cooking practice changes. She said their consumption changed because with her new cooking techniques, they were "interested in the way it is cooked." She continued, "So here, we are able to be happy as we eat, because we have put something in the relish that makes it good... in the old [cooking] style, still it was hard that a person can eat today and wish to eat again tomorrow," because of the monotony of their previous diet.¹²¹

For example, across twenty-five lunches that I ate with the Mvulas and documented, Amayi Mvula cooked or served atypical foods for over two-thirds of them. Most often, Amayi cooked mixed ndiwo, such as a mixture of amaranth greens, tomato, green beans, and fresh lima beans, or a mixture of shushu (chayote), baby pumpkin, mustard, hot pepper, and beans. Compared to the ndiwo participants commonly cooked made with one type of green, onion, and tomato, Amayi Mvula's ndiwo were often composites of flavors, smells, and textures as silky

¹²¹ We conducted this interview in Chichewa in Cluster C on July 2, 2012.

greens juxtaposed chunks of squash or beans. However, she made these changes while broadly maintaining local cuisine norms of serving soft ndiwo with contrasting stiff nsima to help one swallow the dry nsima.

Like Amayi Mvula, many other permaculture farmers reported food access, diet, and health changes since implementing permaculture. I argue that, on average, permaculture farmers incrementally improved their food security and diet diversity compared to conventional farmers. As permaculture farmers increased their crop diversity and received nutrition education from permaculture organizations, participants' tastes and food practices began to change as they experimented with newly available foods and learned to incorporate them into their diets and find them delicious. Many permaculture farmers also reported feeling that the health of their household members improved since starting permaculture. Like with the agricultural, environmental, and livelihood benefits of permaculture use, the impacts of permaculture on food access helped to expand farmers' adaptive capacity to contend with seasonal food shortages and limited access to diverse ndiwo foods.

Food Access and Food Security Changes

Many permaculture farmers reported that the agricultural impacts of using permaculture improved their access to food. By altering agricultural production, particularly increasing agrobiodiversity and cultivating during all seasons, permaculture farmers made changes that directly affected their food access. All permaculture farmers reported improved food access since practicing permaculture. Further, on average, they had higher food security scores than conventional farmers.

A key impact and differentiating characteristic of permaculture that permaculture farmers often identified was improved access to food. In semi-structured interviews, all permaculture farmers (15 PF HH) reported improved access to food.¹²² In particular, most permaculture farmers (12 PF HH, 80%) reported improved access to vegetables for ndiwo and two-thirds (10 PF HH, 67%) said that they spent less money buying food than before starting permaculture. Through increased agrobiodiversity and cultivating during all seasons with the use of available water in villages, permaculture farmers obtained more staggered harvests throughout the year around their homes. Most commonly, households reported spending less money buying vegetables and a few said that they bought less maize. Several farmers explained that they now

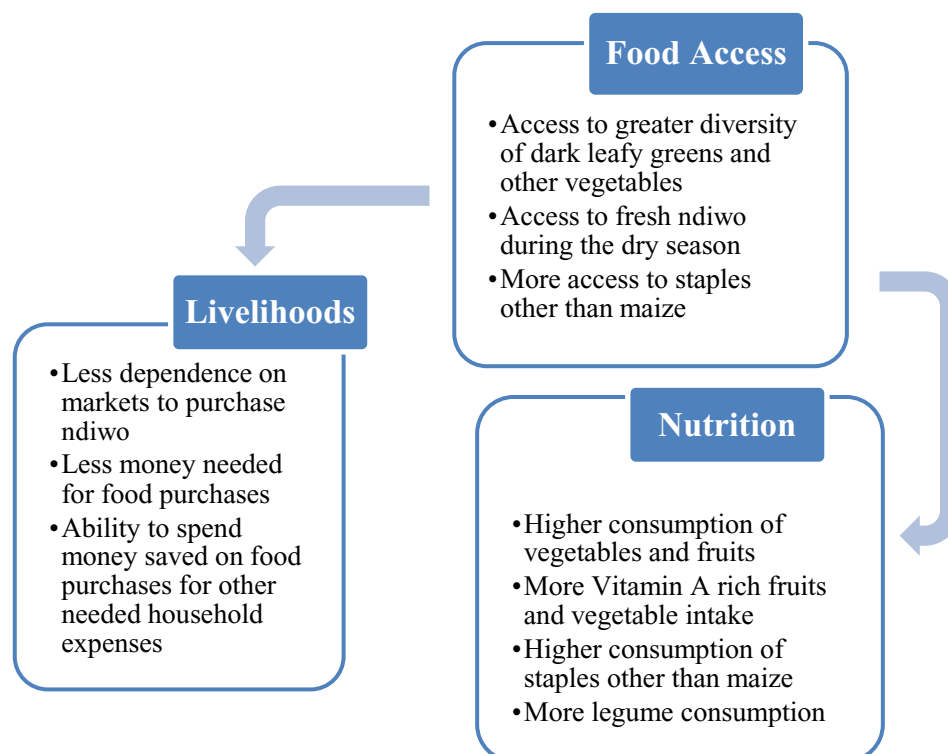


Figure 33. Impacts of Permaculture on Food and Nutrition Security, and Livelihoods

¹²² This section does not include data on one permaculture farmer HH because of missing data for the household, and because the household is an outlier in terms of physical capital, land ownership, and family size.

had access to ndiwo even if they did not have money to buy it, whereas they previously had to buy ndiwo more often. Some households were not pressed to earn additional money to purchase ndiwo, and some people said that they could use the money they saved from not buying food on other non-food household expenses. A few households also said they used the money that they saved buying vegetables to diversify food purchases, such as buying more eggs or meat. As shown in Figure 33, these changes in household food expenses had a positive impact on farmers' livelihoods by decreasing the amount of money needed to purchase food continually. These results are in line with other studies that show that home gardens help to improve year-round food availability and buffer market fluctuations (Eyzaguirre and Linares 2004:10–11).

During four rounds of 24-diet recalls between November 2011 and May 2012, we asked participants for the source of all of the foods that they reported eating that day. There were some differences between permaculture and conventional farmers' food sources. Fewer permaculture farmers got maize flour from their agricultural production than conventional farmers did ($p=0.0177$), which reflects permaculture farmers' smaller average land holdings and the fact that the permaculture practices used typically did not improve permaculture farmers' access to maize. Slightly more permaculture farmers ate dark leafy greens from their agricultural production than conventional farmers did ($p=0.0000$). Slightly fewer permaculture farmers ate purchased vegetables than conventional farmers did ($p=0.0001$), with 44.4% conventional farmers (12 CF HH) buying some vegetables in each diet recall compared to 35.7% of permaculture farmers (5 PF HH). In contrast, more permaculture farmers bought vitamin A rich fruits ($p=0.0114$) and vegetables ($p=0.0143$) than conventional farmers did.¹²³ The increased purchase of vitamin A

¹²³ Wilcoxon signed rank sum test results showed a statistically significant difference between PFs and CFs frequency of maize flour consumption from their own agricultural production ($p=0.0177$, $z=-2.372$), dark leafy greens consumption from their own agricultural production ($p=0.0000$, $z=-4.246$), dark leafy greens consumption

rich fruits may be because permaculture farmers barely grew more vitamin A rich fruits than conventional farmers did, and a few permaculture farmers said that they did not yet benefit from the fruit trees they planted because the trees were not yet fruiting. Further, permaculture farmers may have chosen to diversify their food purchases because they could afford to, due to permaculture nutrition training, or food preference. While permaculture farmers reported being less reliant on purchases for some types of food, they still had to purchase some food.

Abambo Phiri described how he perceived his household's food access changed since beginning to use permaculture. He said, "It has changed as I said that we do have plenty of food"

"It has changed because before we started permaculture, we used to buy food. It ran out before time. But when we started permaculture, we have enough food that we are able to give to other people now."

"Do you know how much less you are spending on food now?" I asked.

"Aaahh more than half," he thought. "As time was passing. Because you don't see benefits of permaculture at the same time, you start seeing it in the second and third year as you go. So to us not spending a lot of money [on food] came in the third year."¹²⁴

Abambo Phiri made a critical observation that while his household benefited from permaculture, it took several years for them to experience those benefits.

Others similarly reported that their access to food improved after using permaculture practices. For example, one 58-year-old high permaculture adopter said that their household's access to food change because more food was available to them from their permaculture production, with the exception of salt that requires money to purchase. He also said that they

from their own agricultural production ($p=0.0000$, $z=-4.246$), purchased vegetables ($p=0.0001$, $z=-3.808$), and purchased vitamin A rich vegetables ($p=0.0143$, $z=2.449$) and fruit ($p=0.0114$, $z=-2.530$).

¹²⁴ We conducted this interview in Chichewa on May 31, 2012.

have more foods to choose from to eat. Whereas, in the past, he said that they had problems accessing food and stayed hungry some days.

We assessed farmers' household food security using an adapted version of the USDA experience-based food security measure (Kennedy, Ballard, and Dop 2011; Perez-Escamilla et al. 2004; Lanning, Tucker, and Ham 2010). Experience-based measures assess an individual's experience of access to food in order to capture the perceptions and experiences of food (in)security (Hadley and Wutich 2009). For example, we asked participant household heads how often their household ran out of food, how often they worried about running out of food, or felt that they were not cooking enough food for their household. I coded the responses with zero to four reflecting the number of days that they experienced the particular event, ranging from never to almost every day respectively. A score of zero indicates that a household is food secure, and the higher the score, the more food insecure the household. The score is based on the reported number of occurrences of eight different events in the previous two or three months (depending on the survey round).¹²⁵ A limitation of the measure is that while the measure intends to assess food security at the household level, the individual participants' perspectives and experiences, such as gender, influenced responses.

We conducted food insecurity surveys three times between November 2011 and May 2012 to capture seasonal differences throughout the farming cycle.¹²⁶ Due to participants'

¹²⁵ The eight events are as follows: worrying about running out of food; running out of food; worked for food; begged for food; children been hungry because do not have enough food; not cooking enough to feed family; spent the whole day without eating; and cooked wild foods because lacked other food.

¹²⁶ The measure was pre-tested and validated in 2010 in Ntcheu District (Lanning, Tucker, and Ham 2010). The measure was validated for this study as well. Using Cronbach's alpha test, the measure has a sufficient alpha of 0.79 for mean household food insecurity scores. The sign of the correlations with food insecurity score means are as expected with physical capital (-0.165), having a job (-0.4), average number of meals eaten during 24-hour diet recalls (-0.31), perceived assistance within their social network (-0.24), running out of 2011 harvest (0.34), not eating what used to (0.39), being female (0.19), and with a Household Dietary Diversity Score (-0.44), which indicates household economic access to food (Kennedy, Ballard, and Dop 2011:23).

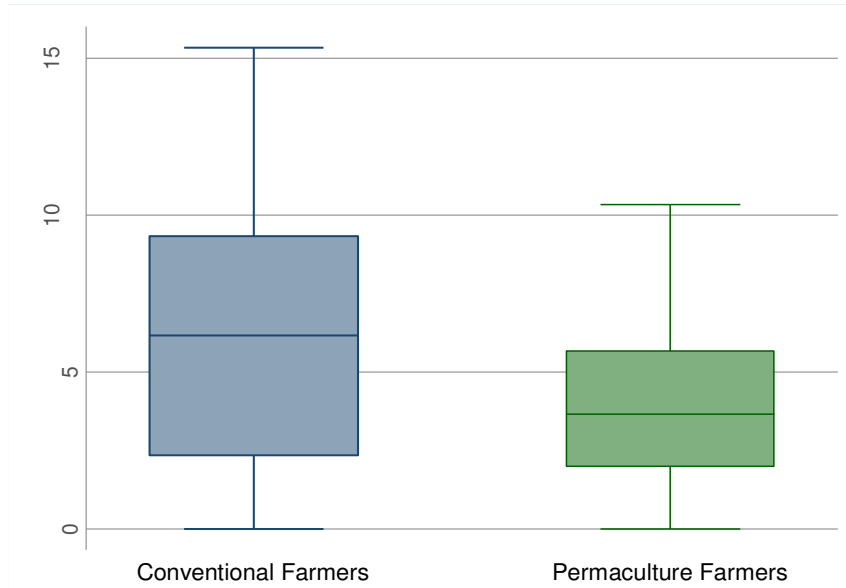


Figure 34. Mean Food Insecurity Score per HH by Sample, CF=28, PF=15

availability, we were not able to conduct the survey with all households during all survey rounds time periods. Over half of households at least once reported experiencing worry (33 HH, 77%), not cooking enough (29 HH, 67%), running out of food (26 HH, 60%), and their children being hungry (26 HH, 60%). In addition, these events occurred most frequently at an average of about once a month. The common occurrence of these events indicates that food insecurity is indeed a problem in the communities.

Over the three survey rounds, conventional farmers had a slightly higher mean food insecurity score of 6.26 compared to permaculture farmers' mean score of 4.12 ($p=0.000$), out of a total possible score of 32 (which would have been each event occurring almost every day) (see in Figure 34).¹²⁷ Linear regression analysis showed that using permaculture was related to food insecurity scores while controlling for household characteristics, including physical capital, wage

¹²⁷ The average difference in food insecurity scores is statistically significant according to Wilcoxon signed rank sum test results ($p=0.0000$, $z=-5.485$).

labor, land ownership, and estimated land size.¹²⁸ In addition to practicing permaculture, running out of the 2011 harvest ($p \leq 0.05$ significance level) and physical capital ($p \leq 0.10$ significance level) had a relationship with food insecurity scores.¹²⁹ In the linear regression models, practicing permaculture improved food insecurity scores slightly more than physical capital, while running out of the harvest worsened food insecurity scores.

In order to categorize household food security, I developed a food security scale to apply to households' mean food insecurity scores. I had difficulty determining how best to create a scale to reflect participants' food security and deciding whether it should be a relative or objective scale. There are two broad methods for constructing food security scales – based on total scores¹³⁰ or based on the meaning of the indicator questions (Nanama and Souli 2007:2; Frongillo, Nanama, and Wolfe 2004). Based on my understanding of households' food security situations from knowing them, I determined that the different ways of constructing total scores overly obscured qualitative differences between households' food security.

Others have written that food security scales developed based on the meaning of the measure questions, or categorical variables, are more qualitative classifications based on the absence or presence of different criteria (Frongillo, Nanama, and Wolfe 2004; Deitchler et al. 2011). Typically, these scales differentiate between psychological stress, coping strategies, and

¹²⁸ Linear regression analysis was used to control for the impact of physical capital, household size, and running out of harvest from 2011 before the 2012 harvest on household food insecurity score means ($R^2 = 0.36$, $\text{Prob} > F = 0.005$). Additional independent variables were added to the model and run one at a time due to the small sample size to control for gender, perceived assistance within their social network, household head education, household head age, highest education in household, land ownership, land size estimates, wage labor, informal business activity, selling agricultural goods, number of livelihood activities, piecework, agricultural input expenses, and estimated maize yields.

¹²⁹ The linear regressions showed that being in the PF sample group ($p = 0.005$), running out of the 2011 harvest ($p = 0.013$), and physical capital ($p = 0.099$) had a relationship with food insecurity scores.

¹³⁰ Based on total scores, one method is to make levels based on equidistant food insecurity scores (Perez-Escamilla et al. 2004:1925). Another method is to determine the levels based on score quintiles, which creates a relative scale of food security, which can be useful depending on the purpose of the scale. However, with both methods the same numerical score can encompass qualitative differences (Frongillo, Nanama, and Wolfe 2004:28).

Table 15. Food Security Category Criteria

Secure	Mild	Moderate	Severe
No worry	Worry	Worry	Worry
No coping strategies	Short-term food access coping strategies	Short-term food access coping strategies	Short-term food access coping strategies
No running out	Running out	Running out	Running out
No reduced consumption	No reduced consumption	Reduced consumption 1/8 of days or less	Reduced consumption more than 1/8 of days

reductions in food quality and quantity. These categories are either constructed just based on a negative or positive answer to questions, or considering both the meaning of the question and the response frequency or severity (Frongillo, Nanama, and Wolfe 2004:28–29). I decided to use the later method to both differentiate between the occurrence and frequency of different events. I categorized the questions into four categories based on their meaning – worry, short-term coping strategies, running out of food, and reduced consumption (see Table 15). I followed the criteria for categories that other scales used to determine frequency cut offs for each level and made sure that the frequencies categorized households across the scale and that the classifications made sense based on my knowledge of the households. After conducting analysis, I realized two other items should have been included in the food security measure but were not. In interviews, we asked how often the household had not been able to eat what they were used to and if they had run out of their staple farm food. The question about not eating what they were used to elicited information about reductions in food quality, which the measure did not address well. In addition, whether or not a household ran out of their staple food supply is a key indicator of food security identified by participants and thus should have been included in the measure. The answers to these questions were not given in a format that could be consistently quantitatively coded in a commensurate manner to combine with the measure score, and the question about not

eating what they were used to was not structured enough to be part of the scale as written. Despite the limitations, the food insecurity measure is still useful to systematically compare permaculture and conventional farmers.

I classified households as food secure, mildly food insecurity, moderately food insecurity, or severely food insecurity based on the criteria laid out in Table 15. Food secure meant that households did not experience any adverse emotions or events. Mild food insecurity allowed for worry, short-term coping strategies, and running out of food, but no reduced consumption. The moderate and severe categories were differentiated based on frequency of reduced consumption, with moderate households reducing consumption 1/8 of the days or less (i.e. 11.25 days or less in three months), and severe households reducing consumption more than that. Over half of households were classified as having moderate food insecurity, which is appropriate given the context of impoverishment, food access constraints, and prevalence of malnutrition in the district.

As shown in Figure 35, there was a difference in the portion of conventional and permaculture farmer households that were classified within the food security categories at the severe end of the spectrum. Three times the portion of conventional farmers were severely food insecure compared to permaculture farmers. In addition, on average, permaculture farmers

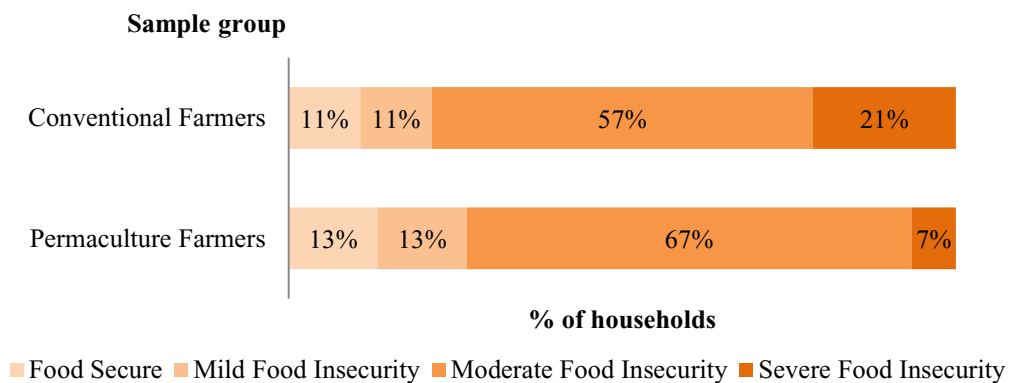


Figure 35. Food Security Categories by Sample, CF=28, PF=15

reported slightly fewer occurrences of worrying about running out of food ($p=0.0000$), running out of food ($p=0.0025$), their children being hungry ($p=0.0089$), and not cooking enough for their household ($p=0.0008$).¹³¹ Based on analysis of food insecurity scores and participants' self-reporting, I suggest that using permaculture incrementally helped improve households' access to food and build farmers adaptive capacity to cope with short- and long-term food shortages based on limited access to quality food, sufficient quantity of food, and diversity of food. Permaculture production helped farmers to access food as part of their improvisational capacity to find food continually and make do with the food to which they could access. In the short- and long-term, improved access to food also helped to reduce farmers' vulnerability to running out of food to a degree and thus reduced their reliance on coping strategies, such as reduced consumption or asset stripping to purchase food.

However, practicing permaculture did not solve household food security problems or prevent farmers from experiencing food insecurity. As shown in Figure 35, most permaculture and conventional farmers experienced moderate food insecurity. As such, permaculture production may have made the most difference at the margins by preventing severe food insecurity. For example, I spoke with Josephy's parents under speckled shade provided by the canopy of a small tree, which pushed through the mulch and tangled vines in one of the permaculture garden beds in their yard. Despite Josephy's implementation of permaculture at a high practitioner level, including several garden beds planted with a variety of vegetables, tubers, and young trees, his family still experienced food insecurity. Amayi and Abambo Mbewe sat together with their legs outstretched, bare feet crossed at the ankles. Abambo aimlessly played

¹³¹ Wilcoxon signed rank sum test results showed that there was a statistically significant difference between the average frequency that PFs and CFs reported worrying about running out of food ($p=0.0000$, $z=-4.270$), running out of food ($p=0.0025$, $z=-3.026$), their children being hungry ($p=0.0089$, $z=-2.616$), and not cooking enough ($p=0.0008$, $z=-3.370$).

with sprigs of grass in his hands, leathered by over forty years of farming. Amayi's grey hair curled along her temples out of her mustard and blue colored head wrap.

Amayi Mbewe said that she worried in January when they had to come up with a plan to earn money to buy more food. Further, she said that they suffered before having other food and so they had to go the whole day without eating three times in January. She added, four times between December and January, she baked chikondamoyo (corn muffins; literally meaning that which loves life) and cooked tea to eat instead of eating the usual nsima. She qualified that her children understood that it was hard for her and Abambo to get enough food for everyone, because they are grown.

Rather than substantially changing household food security status, the food access improvements from using permaculture enabled households to access food, and vegetables in particular, more consistently during the year without having to buy them. This helped to create a nutrition buffer so households could access some complementary food needed to eat with nsima, rather than having to forgo lunch or dinner because of lacking ndiwo foods. In addition, a number of permaculture farmers made herbal tea from crops in their yard like lemon grass or roselle, enabling them to eat breakfast when they could not afford tea. Breakfast was the most commonly skipped meal by participants, largely due to not being able to afford tea and/or sugar. The small scale of permaculture use in part limited the impact of permaculture practices on food security. As a result, permaculture primarily improved access to vegetables and fruits rather than staple crops and legumes, which would be possible on larger pieces of land. In addition, food security is impacted by broader factors like income, weather, market prices, food availability, and health status, which varyingly affect particular households. Due to the small sample size, I

was not able to assess if there was a relationship between the level of farmers' permaculture practice and their food security.

Food Consumption Changes

Permaculture farmers food consumption choices also somewhat changed and diversified with improved food access and permaculture nutrition and cooking training. On average, permaculture farmers had slightly higher diet diversity than conventional farmers at an individual level.

To assess diet diversity and nutritional intake, we used an FAO 24-hour diet recall to collect dietary consumption data from which a diet diversity score was constructed (Kennedy, Ballard, and Dop 2011:23–24). We conducted the 24-hour diet recall with farmers four times between November 2011 and May 2012, during the planting, growing, and harvest season, in order to document food security and nutrition fluctuations throughout the agricultural cycle (Kennedy, Ballard, and Dop 2011:13). From the diet recall, the women's diet diversity score (WDDS) score was constructed based on a 9-food group measure that predicts the micronutrient adequacy of diets for individuals (Kennedy, Ballard, and Dop 2011:23–25).¹³²

In the 24-diet recall, we asked participants what they ate for each meal and in between each meal, and then we went through a list of food groups and asked if they food from that group to illicit any foods they did not mention. We also asked where they got each food that they ate to determine food sources for different households, types of foods, and times of the year. In addition to my observation and informal eating and cooking with families, the diet recalls

¹³² The nine food groups used in this measure are: (1) starchy staples, (2) dark green leafy vegetables, (3) other vitamin A rich fruits and vegetables, (4) other fruits and vegetables, (5) organ meat, (6) meat and fish, (7) eggs, (8) legumes, nuts and seeds, and (9) milk and milk products (Kennedy, Ballard, and Dop 2011:24).

enabled us to elicit recipe ingredients for different dishes and learn about which foods people eat together.

Permaculture farmers on average had slightly higher diet diversity than the conventional farmers ($p=0.0000$). Because this diet diversity measure is only applicable on an individual level, results are presented for each individual separately rather than as a household average. The permaculture farmers consumed a mean of 4.65 food groups and the conventional farmers consumed a mean of 4.06 food groups (see Figure 36).¹³³ Linear regression analysis showed that practicing permaculture was related to diet diversity scores while controlling for household characteristics, such as physical capital, wage labor, and land ownership.¹³⁴ In addition to

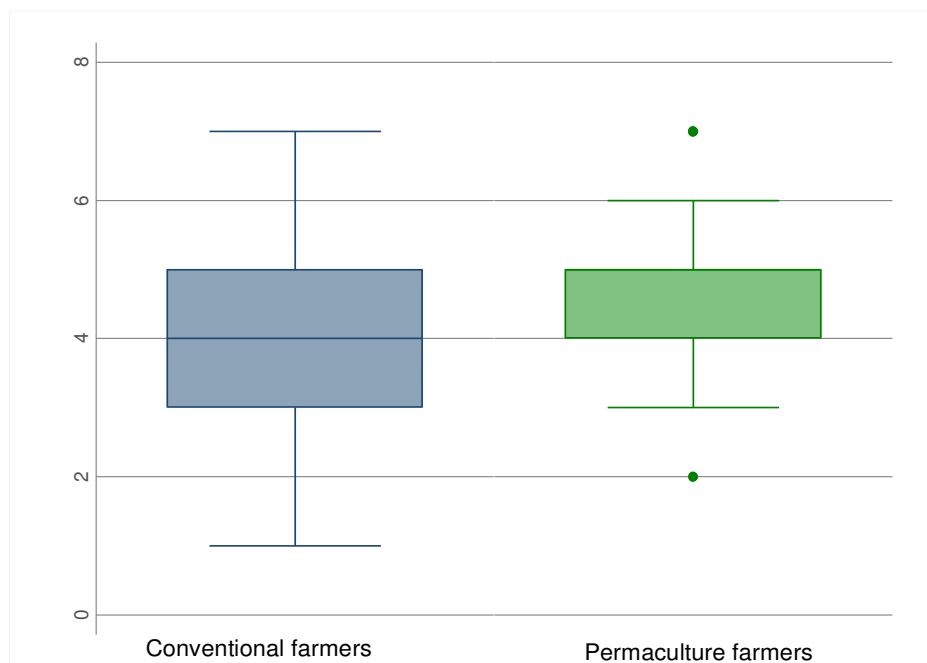


Figure 36. Diet Diversity Score, Conventional n=75, Permaculture n=51

¹³³ The difference between the permaculture and conventional farmer diet diversity score means is statistically significant according to a Wilcoxon signed rank sum test ($p=0.0000$, $z=-10.635$).

¹³⁴ Linear regression analysis was used to control for the impact of physical capital, household size, and running out of harvest from 2011 before the 2012 harvest on household diet diversity means (the household level had to be used for regression analysis) ($R\text{-squared}=0.32$, $\text{Prob} > F=0.01$). Additional independent variables were added to the model and run one at a time due to the small sample size to control for gender, perceived assistance within their social network, household head education, household head age, highest education in household, land ownership, land size estimates, wage labor, informal business activity, piecework, selling agricultural goods, number of livelihood activities, agricultural input expenses, estimated maize yields, and permaculture practice scores.

practicing permaculture, the highest education level of a household member, engaging in informal business, doing piecework ($p \leq 0.05$ significance level), and gender ($p \leq 0.10$ significance level) had a relationship with diet diversity scores.¹³⁵ In the linear regression models, practicing permaculture improved diet diversity scores slightly more than physical capital, education, and doing informal business. Education may improve diet diversity because it is related to physical capital and may be related to nutritional knowledge. Informal business may improve diet diversity by improving access to cash income. Doing piecework lowered diet diversity scores, perhaps because, as Mandala writes, piecework often takes labor away from household agricultural production (2005:126–127). Women likely had lower diet diversity scores on average because, as Mandala also asserts, women typically have unequal entitlement to food (2005:207–208, 223).

The distribution of conventional and permaculture farmers' diet diversity scores according to low, medium, and high diet diversity is significant. These nutritional quality classifications are based on a FAO study in Mozambique which used the same diet diversity measure and determined that a score less than 3 indicated low diet diversity, a score of 4 to 5 indicated medium diet diversity, and a score of 6 or more indicated high diet diversity (Kennedy, Ballard, and Dop 2011:29). I decided to use this classification because nutritionists designed and tested it and food sources and consumption patterns among participants in Malawi were similar to participants in the Mozambique study (Wiesmann, Arimond, and Loechl 2009:4, 30, 33). There is currently no international consensus about how to construct diet diversity scores or thresholds for nutritional quality or adequacy (Kennedy, Ballard, and Dop 2011:5, 26).

¹³⁵ The linear regressions showed that being in the permaculture farmer sample group ($p=0.007$), highest education level of household member ($p=0.039$), engaging in informal business ($p=0.053$), doing piecework ($p=0.16$), and gender ($p=0.077$) had a relationship with diet diversity mean scores.

Table 16. Food Groups Consumed by $\geq 50\%$ of Farmers by Diet Diversity Category, n=148

Low diet diversity (1-3)	Medium diet diversity (4-5)	High diet diversity (6-7)
Starchy staples	Starchy staples	Starchy staples
Dark leafy greens	Dark leafy greens	Dark leafy greens
Other fruits & vegetables	Other fruits & vegetables	Other fruits & vegetables
	Legumes	Legumes
	Vitamin A rich fruits & vegetables	Vitamin A rich fruits & vegetables
		Meat & fish

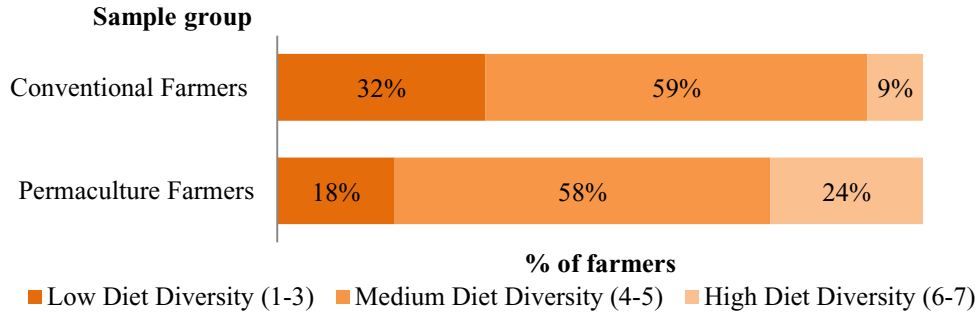


Figure 37. Diet Diversity by Classification, Conventional n=93, Permaculture n=55

Table 16 shows which foods over half of farmers ate in each diet diversity category. The diet diversity score differences between groups were similar to the food security differences, as the differences are at the poles of the spectrum (see Figure 37). More than twice the portion of permaculture farmers had high diet diversity compared to conventional farmers, and almost half the portion of permaculture farmers had low diet diversity compared to conventional farmers. As with food security, using permaculture did not prevent farmers from having low diet diversity. However, improved food access from practicing permaculture helped cushion farmers' vulnerability to food shortages and expand access to diverse foods.

There were also differences in micronutrient intake between the groups. As shown in Figure 38, more permaculture farmers consumed whole grain maize flour, other fruits and vegetables, legumes, and fats at the $p \leq 0.05$ level of significance and vitamin A rich fruits and vegetables other than dark leafy greens at the $p \leq 0.1$ level of significance.¹³⁶ Permaculture

¹³⁶ Wilcoxon signed rank test results were statistically significant (at the $p \leq 0.1$ level given the small sample size (Magnani 1997:17–18)) for whole grain maize flour ($p=0.0000$, $z=-5.336$), vitamin A rich fruits and vegetables

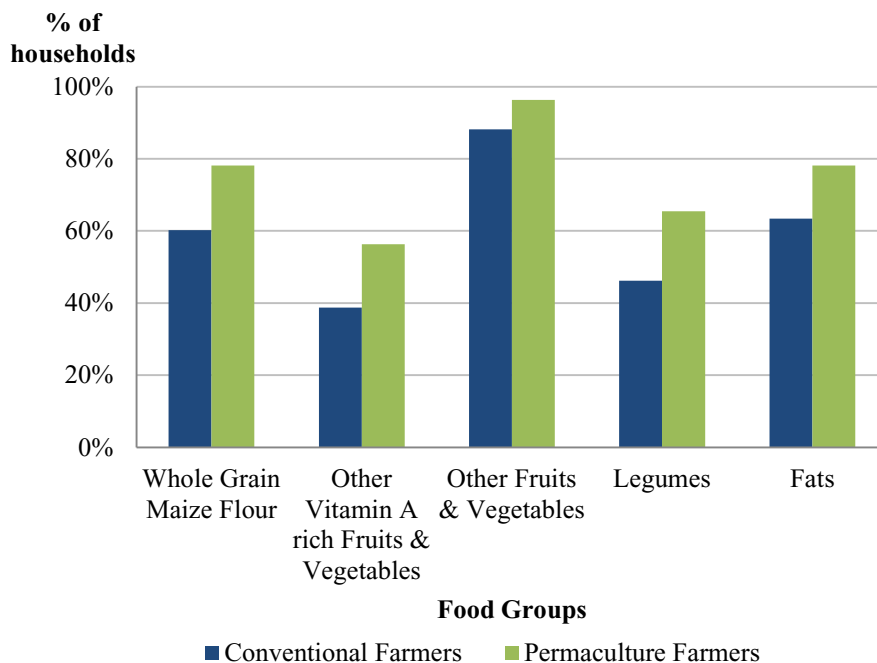


Figure 38. Food Group Consumption Differences, Conventional n=93, Permaculture n=55

farmers reported that they consumed more vegetables and fruits because they grew more of those crops. For these farmers, increased production of those crops led to increased consumption, instead of selling most of the additional produce. In part this increased diet diversity related to permaculture farmers' slightly higher average consumption of snacks (1.51 snacks) than conventional farmers (0.88 snacks) ($p=0.000$), as was recorded in 24-hour diet recalls.¹³⁷ There was no statistically significant difference between the numbers of meals eaten by the groups, likely because permaculture use primarily improved access to complementary foods. The fact that more permaculture farmers consumed fat in the form of cooking oil may be a result of being able to diversify food purchases away from necessary vegetables as some reported doing, or this difference could be unrelated to permaculture practice. As discussed in Chapter 5, the choice to

other than dark leafy greens ($p=0.096$, $z=-1.664$), other fruits and vegetables ($p=0.0000$, $z=-8.729$), legumes ($p=0.0023$, $z=-3.048$), and fats ($p=0.0000$, $z=-5.578$).

¹³⁷ According to a Wilcoxon signed rank sum test there was a statistically significant difference between mean number of snacks ($p=0.000$, $z=-5.093$) and meals ($p=0.000$, $z=-5.748$) eaten between permaculture and conventional farmers, as recorded in 24-hour diet recalls.

eat whole grain or refined maize flour is one shaped by food access, preference, nutrition, energy requirements, and cultural norms. Some permaculture farmers were exposed to nutrition education that emphasized whole grain maize flour consumption, however the difference in consumption could be due to other factors like growing less maize as some permaculture farmers did, access to maize, or preference. These consumption differences between the groups' vitamin A and protein consumption are important as these nutrients are often lacking in Malawians' diets. Low diet diversity including inadequate vitamin A and protein consumption contribute to malnutrition, which stunts physical growth and mental development and weakens the immune system (Moffat and Prowse 2010; Pinstруп-Andersen 2010; Dickinson et al. 2009). Anthropologist Singer emphasizes the compounding biosocial impact of HIV/AIDS, malnutrition, and poverty on health and vulnerability in southern Africa (2011).

Particularly relevant to permaculture is literature that discusses the importance of increasing agricultural biodiversity to increase dietary diversity, thereby improving food security and health (Frison et al. 2006; Fleuret and Fleuret 1980; Frison, Cherfas, and Hodgkin 2011). The diet diversity impacts of permaculture use, as a food-based approach, are supported by studies from public health and medical anthropology that show that community-based gardening interventions in sub-Saharan Africa improve nutrition at household and community levels by increasing direct access to and consumption of fruits and vegetables (Muller and Krawinkel 2005; Romero-daza et al. 2009; Pinstруп-Andersen 2010:143; Faber and Benade 2003; Yeudall et al. 2007; Murphy 2008). Burchi, Fanzo, and Frison write that home gardens are often a central component of improving micronutrient intake in food-based programs (2011:365). This literature suggests that permaculture may be able to help improve nutrition as a result of diet diversity and food access improvements.



Staples

- Ufa woyera (refined maize flour)
- Ufa mgayiwa (whole grain maize flour)
- Sweet potatoes

Vegetables & fruits

- Mustard greens
- Hot pepper
- Cucumber
- Tomato
- Chidede (type of hibiscus)
- Lemon

Legumes

- Beans
- Amaranth seeds
- Groundnut flour

Animal products

- Eggs

Oil & fats

- Cooking oil

Herbs & medicinal

- Lemongrass

Condiments

- Salt

Figure 39. A High Practitioner Permaculture Household with Good for One Day
 Photograph: Austin Dunn

While the food security and diet diversity differences between permaculture and conventional farmers were not large, the incremental improvements experienced by permaculture farmers, particularly at the margins, is beneficial given the pervasive food insecurity, lack of diet diversity, and malnutrition in Malawi.

In addition to improved food access, permaculture farmers' food practices and consumption were somewhat influenced by nutrition education through trainings held by the NGOs and interactions with NGO employees or neighbors who attended trainings (see Figure 40). As discussed in Chapter 5, I helped develop, facilitate, and fund a nutrition and cooking training in each Cluster to try to give back to the communities. In this way, I may have shaped some of the participants' practices and research results. The trainings were introductory, lasting a maximum of three hours. They covered food groups, ways to diversify diets including eating more whole grain maize flour, fruit, and ndiwo, and mixing vegetables when making ndiwo. The



Figure 40. Nutrition and Cooking Education with Participants

recipes taught, demonstrated, and sampled at the trainings were developed by Malawians Rachel and Francine from Ulimi and Amayi Mvula in an effort to create locally appropriate and delicious recipes with available ingredients. Participants discussed how the trainings, and learning about new foods and cooking methods generally, helped to open options for them because changing food practices requires information, ideas, and experimentation.

Increased access to more diverse foods led to changes in food consumption as shown in Figure 41.¹³⁸ Eleven permaculture farmers HH (92%) reported that their diet changed since beginning permaculture. Of these, over three-quarters (10 PF HH, 83%) reported that they ate new foods since starting permaculture like lima beans and air potatoes (average of 3.4 new foods), three-quarters (9 PF HH, 75%) said they ate more vegetables, and just over half (7 PF HH, 58%) reportedly ate more fruits. For some, it was because they could access new foods. Others learned that uncommonly consumed foods like cocoyam and pumpkin seeds are edible. As one permaculture farmer explained, his household now had a wider range of choices for *ndiwo*, which allowed them to vary the vegetables they ate day to day. Higher consumption of

¹³⁸ The semi-structured interview data in this paragraph is from 12 HH, due to incomplete data from 3 HH.

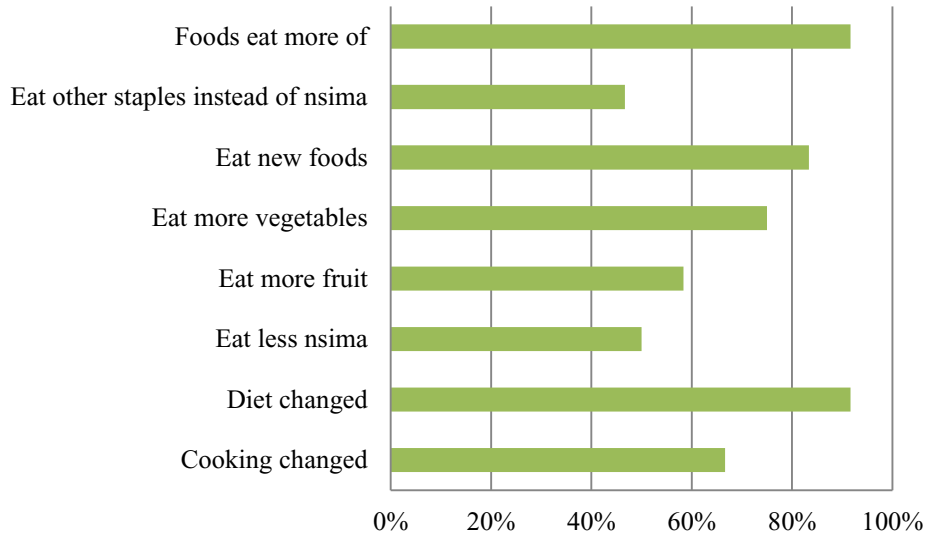


Figure 41. Food Practice Changes Reported by Permaculture Farmers, PF=12

fruits and vegetables has been found among households with kitchen gardens in other sub-Saharan African countries as well (Pinstrup-Andersen 2010; Faber, Witten, and Drimie 2011).

Six permaculture farmer HH (50%) also reported eating less nsima due to eating more foods during the day, more ndiwo, or eating other staples instead of nsima. Diet recalls did not reflect a reduced frequency of nsima consumption; however, the diet recalls did not assess food quantities. A few permaculture farmers said that permaculture trainings that discussed ways to diversify one's diet contributed to reduced nsima consumption. One woman explained that she learned you can eat any food that makes you full and that she could be full from eating sweet potatoes, so she said she learned that she could eat other staples that make her full for dinner instead of nsima.

Of those we asked, over half of conventional farmers (12 CF HH, 63%) specified only needing maize or nsima to have enough food, compared to one permaculture farmer (1 PF HH, 10%). Conventional farmers reported needing an average of 198 kg/person/year (range 125-312kg), compared to permaculture farmers who reported needing an average of

160kg/person/year (range 100-208kg) ($p=0.0002$).¹³⁹ Permaculture farmers on average reported needing 20% (100g) less maize per person per year, with a lower range than conventional farmers. This difference may suggest a change in how much maize permaculture farmers think they needed to be satisfied and healthy, which perhaps relates to their changing food practices.

Two-thirds of permaculture farmers (8 PF HH, 67%) reported that cooking in their household changed since beginning permaculture. For instance, some used flour from sunflowers instead of groundnuts in ndiwo, made herbal tea instead of buying black tea, or cooked ndiwo differently. One permaculture farmer explained that her family loves the new food. She said that she now combines different greens together to increase the vitamin content of the ndiwo.

Participants often explained that the quality and taste of ndiwo influences how much ndiwo and nsima one consumes during a particular meal. Other participants explained that it was at times hard to eat the same thing day in and day out. I observed that the monotony of diets affected some children's food consumption. For example, during lunch one day, a girl around the age of five leaned against her grandmother, a conventional farmer in Cluster A. The girl only dipped chunks of nsima in the watery pumpkin leaf sauce and did not eat any of the pumpkin greens. Her grandmother said she reasoned that her granddaughter was probably tired of eating pumpkin leaves, because that is often what she cooks. Amayi Mvula said that they used to eat pumpkin greens only, but then she learned she could cook it with other ingredients to make ndiwo look and taste better, and as a result, she said that her children began to eat more. Amayi Mvula diversified the flavors and textures of ndiwo by mixing different vegetables and legumes she harvested from their permaculture garden (see example in Figure 42).

¹³⁹ Wilcoxon signed rank sum test showed a statistically significant difference between the kilograms of maize the conventional farmers and permaculture farmers reported is needed per person per year ($p=0.0002$).



Amayi Mvula's Mixed Vegetable Ndiwo

Amaranth greens
Fresh lima beans
Fresh beans
Green beans
Tomatoes
Onion
Oil
Salt

Figure 42. Mixed Ndiwo that a Permaculture Farmer Started to Make After Starting to Use Permaculture

For some farmers, their change in tastes and cooking was an experiential process of having access to new foods, learning about them, trying them, and learning to find them delicious and thus incorporating them into their food practices. Several permaculture farmers said that when they were introduced to new foods, they evaluated the food by trying it to judge its taste and how it feels when eaten. For example, a few permaculture farmers asserted that one cannot eat sweet potatoes with ndiwo or become full from such a meal before conceding that they had never tried to eat sweet potatoes in place of nsima because sweet potatoes are typically eaten alone for breakfast. However, after eating a lunch of sweet potatoes and ndiwo at a permaculture training, they changed their mind and said that they did enjoy the meal and could be full from it. Amayi Sesani told me that when she first tried the passion fruit her husband planted, which blanketed the roof of her home, she said that she did not like it because it was too sour. She harvested quite a number of passion fruit so she said that she tried it a few more times and that the flavor grew on her. She said that she particularly came to like passion fruit pulp mixed with a little sugar. These examples show how food practice changes were an experiential process for some farmers.

For instance, we discussed household diet and cooking changes with Abambo Phiri. I asked him, “Has your household’s diet changed since you started permaculture?”

“Eya, it has changed,” he affirmed.

“How has it changed?”

“What has changed is aah, before we started permaculture we were just eating a lot of nsima without thinking that, that maybe we need to eat a fruit, maybe, maybe we can drink a little water. Yeah, so now we realized that there’s need to have bananas, water. And also eating vegetables like [intelligible] sleeping husband. Those are some of the ndiwo we didn’t know but when we started permaculture we’ve begun to know them.”

Abambo Phiri said that he knew about some of the crops like chilazi (yam), sleeping husband, luni (Cat’s whiskers), and air potato, which he reports they eat more frequently now. “Aah we used to eat, but the days weren’t many of eating those relish. By not realizing the nutrients and also maybe it’s found at our friend’s, but we don’t realize that we can also have [it].”

“How have your household members reacted to these changes?” I asked.

“A lot of people are admiring so much.”

“People of this house?” Chisomo asked.

“They are happy,” Abambo Phiri said. “Because the eating is good. Food is not lacking.”

I asked, “Has cooking in your household changed?”

“The change is that as I said that it’s not every time that we do cook nsima. Sometime we cook such as the air potato and eat as staple food... Before permaculture there was no cooking

nutritious relish. But when we started permaculture we've realized that we should be cooking nutritious relish so that we shouldn't be losing nutrients.”¹⁴⁰

To explore participants food preferences and look for common food preferences, we did a pair-wise ranking exercise with farmers. Using cards with labels and pictures, we asked farmers to choose which of two foods they would prefer to eat for lunch or dinner.¹⁴¹ Results from the paired comparison exercises indicate how food preferences are complex and shaped by food access, perceptions of nutrition, energy requirements, and cultural norms.

More permaculture farmers indicated a preference for some common foods like okra and pumpkin greens than conventional farmers did. More permaculture farmers may have stated a preference for these vegetables because they are common, important foods in Malawi, but the permaculture farmers did not have to primarily rely on eating these vegetables as many conventional farmers did who said that they were tired of eating them. Among protein ndiwo foods, more permaculture farmers said they preferred eggs and fish, whereas more conventional farmers said they preferred beans, perhaps reflecting permaculture farmers' increased production and consumption of beans. Many participants discussed how they preferred foods that they ate less often over those that they could easily access and that they ate day in and day out. For staples, more permaculture farmers preferred rice and cassava than conventional farmers did. Both groups primarily preferred whole grain maize flour (mgayiwa), however, refined white flour (ufa woyera) was a close second for conventional farmers, whereas no permaculture farmers said that they preferred white flour even though it can be seen as more valuable. The

¹⁴⁰ We conducted this interview in Chichewa in Cluster C on March 14, 2012.

¹⁴¹ In pair-wise rankings, each combination is tested to see the preferences between the foods and across the group (Bernard 2006). They did three sets of rankings: (1) protein (body building) ndiwo – chickens, beans, eggs, fish, soya; (2) vegetable ndiwo – cabbage, pumpkin greens, okra, cabbage, and tomato; and (3) carbohydrates (energy giving) – Irish potatoes, cassava, rice, whole grain maize flour, and refined maize flour. We chose these foods because they are typically consumed and have a range of qualities.

paired comparison exercise suggests that participants' food access and daily consumption may influence their food preferences.

The above diet and cooking changes indicate that food access changes resulted in different food consumption choices and practices for permaculture farmers given the close connection between food access and household agricultural production. The fact that permaculture farmers made different food consumption choices and changed some of their food practices with improved food access and new information about food and cooking, suggests that Malawians do not have inflexible food preferences and that their choices changed with circumstance. The cuisine patterns used by permaculture farmers did not change but the food practice changes they made may indicate that what foods could fulfill those categories under particular circumstances were changing, as others found with food changes in Tanzania (Ohna, Kaarhus, and Kinabo 2012). This could have implications for one's sense of food security because which foods actually fill different cuisine categories in a local context relates to what foods people require to feel and be food secure. The way that farmers incorporated new foods is commensurate with Mintz's work on sugar, which highlights the close link between the production and consumption of food, that the meaning of new foods "arises out of use" (1985:xxix), and that food consumption choices depend on both one's preferences and the constraints under which choices are made (Mintz 1985; Mintz 1996). Permaculture farmers diversified their food practices and choices after they had access to slightly expanded food options and after exposure to permaculture trainings that introduced food practice changes. Most study participants were not satisfied with their current diets, although they valued their cuisine. In this context, food practices seemed to be malleable and changed in particular ways in response to food access changes. For the participants I worked with, cultural conceptions of cuisine and

taste did not inhibit improvements to food security and diet in the way that some Malawian government and donor agencies assume.

The above findings suggest that permaculture, as an agricultural intervention, had specific impacts on food consumption and practices that are directly related to the food production impacts of permaculture methods. The farmers primarily ate the permaculture harvests and so the resulting food security and diet diversity changes were closely related to the agricultural production changes that farmers made. In this case, farmers experienced improved food access because permaculture addressed a key problem – year-round access to fresh fruits and vegetables. Permaculture practice did not significantly affect maize access because farmers used permaculture on very small scales.

Health Impacts

Some permaculture farmers reported feeling that the health of their household members improved and disease incidence was lower compared to before they started permaculture. Including permaculture farmers from each practice level, nine permaculture farmers HH (75%) reported improved health and ten permaculture farmers HH (83%) reported that diseases occurred less often in their households.¹⁴² These households reported that malaria incidence decreased the most; however, it is important to note that individuals and health workers may over diagnose malaria because of its general prevalence and limited ability to test for the disease.

Amayi Sesani explained, “Some of the things I plant, they help me that our body should be free. Like this lemon grass here, when I get coughs I don’t trouble myself to buy medicine. I just prepare the same lemon grass and drink it, even for malaria, we also get help from it... as of

¹⁴² The semi-structured interview data in this paragraph is from 12 HH due to incomplete data from 3 HH.

now, I see that frequent illnesses are decreased now because the things that I am able to plant are the things I'm getting help from in my life.”

“The entire family is the one showing the change,” she continued. “Because the illnesses I am talking about were not for only one person... one is attacked by malaria, [then] while feeling better, another one is also attacked. While as of now, I see that it is taking some time for something like that to happen.”¹⁴³

Abambo Phiri said, that for his family, “Yes, there is a change [in health]. Ahh, we are not sick often.”

“It's less—it's less often suffering from malaria, stomach ache.”

“Why has it changed?” I asked.

“It has changed because of food,” Abambo Phiri said.

“Have you noticed any changes in your children?” I asked.

“In the way they live—I've seen health. The way they are growing compared to other children whom were born the same year.” Abambo Phiri explained that his children, who were both born after he and his wife started using permaculture, have never had malaria and people often think they are a year or so older than they actually are due to their height.¹⁴⁴

Verifying and determining the cause for these reported health changes was outside of the scope of this study. It is possible that managing waste water and growing strong smelling plants near the home helped reduce the amount of mosquitoes in and around homes, as environmental management and larval control is an important part of minimizing malaria (Pinstrup-Andersen 2010). A few farmers reported less diarrhea, coughs, and body pains among household members. Frison, Cherfas, and Hodgkin write that there is some evidence that diet diversity in general

¹⁴³ We conducted this interview in Chichewa in Cluster C on May 31, 2012.

¹⁴⁴ We conducted this interview in Chichewa in Cluster C on March 14, 2012.

positively impacts disease, morbidity, and mortality and that there are strong evidence that diet diversity improves child development and survival (2011:245). Improved health and reduced disease incidence may be a result of improved food access and nutritional intake (Pinstруп-Andersen 2010), however further study would be required to determine the cause of improved health changes among participants and could be an valuable area of future study.

Like Amayi Sesani, some other permaculture farmers discussed their use of natural medicine in connection to permaculture practice. These farmers discussed using some plants they grew in permaculture plots for medicinal purposes, such as lemon grass and aloe. I observed during permaculture trainings that farmers were particularly interested in discussions of natural medicine and took notes about how to use plants for specific health problems. Several farmers in Ufulu also told me that they wanted to learn more about how to use natural medicine in future permaculture trainings. As discussed in Chapter 4, participants had limited access to biomedicine as clinics frequently ran out medication like those for malaria and faced serious personnel, infrastructure, and resource constraints.

Building Adaptive Capacity

With an incremental improvement in food access, permaculture farmers had slightly higher food security and diet diversity on average compared to conventional farmers, particularly at the margins. Permaculture use primarily influenced farmers' access to complementary foods during all seasons, thus addressing their vulnerability to seasonal food shortages and the limited market availability of foods. Permaculture farmers had marginally improved adaptive capacity to contend with systemic vulnerability and regular food shortages without having to engage in coping strategies like reducing food consumption. In addition, permaculture farmers decreased their dependence on the market by decreasing food and agricultural input purchasing needs,

which may help provide a buffer for households against the negative effects of broader economic problems. For example, economic problems, such as food price volatility, foreign aid suspension, fuel costs, and currency inflation and devaluation, were a problem during the study, limited the availability of agricultural inputs and food in local markets, and constrained farmers' ability to afford those goods (Dionne, Kramon, and Roberts 2013; Joala 2012; Wroe 2012). The marginal improvements permaculture farmers experienced were important given the broader context of food insecurity and malnutrition.

As with agricultural impacts, the effect of permaculture on household food and nutrition security was limited. Permaculture use likely primarily influenced access to complementary foods because permaculture farmers implemented permaculture on a small scale. Permaculture farmers' application of permaculture did not address other important factors of food access. For example, permaculture use did not address limited food access in markets, livestock production, food storages, or access to potable water. Further, while some permaculture farmers reported saving money and earning money because of permaculture production, households' income did not substantially change. Permaculture farmers used permaculture to build on their existing livelihood strategies, but it did not change or diversify their livelihood strategies. Similarly, regarding a project in South Africa, Khumbane states that while permaculture implementation in homesteads improved household food production, the issue of food security is broader than what households can address with permaculture practices alone (2004:48–49). More generally, Burchi, Fanzo, and Frison assert that a key limitation of food-based agriculture programs is that they do not address critical socio-economic factors, social norms, or entitlement to food (2011:366). As such, the effect of permaculture implementation was limited to the household level, and as such,

it did not address the powerful social, economic, and political systems that structurally constrain farmers' economic opportunities, health care, and food access.

Conclusion

While the food security, diet diversity, and reported health impacts of permaculture were not large, they were significant given the context of structural violence in which hunger, illness, and premature death are all too common. Learning permaculture gave farmers tools to improve their food access. As permaculture education opened new possibilities for ways to farm, it expanded the food consumption choices available to farmers. Permaculture farmers altered their food practices and cooking to a degree in response to improved food access. Using permaculture did not solve the structural constraints farmers faced to accessing sufficient qualities and quantities of food for their families, but, on average, it helped to cushion vulnerability and improve adaptive capacity at the margins to contend with those constraints.

CHAPTER 9

PERMACULTURE BENEFITS, LIMITATIONS, AND RECOMMENDATIONS




My primary findings suggest that permaculture farmers experienced multifaceted benefits from implementing permaculture because the farmers used permaculture practices that addressed specific household constraints and expanded their adaptive capacity. However, permaculture use largely did not alter farmers' systemic risk and vulnerability within Malawi's agro-food system.

The current dominance of conventional agriculture, maize production, and monocropping in Malawi is a result of social, political, and economic forces prior to colonization, British colonial rule, and development interventions and post-colonial government policies. In Malawi, the impetus for and spread of conventional agriculture and permaculture both in part occurred within the 20th century development apparatus.

Participant farmers experienced persistent food access problems and thus hunger and malnutrition within a context of structural violence. The information and resource environment from the government, agribusiness, and NGOs largely encourages farmers to address their food security problems through conventional agriculture, while the public health sector largely addresses malnutrition. Farmers learned about permaculture from Ulimi and Everlasting Harvest and within their social networks. The potential to address household problems typically motivated permaculture farmers to implement permaculture. In a low risk fashion, permaculture farmers incorporated permaculture into their livelihood strategies and most continued to practice conventional agriculture.

Within a context of layered vulnerability and limited options, permaculture farmers implemented practices that addressed key problems they experienced. As a result, permaculture farmers reported agricultural, environmental, livelihood, food access, and health benefits from practicing permaculture (see Table 17). Many permaculture farmers diversified their diet, altered

Table 17. Impacts of Permaculture and Building Adaptive Capacity

Livelihood	Health	Environmental
<ul style="list-style-type: none"> ✓ Cultivate small piece of land ✓ Decreased food purchasing costs ✓ Diversified crops sold ✓ Diversify timing of harvests ✓ Lower agricultural input costs ✓ Income generation 	<ul style="list-style-type: none"> ✓ Higher diet diversity ✓ Higher nutritional intake ✓ Improved food access 	<ul style="list-style-type: none"> ✓ Increased agrobiodiversity ✓ Reduced dependence on non-renewable inputs ✓ Tree planting ✓ Soil & water conservation
		
Building adaptive capacity by helping to:		
support livelihood activities and decrease market dependence	support well-being and labor availability	<i>improve farmers' ability to address farming and environmental problems and climate change</i>

food practices, and incorporated new foods within existing Malawians cuisine patterns largely in response to improved access to fruits and vegetables from permaculture production. I suggest that permaculture education and skills helped to expand farmers' improvisational or adaptive capacity to mitigate risk and address agricultural, food, and health problems.

The multi-functional benefits farmers experienced from using permaculture supports the growing call for “triple-win solutions” for agriculture, health, and environmental sustainability by donors and policy-makers that promote low external agriculture (IFPRI 2013a:13). Further, permaculture, like agroecology more generally, is a skill-based rather than an external input-based approach, which Uphoff writes is useful as an agricultural development strategy (2002:9). De Shutter, the UN Rapporteur on the Right to Food, writes that in agroecology systems, “inputs are being replaced by knowledge” (2010:14). Uphoff states,

It is appropriate for governments and external agencies to try increase the options that rural people have, for themselves and for their children... Agroecological approaches are not intended to keep rural residents ‘down on the farm’, but rather to enable them to improve their livelihoods, and especially their knowledge and skills, so that they can have and can make more desirable choices (2002:16).

Similarly, learning about permaculture has helped to widen the set of knowledge and tools at farmers' disposal, and therefore the options available to them, to make changes to their agricultural production and to solve a host of associated problems. Uphoff further asserts that the broader skills of ecological observation and design, along with the systems analysis and decision-making that are part of agroecology, may be more significant for improving long-term agricultural production and livelihood security than the individual agricultural techniques farmers learn (2002:219). Building adaptive capacity around agriculture and food access may help contribute towards broadly expanding one's capabilities, which Sen argues is central to improving one's quality of life (1999).

Within agricultural production systems, agroecology allows for diverse social and economic relations because agroecology practices are not capital-intensive like conventional techniques. Further, some scholars promote agroecology as a technique that can improve social cohesion and community cooperation, which is in turn seen as necessary for natural resource and biodiversity conservation (Pretty and Smith 2004:634–635, 637; Perfecto, Vandermeer, and Wright 2009:210). For example, the permaculture ethic of equitably sharing surplus resources that the permaculture organizations promoted helped to support local community norms of sharing and reciprocity. More generally, as a type of social learning, permaculture education involves farmer-to-farmer learning and promotes local knowledge, which can potentially build community capacity, strengthen relationships of reciprocity, and expand knowledge sharing (Pretty and Smith 2004:637; Altieri and Toledo 2011:588–589).

Further, the permaculture farmers experienced the benefits discussed during an abnormal time of political, economic, and environmental stress and shocks. In 2011-2012, the economy was unstable because of limited foreign currency due to donors withholding aid funds and low

global tobacco prices, which led to higher food prices, inflation, imported fuel shortages, decreased fertilizer imports, and sugar shortages (Dionne, Kramon, and Roberts 2013:14; Wroe 2012:139). The political situation was also unstable with growing popular discontent and the sudden death of then President Bingu wa Mutharika. After a brief failed *coup d'état* plot, Joyce Banda was sworn in as president. In 2012 and 2013, Joyce Banda worked to reverse the most egregious new laws, win back donors, and improve the economy. However, she significantly devalued the currency as part of aid conditionality, which raised the cost of basic goods and increased inflation (Joala 2012). Erratic rainfall and a late start to the rainy season led to lower yields and a late harvest that lengthened the hungry season (FEWS NET 2012). These broader factors negatively affected household livelihoods; however, these problems did not prevent permaculture farmers from experiencing benefits.

Permaculture farmers faced social, material, environmental, and knowledge constraints when implementing permaculture. I contend that the impact of smallholders' permaculture use was primarily limited to the household level because using permaculture did not change other critical determinants of their livelihoods and wellbeing like poverty and inequality, and the problems and failures of Malawi's political, economic, healthcare, and education systems. It also did not affect the local or Malawian agro-food system, particularly because a minority of households in the area implemented permaculture and they implemented it on a small scale. Further, government, elite, agribusiness, and donor interests and activities remain unchanged and continue to promote conventional agriculture and neoliberal economic policies. Fundamentally, the farmers still live in a context characterized by structural violence and scarcity, in which they face systemic risk and powerful constraints that inhibit their health and well-being. Indeed, radical change in farmers' lives and livelihoods would require deep shifts in the relations of

production and the broader political-economic structure (Watts 1983:89), which permaculture alone cannot bring about. As Edelman points out with the agro-food localization model generally (2014), as a place-based, bioregional, agroecology model, permaculture is not an unquestionable good and involves numerous questions, tensions, and contradictions that permaculture practitioners and the permaculture movement have not fully addressed.

Literature addressing food sovereignty, a concept and movement that critiques the current agro-food system and promotes the rights of smallholder and peasant farmers, supports this analysis by emphasizing the power held by actors that support conventional agriculture and the scope of action required to achieve structural change within the agro-food system (Bernstein 2014; McMichael 2014). The concept of food sovereignty focuses on the structural causes of food insecurity, hunger and malnutrition, and on access to productive resources beyond access to food (Boyer 2010). Bernstein cautions that food sovereignty advocates uphold a false binary between capitalism and its other in the form of peasants, and have not fully problematized their emphasis on increasing government intervention to meet the needs of food producers and consumers when most states are invested in capitalism (2014). While permaculture methods do not require access to resources like chemical inputs, permaculture strategies do not address access to critical productive resources like land, credit, or infrastructure, among others. Further, farmers' use of permaculture and its impacts were constrained by the broader agro-food system and climate change, pointing to the power of structural inequality in the global agro-food system. Within Malawi, smallholder farmers need equitable access to productive resources and sufficient public services and infrastructure. In the global agro-food system, Malawi needs to have more bargaining power to negotiate the nation's relationship within global trade regimes and with transnational agribusinesses and donors to set their own agenda. Although as Aragwal and

Edelman caution, democratic choice and state action may result in changes that do not address the needs of smallholder farmers, particularly given the limited power of, and the economic differentiation among, smallholder farmers in an increasingly globalizing world (Agarwal 2014; Edelman 2014).

To overturn two permaculture idioms, all the world's problems cannot be solved in a garden, and permaculture is not necessarily revolution disguised as organic gardening. Despite the above caution drawn from food sovereignty scholarship, the positioning of permaculture as an alternative to the dominant conventional system could serve as a productive broader critique and may act as a form of resistance. Scott argues that peasant resistance takes many forms within different contexts of oppression (1985). Lewis writes that permaculturalists in industrialized countries typically engage in micro- and life-style activism, which focuses on making changes in one's everyday routine and practices to develop ways of sustainable living (2014:7–8). Lewis suggests that this type of activism prompts questions about “the nature and form of what we recognize as civic politics” (2014:6) and “how we imagine and facilitate social transformation” (2014:13). While the impact of such everyday practices has very different implications for the lives of those practicing permaculture in different circumstances, Lewis's work merits reflection about alternative forms of political expression and social change. Ploeg, following Negri, proposes that in the current global configuration of power, one of the only ways for peasants to resist is through local solutions, production, and action based on innovation (2008:271–272). Ploeg writes that peasants and their alternative farming systems, “by simply being there,” pose some form of resistance (2008:xvi). Although, Ploeg suggests that such action must involve significant numbers of people to exert power and create change (2008:272). The permaculture farmers took a measure of action to make changes in their own lives according to their valuation

of the current agro-food system in Malawi and their place and ability to maneuver within it. As it stands today, there is not a broad permaculture, peasant, or food sovereignty movement in Malawi, although as the permaculture movement expands in Malawi, it may be able to exert more influence and foster broader changes at a regional and national level. In addition, the global permaculture movement can work with other global agrarian movements to support and initiate further change. As Hendrickson and Heffernan argue, alternatives can take advantage of the vulnerabilities and problems of the global food system to reorganize the relationships within, and the structure of, food chains to develop self-reliant systems that strive for social, economic, and environmental justice and resilience (2002:361, 365).

Limitations and Future Research

In addition to the methods limitations discussed in Chapters 1 and 8, a main limitation of the study was the small sample size and limited timeframe. The number of farmers who adopted permaculture in the area limited the sample size. Given the 9-month study period and the in-depth, time-consuming nature of ethnographic research methods, 44 households was the maximum with whom we could realistically work. In addition, the fact that we were only able to work with farmers applying permaculture on a small scale was a limiting factor. There were also limitations in the data collected. We were not able to get complete economic data on farming from households, because farmers had difficulty recalling the information and did not keep records. Deeper ethnographic work would help to learn more about constraints of permaculture use, farmers' perceptions of permaculture and permaculture organizations, and if permaculture adoption influences farmers' perceptions of farming and food security.

There are a number of productive avenues for future research on permaculture in Malawi and elsewhere. In future research, it would be beneficial to work with farmers applying

permaculture on a larger scale, applying it to conventional agricultural land, and over several years. Further research with a larger sample size would be beneficial to learn more about the challenges and benefits of practicing permaculture in Malawi and elsewhere. A larger sample size would also allow for analysis of the relationship between the level of permaculture practice and the benefits and challenges farmers experience. In addition, research could explore the nature and magnitude of the impacts of particular combinations of permaculture practices. Future research should also investigate the impact of practicing permaculture on household and community resilience to food insecurity and climate change over time and with different levels of permaculture practice. Studies could also investigate the relationship between social systems and permaculture application, such as the potential gender implications of permaculture use in different contexts. Future research on environmental impacts and biomedical studies on nutrition and health outcomes would provide important information about the impacts of using permaculture. Longitudinal studies and studies of larger permaculture projects are also needed to enable larger sample sizes to gather more data and allow for robust statistical analysis. More research needs to be done to untangle how the development apparatus influences permaculture development organizations and programs. Further research should investigate how policy and NGO agriculture interventions in general and specific farming methods are related to food security conceptions and food practices.

The relative isolation of permaculturalists from academia has several downsides. First, according to Ferguson and Lovell, the isolation from academia and research has enabled overreaching claims of the successes of permaculture while downplaying risks and challenges, idiosyncratic use of scientific concepts and terms, and encourages a pseudo-scientific approach in permaculture writing and application (2013:17–18). Second, Lockyer and Veteto write that the

design system and permaculture practice has not kept up with new findings and approaches in ecology, agroecology, and other disciplines or resilience theory (2013:13–14). Third, there are significant bodies of work on ecology, agroecology, agriculture, sustainable energy, community organizing, social change, sustainable development, and human-environment relations from a range of disciplines that permaculturalists could use to improve and support their work rather than reinventing the wheel or making known errors. Fourth, Lockyer and Veteto assert that permaculture has been left “behind in theoretical development” (2013:14). Academic analysis could help provide a critical lens to analyze the application, implications, and limitations of permaculture application, development efforts, and social movement organizing.

There are many significant questions remaining about the efficacy and place of permaculture as an alternative agriculture system. For example, what is the impact of permaculture application within larger food market systems, or when farmers incorporate significant staple production and animal husbandry in their permaculture practice? What is the community or food systems level impact of permaculture if it is used extensively by a larger portion of people in an area? How can transnational agrarian movements, if I can characterize permaculture as such, address increasing transnationalization of agribusiness power, global integration and marginalization, and inequality, particularly in the wake of global governance and circumscribed state power? What scope of action do farmers and movements need to engage in to meet the needs of those most marginalized and oppressed in the global agro-food system?

Policy Recommendations

The differences between conventional and permaculture farming, and the challenges and benefits of using permaculture have implications for the development sector and the permaculture movement. For the development sector, the research findings point to the potential

value of skill-based approaches to agricultural development and food-based approaches to food and nutrition security. For the permaculture movement, this work begins to understand how permaculture development projects are impacted by the broader development sector and political, economic and social systems, and gives caution about the scope of change that can result from smallholder farmers practicing permaculture. More broadly, important questions remain about who should do the work of development to reduce the influence of wealthy foreign institutions and corporations on the one hand, and to affect structural change and support efforts to redress inequality and systemic problems on the other.

Implications for Development Sector

The changes in permaculture farmers' food access, and potentially in conceptions of food security, have implications for agricultural program design and monitoring. First, it is critical not to rely on tropes about cultural norms or naturalized explanations. I suggest that food consumption, crop choice, and food security changes were not constrained by taste as has been generally assumed in Malawi. As many anthropologists have shown, social, political, and economic contexts and systems shape food practices. Agricultural development and food security work should apply this perspective to avoid operating on false and destructive assumptions.

This study speaks to the current policy debate about how to make agricultural development projects nutrition sensitive. I suggest that the type of crop diversity changes that permaculture farmers made directly influenced subsequent food security and nutrition impacts. This example suggests that the potential nutrition impacts from agricultural programs may be closely related or indeed limited by the scope of the program. It also argues for the utility of diverse food-based approaches to food and nutrition security rather than programs that focus on cereal production under the assumption that improved livelihoods will lead to diversified food

consumption. As was the case with the permaculture projects studied, programs can work to directly facilitate diet diversity.

In addition, farmers' ability to use permaculture suggests that the complexity of a given intervention is not necessarily a constraint to implementation. The utility of permaculture, as a complex design system, is a reminder that development projects can be multifaceted, complex, and flexible, while still being feasible and effective.

I argue that along with other structural interventions, permaculture is a strategy that donors and development practitioners should consider incorporating in livelihood, food and nutrition security, and agricultural development programs. As discussed in Chapter 3, development programs have incorporated permaculture as part of programs in a variety of settings, such as schools and health clinics, in many different countries. In addition, the United Nations has called for increasing support for, and application of, agroecology to meet global food needs in the face of climate change (IAASTD 2009; De Shutter 2010; UNCTAD 2013). The primary input required is skilled personnel who can provide permaculture expertise and education. As projects require little purchase, transport, and distribution of material goods, the costs are relatively low. Further, as a skills-based approach, the development sector can use permaculture in projects to facilitate multifaceted impacts and to help achieve a broader development goal of expanded capabilities and options. In addition, permaculture use has the potential to contribute multifaceted impacts of nutrition-sensitive agricultural programs for households.

While there are opportunities for NGOs to incorporate permaculture into development programs, there are serious questions about the impacts of the development apparatus. In particular, NGOs can apply permaculture as a technical solution to a technical problem as

typically occurs in agricultural development programs among proponents of both high and low external input techniques. Technical approaches elide the role of powerful actors, politics, and structural violence, among others, in creating the problems that development programs ostensibly aim to address. Conventional agriculture development work, such as that supported by the Alliance for a Green Revolution in Africa, the New Alliance for Food Security and Nutrition, and Malawi's Farm Input Subsidy Program, often supports the economic interests of companies and economies in the global North at the expense of environmental sustainability and smallholder farmers' economic and food sovereignty (Bezner Kerr 2012; Altieri and Toledo 2011). As is further discussed in the next section, the use of permaculture in the development apparatus has important implications about its potential impacts and the types of power relations and structures it helps to perpetuate.

Implications for Permaculture Movement

Some research findings are generalizable to smallholder farmers and permaculture development projects in other contexts. Both as an implication for the permaculture movement and projects in Malawi, farmers learned about permaculture through social learning and often adopted it after observing, learning from, and imitating others in their community. Other studies support the effectiveness of processes that facilitate knowledge sharing within communities, including demonstrations by community members, learning exchanges and networks, and community dialogue. Further, widely accepted innovation-diffusion theory shows that social learning and imitation are central to the adoption and diffusion of agricultural innovations. Therefore, permaculture education models should work within existing organizations, groups, communities, or social networks to enable social learning, knowledge sharing, social support, observation, and imitation between individuals.

Broadly, the findings of this study suggest that smallholder farmers can benefit from using permaculture and the permaculture model for social change and development may have limited impacts. The permaculture movement's model for social change underlies a common permaculture approach to development. As Ferguson, Lovell, and Furze write, the predominate model of social change discussed in the permaculture movement focuses on individual action and personal responsibility, while largely disregarding structural constraints (Ferguson and Lovell 2013:16; Furze 1992:145, 152). While permaculture is based on a radical critique of agro-food systems and human-environment relations, the typically espoused permaculture model for social change is broadly neoliberal and depoliticized. In addition, incorporation within the development sector in Malawi shaped the permaculture development projects I studied. While the agricultural techniques promoted were different from mainstream programs, they applied participatory project approaches based on a self-help model that is in line with mainstream development approaches.

Permaculture development work can learn from studies that evaluate participatory development approaches. Berner and Phillips advise that “the poor cannot be self-sufficient in escaping poverty... and that the social, political and economic macro-structure cannot be side-stepped” (2005:20). Further, the self-help argument made by development practitioners (and permaculturalists) “may not even be practical” (Berner and Phillips 2005:22), and can make for regressive policy, as individuals and groups often face powerful constraints to action and change (Berner and Phillips 2005:23). As such, it is important to be aware of and address the potential constraints associated with, and power relations reinforced by, permaculture development projects when they are embedded in the broader development paradigm and use self-help or top-down approaches. Understanding the similarities between permaculture and mainstream

development approaches can help permaculture practitioners to critically evaluate the strategies they use and the potential for reinforcing current power relations rather than leading to their change. For example, Ferguson, among others, has found that development programs typically have a depoliticizing effect (1994:256, 276). The action, and critically, the inaction of development programs have political implications. To understand the broader impacts of permaculture development efforts, it is important to interrogate how NGOs and farmers enact permaculture, their goals, and scope of action.

In addition, the fact that the impact of permaculture is primarily limited to the household level and is constrained by the broader agro-food system is generalizable to most contexts. Whether using permaculture in a rural, agricultural economy or an industrialized one, a households' or community's use of permaculture may help people to withdraw from or maneuver within the broader agro-food system, but it will not change political and economic structures on its own. Beyond practicing permaculture, it is likely that permaculturalists would need to engage in other efforts like broad dissemination, community organizing, lobbying, and civic engagement to effect change beyond the household or village level. Permaculturalists have limited ability to influence the profit incentives, market structure, and trade regulations that structure the global, capitalist agro-food system. Agribusinesses possess a monopoly over the production, sale, and trade of much of the world's agricultural inputs and food. These powerful forces pose strong barriers to change and constrain national and local food sovereignty.

Implications for Permaculture Projects

There are six primary lessons for permaculture programs in Malawi and similar contexts based on the research findings. First, permaculture implementation is a multi-year process. NGOs can teach permaculture implementation as such to manage farmers' expectations and

support implementation throughout with staggered training and outreach. Second, demonstrations of different permaculture applications at NGOs, permaculture examples in villages, and one-on-one informal teaching can be effective education and motivation tools. Third, to lessen social stigma associated with using permaculture, NGOs can conduct outreach with whole communities and not only program participants to explain permaculture and its goals. Fourth, NGOs can work through existing social networks to disseminate permaculture and encourage adoption, because, in addition to NGO activities, farmers learned about permaculture from relatives, friends, and neighbors who were using it, were motivated by the benefits they saw, replicated the practices others used, and supported each other. Fifth, formal permaculture classes and access to different permaculture education sources was more important for farmers to intensify permaculture implementation and use of the design system rather than for initial adoption. Sixth, permaculture education and programs should prioritize building on and reinforcing local knowledge, crops, and practices to help make permaculture education and programs relevant, respectful, and equitable.

Permaculture has applicability as a skills-based farming approach. However, the particular benefits that farmers may experience from practicing permaculture depend on farmers' particular needs, problems, permaculture application, and the local context. In this case, farmers experienced improved food access because permaculture addressed a key problem of consistent access to fresh fruits and vegetables all year. The expense of inputs is also a serious problem, so farmers benefited from permaculture practices that addressed their material constraints to agricultural production. Therefore, farmers should apply permaculture in a way that specifically addresses their problems and that is suitable to and relevant within the local context.

Conclusion

Permaculture education improved farmers' adaptive and improvisational capacity to respond to problems and shocks within unpredictable and vulnerable conditions by helping to expand the options they had to solve or cushion problems. The agricultural and environmental techniques permaculture farmers applied may also incrementally improve their land quality and ecosystem services in the long-term, which could improve their agricultural yields and resilience. Improved food security, diet diversity, and health in the short-term, may also help support households' livelihoods, health, and well-being in the long-term.

Amayi Sesani aptly summarized her perception of the difference between resource use in conventional agriculture and permaculture. She said, "Ahh, this ongoing [permaculture] farming, and this type of [conventional] farming that we are seeing nowadays, there is indeed a difference. This other [conventional] type needs more energy from a person each and every time, and also it needs more inputs. While the permaculture one does not count whether I am rich or I am poor. Everyone can use it well," she emphasized.¹⁴⁵

The fact that permaculture is not dependent on access to money created options for the farmers who learned about and used permaculture. Their expanded skill set increased the options available to them for how to farm, and the changes in farming led to increased food consumption choices. These changes affected farmers beyond material benefits, because food insecurity and impoverishment lead to other forms of suffering such as stress, malnutrition, disease, and death in some cases. As such, improving agricultural production and food access can also help improve farmers' well-being.

¹⁴⁵ We conducted this interview in Cluster C in Chichewa on May 21, 2012.

For Agogo Chisale, seeing other people practice permaculture validated how she farmed with her family as a girl, encouraged her to return to those methods, and gave her new examples of how to improve her agricultural production. She explained to me what these farming changes meant to her.

She said, “It’s freedom, to plant the way you want.” It is her freedom, she said, to be able to decide how to farm and provide food for herself and her grandchildren.¹⁴⁶

¹⁴⁶ We conducted this interview in Cluster C in Chichewa on July 2, 2012.

APPENDIX A

PERMACULTURE PRACTICE RUBRIC

Each farmer household received one point per item of the scale in Table 19 if the criteria were met. The individual items were not weighted; however, items (19-27) give an additional point to a household for a repeat item for being at the high end of the permaculture practitioner spectrum for that item. The extent to which the average CF did an item, like the number of trees planted on average, was used as the criteria for items (5, 31-33, 40, 42, 44, 51-53, 55) to differentiate between practices that Conventional Farmers to use and ones that PFs also do, but typically to a greater extent. Similarly, the criteria for items 19-27 were determined by the extent to which the 3rd quartile of PFs did to help differentiate between levels of permaculture practices.

Permaculture practices	1=Yes, 0=No
A. Permaculture design	
1 Self-identify as doing permaculture	
2 Observation & consideration of multiple environmental factors (3 or more, including weather, soil, land, animals, etc.)	
3 Use zone system (plan land use based on zones)	
4 Use guilds (7 functions)	
5 Recycle output(s) back into system (more than CF average of 1.21 recycled outputs, i.e. organic matter, seeds, water, etc.)	
6 Plan/design to decrease or conserve energy or input use	
7 Channel & catch water flow (swales, bed shapes, bed location, etc.)	
8 Created multifunctional design (dish rack, bed with wastewater management, swale with multipurpose plants, etc.)	
9 Aim of conserving or improving the environment (i.e. air, rainfall, soil fertility, etc.)	
10 Considered efficiency and needs in land use design	
11 Put plants in the right place, not just anyhow (even if do not use guilds)	
12 Improved design after observation and experience, or has plans to improve	
13 Use elements of the design system or systems thinking to solve a problem	
B. Permaculture practices	
Extent of use	
14 Use permaculture for all farming	
15 Permaculture in zone 1 (intensive production in or adjacent to yard)	
16 Permaculture in zone 2 (garden or food forest even if small)	
17 Permaculture in zone 3 (rain-fed field)	
18 High resource recycling (at least 3rd PF quartile of 4)	

19	High tree planting (at least 3rd PF quartile of 7 varieties)	
20	High agrobiodiversity (at least 3rd PF quartile of 44 crop varieties)	
21	High leave crops that grow naturally (at least 3rd PF quartile of 5 varieties)	
22	High plants to increase soil fertility (at least 3rd PF quartile of 5 varieties)	
23	High legumes (at least 3rd PF quartile of 6 varieties)	
24	High leguminous trees (at least 3rd PF quartile of 2 varieties)	
25	High local seeds (at least 3rd PF quartile of 26 varieties)	
26	High perennials (not including trees; at least 3rd PF quartile of 13 varieties)	
Soil & water conservation		
27	Uses compost manure	
28	Uses animal manure	
29	Uses human manure	
30	Grow plants to increase soil fertility (above CF average of 0.33 varieties)	
31	Planted legumes (above CF average of 1.96 varieties)	
32	Planted leguminous tree(s) (above CF average of 0.58 varieties)	
33	No burning of organic matter (i.e. crop residue, maize stalks, weeds, etc.)	
34	Mulch	
35	Permanent (mostly) no-till beds	
36	No-till weeding (i.e. weeding by hand, no banding)	
37	Irrigate with grey water	
38	Prevent erosion (bed borders, swales, vetiver grass, etc.)	
Agro-biodiversity		
39	Agrobiodiversity (above CF average of 10.25 crop varieties)	
40	Intercrop more than before started permaculture	
41	Tree planting (more than CF average of 2.08 varieties)	
42	Cultivation in all seasons	
43	Grow perennials (other than trees; above CF average of 1 varieties)	
44	Grow more diverse crops than before starting permaculture	
Pest & livestock management		
45	Grow crops to deter pests	
46	Use other organic IPM techniques (like ashes or homemade organic spray)	
47	Use livestock outputs (use for digging, manure, etc.)	
Other resource use		
48	All organic (no fertilizer, pesticides, etc.)	
49	Makes compost	
50	Leave crops that grow naturally (above CF average of 2.767 varieties)	
51	Saved, propagated, or found seeds (above CF average of 3.43 varieties)	
52	Shared, given, or traded seeds (above CF average of 1.3 varieties)	
53	Did not purchase seeds	
54	Local seeds (above CF average of 5.92 varieties)	
C. Changes to conventional with permaculture intent		
55	Decreasing fertilizer use	
56	Increasing use of manure or compost	
57	Increased crop diversity	
Total practice score		

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