

The Importance and Relevance of Small-Scale Home Gardens in
Sirsi, India

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Abstract

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The future of agriculture is a hotly debated issue, with one side advocating for more technological fixes and the other looking toward a more sustainable and eco-friendly path. Countries all over the world are taking part in struggle to find a sustainable way to feed the world's population. Meanwhile, small-scale agriculture systems are hanging in the balance. This paper focuses on how home gardens fit in to the future of food. These gardens harbor local varieties of foods as well as knowledge of traditional agricultural practices. This knowledge is in danger of being lost in the wake of modern agriculture technologies. Research on these small home gardens was conducted with a small women's cooperative, Vanastree, in Sirsi, Karnataka, India. Four women from Sirsi's surrounding villages took part in a study examining the diversity in and culture surrounding home gardens. Time was spent interviewing each woman about their individual gardens, and their attitudes about it. The small home gardens of the not-for-profit organization Vanastree are instrumental in arriving at a sustainable solution for the future of food.

This report is dedicated to all of the hard-working women of Vanastree.

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Purpose

Personal Interest

The initial aim of this paper was to explore the relationship between the United States and India with respect to their modern agriculture technologies. I thought it would be interesting to explore agriculture in other countries since my understanding of agriculture was limited to the United States and its practices. Upon further research, I found that this topic has too large a scale to be addressed and fully explored in such a short period of time. However, spurred by my initial interest, this paper has taken the turn of embarking on a preliminary exploration of small-scale sustainable agriculture in India.

I chose to examine India because of its fascinating and complex cultural identity. With a current population of 1.2 billion people growing at a yearly rate of 1.34%, the country is facing huge resource shortages and energy problems due to climate change.¹ There is a great divide within the population: on the one hand are the extravagantly rich and on the other, the extremely poor. With regards to agriculture,

¹ CIA. "Central Intelligence Agency." *The World Fact Book*. CIA, n.d. Web. <<https://www.cia.gov/library/publications/the-world-factbook/geos/in.html>>.

this inequality causes hardships for farmers who cannot afford the technologies made available by modern agriculture, such as chemical fertilizers, chemical pesticides, heavy machinery such as tractors and tillers, and genetically modified seeds. This changes the variety of crops available, as well as their market cost. Due to the government subsidies of Green Revolution technologies, poorer farmers are unable to compete. Between the year 1999 and 2000, fertilizers and irrigation were the main object of agricultural subsidies from the Indian government.² These subsidies have a number of problems associated with them including soil damage and other environmental degradation from fertilizers, salination, the lowering of the water table, and the reduction of the overall water supply.³

In addition, the country is made up of many cultures, customs, and traditions that vary from state to state. In some cases this variation occurs between cities within one state. India is made up of a wide array of religions and cultures ranging from Hinduism to Christianity. With such a richly diverse culture, there are bound to be discrepancies of thought about India's future, especially when it comes to Westernization.

² Jha, Ragbendra, Investment and Subsidies in Indian Agriculture. Web. May 2007. SSRN. <<http://dx.doi.org/10.2139/ssrn.987147>>

³ Ibid

I wanted to learn more about how the introduction of Western agriculture technologies (industrialized agriculture) has influenced the country's culture and identities. As India is so large and densely populated, I focused my research on one specific area of the country, thus allowing me to see the small-scale effect of industrial agriculture. I was lucky enough to have the opportunity to intern with the seed-saving organization Vanastree, which works with gardens in rural villages. During this internship, I was able to conduct my own research and study traditional small-scale agriculture. Vanastree will be discussed at greater length in the following sections. Vanastree is a Non-Governmental Organization (NGO) situated in the southern state of India, Karnataka⁴, in a small town called Sirsi. Interning in this town provided me with an inside look into the battle between traditional and industrial methods, not just of agriculture but of culture as well.

⁴ While Hindi is the national language of India, each state also has its own language. The state language of Karnataka is Kannada. Throughout this paper I will reference the Kannada names of the local plants.

Topics to be addressed

This report aims to address the following issues: the role of home gardens in Sirsi and Vanastree's in the debate between small- and large-scale agriculture in India. The forest home gardens of Sirsi, Karnataka have an important role in the future of sustainable agriculture, as they harbor local plant varieties. Forest home gardens also contain many species and much genetic diversity, something that has been lost in modern agriculture. Large agricultural systems alone have not been able to solve India's food problems. There is still a portion of their population without adequate access to food. To achieve a sustainable future, there needs to be a movement toward a network of small agricultural initiatives and away from corporate farms, as well as a hybrid approach, combining aspects of both traditional and industrial agriculture. Neither traditional nor industrial agriculture has been shown to be solely capable of carrying India, nor the world at large, to sustain food production.

Importance/Significance

Before going to Sirsi, I had a very limited view on what small-scale sustainable agriculture means in other countries. The effect of the Green Revolution on rural villages, such as those surrounding Sirsi, is the focus of this paper, because as a country with a ballooning population, food security is an increasing issue. The World Health Organization (WHO) at the 1996 World Food Summit defined food security as “when people at all times have access to sufficient, safe, nutritious food to maintain an active and healthy life.” Food security is based on three things: availability, access, and use of food.⁵ Food insecurity is what fueled the Green Revolution of the 1970s, and led to the introduction of agriculture technologies to countries outside of the United States. Agriculture remains the largest employment sector in most developing countries, and international agriculture agreements (such as trade) are crucial to a country’s food security.⁶ Increased food production has the potential to stimulate a country’s economy and to free it from dependence on imported foreign produce. The more food a country is able to produce itself, the less it needs to import from other countries to feed

⁵ World Health Organization. "Food Security." *World Health Organization- WHO*. World Health Organization, n.d. Web.
<<http://www.who.int/trade/glossary/story028/en/>>.

⁶ Ibid

its people. The existing literature on this subject contains varying opinions on the effects of the Green Revolution, and the potential dangers of Genetically Modified Organisms (GMOs)⁷ and Bt crops⁸ such as cotton, corn, and eggplant⁹. Some believe that these new technologies are the answer to solving world hunger issues, while others see them as a dangerous new territory with which we should not experiment with.

I wanted to explore what (if anything) is being done to avoid the complete loss of India's long standing agricultural traditions in the wake of Westernization, and their replacement with uniformity, machinery, and vast amounts of chemical input. With the globalization of the world food market¹⁰, it has become more apparent how drastically

⁷ For this paper GMOs refer to plants that are created through gene splicing techniques that merge DNA from different species, creating combinations of plant, animal, bacterial, and viral genes not naturally occurring in nature or traditional crossbreeding. – Non GMO Project. "GMO Facts." *Non-GMO Project*.
<<http://www.nongmoproject.org/learn-more/>>.

⁸ Bt stands for a naturally occurring soil bacterium, *Bacillus thuringiensis*. In the case of Bt crops, the bacterium gene is combined with additional genetic material and inserted into the original plant allowing it to express the new trait– a toxin–which is lethal to certain insects that are feeding on the crop. Growing Bt crops is an alternative to spraying insecticide...The repercussions of using Bt crops are still being discovered. – Bessen, Ric. "Bt-Corn: What Is It and How It Works." *College of Agriculture*. University of Kentucky, Jan. 2004.
<<http://www.ca.uky.edu/entomology/entfacts/ef130.asp>>.

⁹ For the remainder of this paper, I will refer to eggplant as brinjal, the Kannada name for the vegetable.

¹⁰ Increased exports and imports between nations

one country can influence others. For example, the United States was able to change agriculture systems from small-scale farms to huge, mass-producing “factory farms” in a matter of decades.¹¹ This mass-production-based agriculture, common in the United States, has now been transferred to agricultural production throughout the world as a result of globalization. However, this method of agriculture has proven to be problematic, and causes the degradation of both environment and culture. The Green Revolution marked the start of the use of chemical fertilizers and pesticides to increase food production. Industrialized agriculture also replaces many of the traditional agricultural knowledge and practices that were once so vital to the area. As an example of this, my study revealed that one of the study participants had medicinal plants in her garden whose uses are no longer known. This is an aspect of the traditional knowledge that is being lost to modern agriculture.

A case study on small-scale agriculture in rural India provides insight into how traditional agriculture fits into the future of a sustainable agriculture that is largely dominated by modern technology.

¹¹ Engdahl, William. *Seeds of Destruction: The Hidden Agenda of Genetic Manipulation*. Montréal: Global Research, 2007.

Methodology

I conducted a 12-week-long study on four gardens operated by women participating in Vansatree.¹² The objective was to look at the function of home gardens in this particular region in order to understand traditional gardening practices and survey the biodiversity of each garden. This study highlights the importance of keeping traditional agriculture alive in this area, as seen through Vanastree's promotion of the sharing of indigenous knowledge and conservation of local biodiversity.

During a preliminary visit, each of the women was asked if she would be willing to participate in the study. With the help of my boss, Sunita Rao, I approached three different women, all of whom agreed to participate. The women were chosen based on their differing gardens and social standing, their openness towards international interns, and their proximity to my homestay. The women were then left with a questionnaire and given a week and a half to begin answering the proposed questions (see Table 1). The women were given the opportunity to thoughtfully reflect on the questions and form their own responses. This was an important aspect of the project, as it gave each of the women a voice—something that not all of them have in a patriarchal society. Each garden was then visited four times over the course of twelve

¹² The women's names are Bharti, Bhagya, Savatri, and Sunita

weeks in order to review and discuss the information on the survey. Measurements of each garden's total area were taken and recorded, and the number of plants grown in the garden was recorded and made into a data table. The data were then analyzed to determine each garden's diversity level, as well as the traditional practices sustaining it.

In addition to fieldwork, research was done on biotechnology's role in India, traditional agriculture practices, and the pros and cons of both industrial and traditional agriculture. This research was conducted to show how the home gardens of Sirsi fit into the larger scope of the agricultural debate.

Data Collection Template**Introductory Information**

Name(s):

Age:

Community:

Village:

Eco-Region:

Quantitative Data

1. Time spent in the garden daily:
2. Topology/ land use:
3. Number of gardeners per household:
4. Total home garden area:
5. Dairy (breed):
6. Livestock/poultry:
7. Water input (rain-fed or irrigated, or fallow for parts of the year):
8. Type of irrigation (hand-watered, drip irrigation, micro jet, jet):
9. Soil type:
10. Soil inputs:
11. Soil health care:
12. Amount of material composted (seasonal basis, basket load):
13. Pests/diseases encountered:
14. Weeds:
15. Weed Management:
16. Pesticide management:
17. Money invested in the garden (hard cash minus the labor per annum):
18. Income from the garden:
19. Money spent on fruits and vegetables not found in the garden per week:

Qualitative Data

1. Socio-economic status of gardener:
2. History of the garden (how it started, what it was before):
3. Organic or non-organic:
4. Personal facts (pertaining to the garden):
5. Schematic layout of the garden:
6. Tools used:
7. Ornamental inputs:
8. Use (market sale, home use, trading, gifting):
9. Add-ons (flower beds, ornamental plants, plants that don't yield food):
10. Constraints:
11. Human-animal conflict:
12. Cleaning products used in the house:
13. Ecological services:
14. Cultivated, semi-wild, or wild:
15. Future plans for the garden:
16. Impression of the study:

Women's Profiles

Sunita- Sunita Rao is the founder and creator of Vanastree, and was my boss and mentor throughout this project and my internship in Sirsi. She is an extremely intelligent, hardworking, and busy individual involved in many projects. I spent the most time with Sunita because her home served as my homestay for the three months I spent in Sirsi. She helped acclimate me to South Indian customs, food, cooking, and culture.



Image 1 (From left to right) Sunita, me

Sunita is very passionate about her involvement in the environmental movement within India, and she works with many organizations around the country to spur change by promoting environmental education. Her home sometimes serves as a camp for local school children where they are able to take part in gardening activities while learning about local biodiversity. She has worked with environmental organizations throughout India. Sunita is part of the ATREE foundation and has studied agriculture at the University of California Santa Cruz on a fellowship in 2007.

Growing up in Bangalore, Karnataka, India, Sunita is considered an outsider to the area. She decided to move to Karkolli village, and start Vanastree. Her home is now used as an educational facility, hosting workshops, school field trips, and the occasional intern. Sunita strives to live as sustainably as possible, and her property, Huthina Betta¹³, is virtually self-sufficient. Visitors to her home are encouraged to use biodegradable, environmentally friendly soaps. Water used for showering and washing hands is then used to water the garden. All kitchen scraps are either composted or fed to the cows. She has recently installed a compost toilet– one that does not use any water– on her property. Excrement is covered up with ash and dirt to help keep the smell down, flies out, and to facilitate decomposition. The local soapberry¹⁴ is used for washing dishes, and dried sponge gourds and coconut husks are used as scrubbers. As there is no government facilitated garbage pick-up program in the village, Sunita encourages all visitors to take their trash back with them where it can be disposed of properly. While living at Huthina Betta, I created less than a plastic grocery bag's worth of trash in three months.

¹³ Huthina Betta means termite mound in Kannada.

¹⁴ Soapberry is a naturally occurring soap, and is effective dish soap.

Bharti- Bharti is a shy, smart, and strong woman. She is part of the Dalit caste, formerly known as the untouchables, and works outside the home as



hired labor to support her family. From what I

Image 2. (From right to left) Bharti, Laxsmi (Bharti's mother), and Bharti's sister-in-law (name unknown). Bharti and her mother are the main gardeners of the household.

could gather, she lives with her mother, sister-in-law, father, and other relatives. Of the four women, she was one of two who attempted to fill out my questionnaire by herself. The other women were afraid they would negatively affect the study if they attempted it alone. Bharti was very excited about participating in the study and felt that documenting what is happening in the Vanastree gardens will help them see trends, as well as increase their garden diversity.

Bharti's garden utilized every nook and cranny of land available; it meandered around the property with no real rhyme or reason, making it one of my favorite gardens. Bharti was unable to spend hours and hours at a time in her garden but the

little time she was able to devote to it provided her with an amazing amount of diversity.

I greatly enjoyed my time spent with Bharti and her family. Her mother, Laxsmi, works for Manoramaka (Sunita's business partner and close friend, with whom I spent my first week in India with), and I had the pleasure of meeting her within my first week in Sirsi. Bharti's family was very hospitable and, although I was a stranger from a distant land, I always felt welcome.

Bhagya- Bhagya is one of the women with whom I bonded the most, though I did not realize this until the end of my internship. Bhagya has one of the most beautiful home gardens I have ever seen. Part of its beauty is due to the amount of time she spends in her garden daily: a minimum of one and a half hours.



Image 3 Bhagya Bhat in her garden.

Her garden held a great number and variety of plants. The sheer size of the fruits and vegetables she was able to coax from her soil was incredible, including some of the largest brinjal I had ever seen. She had the largest garden area of any of the women in my study. Bhagya was also the only one that had utilized inter-planting in her garden, where flowers were dispersed throughout the garden beds, coinciding with tomato plants, brinjal, amaranth, etc. She even had a space devoted to a monsoonal garden, in which she would grow all the vegetables and fruits that thrive in extreme downpour.

Bhagya and her husband were warm and inviting. Although they spoke virtually no English, they greeted me by name with a smile and snacks upon each visit.

As a parting gift, Bhagya made me five pounds of freshly-made banana chips to share with my friends and family back home in the United States.

Savatri – Savatri is married to Manju (the farm hand, who worked for Sunita and helped take care of her blossoming farm), and is the mother of two young, giggling boys, Praduel and Presana. Savatri was one of



Image 4 Savatri in her garden.

the most timid women I worked with during this project.

During my study, I noticed that she was a little bit hesitant to talk about her garden and seemed to be slightly embarrassed by its small size. However, the amount of work and care that went into her garden was astounding. The meticulous layout and neatness of her garden suggested that she takes great pride in her work. Her work was very detail-oriented, as evidenced by the raised garden beds lined with halved coconut shells. She made efficient use of the small plot of land she had available, and has visions of expanding her garden to take up all of the available area behind her house. Her garden is situated on a shaded slope abutting the forest preserve that surrounds the property, making it difficult to garden. Even with these limitations, her garden is thriving. Savatri started her garden in 2009, with the hope of having fresh vegetables to

use for everyday cooking as a way to save money; it seems she is well on her way towards this goal.

Upon interviewing her I found that she spends a fair amount of time tending to her garden: thirty minutes to three hours per day. Her garden, like all the others in my study, is used solely for home consumption, though Savatri hopes to be able to generate income from it once it expands.

The Industrialization of Agriculture

The industrialization of agriculture began in the 20th century with the use of fossil fuels to increase farm productivity.¹⁵ Fossil fuels, such as petroleum, enabled the development of tractors and other farm machinery as well as chemical fertilizers, pesticides, and refrigerators. They have made it possible for produce to travel far away from its place of origin. Agriculture has drastically changed in the United States since the 1800s. At that time, 95% of the population lived on farms and fed not only themselves, but also the remaining 5% of the population. Currently, 10% of the population lives on farms, feeds the remaining 90% of the population, and also produces enough food to supply a large export market.¹⁶

When driving by farmland today, one does not see the pastoral image of the farm often depicted in the media. There is no red barn surrounded by rows of different crops with cows, pigs, and chickens happily grazing. The new farm looks nothing like the farms of yesteryear. When you drive by farmland today, you are greeted with mono-cropped acres of corn, wheat, and soybeans.¹⁷ These mono-cropped acres, or

¹⁵ Randhawa, M S. *Green Revolution*. (New York: Wiley, 1973).

¹⁶ Ibid

¹⁷ Boody, Georege, and Brain DeVore. "Redesigning Agriculture." *Bioscience Magazine* 56.10 (2006): 839-44. These are known as "monoscapes," a term developed

monocultures, are a way for farmers to try to make the most money they can per one acre of land. There is not a cow, chicken, or pig in sight because it is now monetarily beneficial to keep all livestock in factory-like warehouses that enable more livestock to be produced per acre of land. The sole purpose of today's livestock is consumption; livestock and produce are managed with the same intent: extract the most money from the land as possible. In order to turn a profit, a farmer grows rows of the same subsidized vegetable and treats livestock with the same attention and care one gives a part on an assembly line. Like capitalism, modern industrial agriculture is incredibly effective at the mass production of low-priced commodities.¹⁸

The Green Revolution introduced new technologies to subsistence farmers in hopes of generating higher yields of grains to make food more accessible.¹⁹ These technologies included tractors, chemical fertilizers and pesticides, and have more recently come to include GM seeds. There is much debate on whether or not the benefits of these new technologies outweigh their potentially negative consequences. If

to describe the landscape resulting from industrial agriculture operations and its accompanying problems.

¹⁸ Boody, George, and Brian DeVore. "Redesigning Agriculture." *Bioscience Magazine* 56.10 (2006): 839-44.

¹⁹ Paarlberg, Don, and P L. Paarlberg. *The Agricultural Revolution of the 20th Century: Don Paarlberg and Philip Paarlberg*. (Ames: Iowa State University Press, 2000).

a pesticide is used improperly, it is ineffective at protecting the crop from being devoured by pests. There is also a risk of increased pest populations to farmers in adjacent plots of land who are not using pesticides. “All of the farmers have to use the poison. If the farmer in an adjacent field does not use it, worms can come from that field into one’s own, even if the pesticide is used properly.”²⁰ If all farmers in the area do not apply the pesticide, the pesticide is less effective at protecting the crops from unwanted pests.

Fertilizers are similar to pesticides in that the usage and concentration increase over time. The more fertilizer inputs one adds to his land, the more he will have to add the following season. Adding nutrients to soil is not a permanent fix, as not all of the nutrients added to the soil stay in the soil. The increased use of chemical fertilizers and pesticides causes pollutants to be leached into the surrounding environment. Fertilizers generally increase the amount of nitrogen and phosphorous in the soil, which then infiltrates and poisons the water table, making it toxic for human consumption. Before the industrialization of agriculture, animal bones were applied to the fields to replenish

²⁰ Freed, Stanley A, and Ruth S. Freed. *Green Revolution: Agricultural and Social Change in a North Indian Village*. New York: American Museum of Natural History, 2002. Internet resource.

the levels of phosphorous.²¹ The phosphorus found in animal bones is relatively insoluble; it allowed farmers to keep their fields fertile season after season without damaging the surrounding environment.²² The phosphorous in today's fertilizers is highly soluble and leeches into the water table. Industrialized agriculture uses the land so intensively, that an extensive amount of inputs is required in order to maintain the soil's viability for each growing season.

Maintaining monocultures is extremely resource intensive (utilizing fossil fuels and minerals), and requires increasing use of chemical fertilizers and pesticides each growing season.²³ Growing a large amount of the same crop on one parcel of land means that each plant will vie for the soil's nutrients. The nutrients become depleted and need to be replenished in order to maintain the soil's viability. This requires the input of chemical fertilizers to replace the nutrients leached by the crops. Since present day monocultures are mostly comprised of GM crops there is a decrease in the *genetic*

²¹ Paarlberg, Don, and P L. Paarlberg. *The Agricultural Revolution of the 20th Century: Don Paarlberg and Philip Paarlberg*. (Ames: Iowa State University Press, 2000).

²² Ibid

²³ Paarlberg, Don, and P L. Paarlberg. *The Agricultural Revolution of the 20th Century: Don Paarlberg and Philip Paarlberg*. (Ames: Iowa State University Press, 2000).

diversity of foods we eat. Pesticides are not 100% effective at wiping out the targeted pest, and some of the pests will have a natural resistance to that pesticide. Thus, that part of the population survives and passes on its resistance gene to the next population. If the same pesticide is used again the following season, it may be virtually ineffective at destroying the pests. Therefore, a stronger or different pesticide will need to be used.

Genetically modified crops are aimed at creating a plant that is able to grow a certain kind of the crop. For instance, corn is thought to be most desirable if it has a certain height, weight, and uniform yellow coloring. To obtain these traits throughout a crop yield, genetic variety is reduced. The plants that do not grow this specific type of corn are not used.

According to Diana Stuart's article, *"Illusion of Control: Industrialized Agriculture, Nature, and Food Safety,"* industrialized agriculture has become all about human control over nature, and has become uniform and mechanized. The business of industrialized agriculture is all about limiting risks that could compromise crop yields and profits. While this may sound reasonable, modern agriculture has nearly succeeded in excluding nature from the process. Nature is a dynamic actor in agriculture drama

and can present risks, uncertainties, and surprises to the industry.²⁴ In an attempt to gain complete control over agricultural production, there is a great desire to eliminate nature from the equation. The use of GMO seeds, pesticides, and fertilizers help to make the natural environment virtually obsolete. Although all farmers attempt to have control over nature, traditional agriculture practices adapt their growing practices to nature rather than trying to eliminate it. For example, in traditional agriculture crop rotations are used so as not to completely deplete the soil of its fertility. In modern agriculture, rather than changing the way food is being grown, man-made nutrients are continually added to the soil. This process is extremely resource intensive and relies almost exclusively on fossil fuels.

The main issues with erasing the effects of nature are the numerous consequences that have been overlooked in the race to generate the largest profit. There has been an increase in the number of outbreaks of food borne illnesses such as *E.coli* outbreaks in 2006²⁵ and mad cow disease in 2003. The United States' attempts at increasing food yields come at a great cost to the overall health and well-being of the

²⁴ Stuart, Diana. "The illusion of control: industrialized, agriculture, nature, and food safety." *Agriculture and Human Values*. 2008. 25: 177-181.

²⁵ Stuart, Diana. "The illusion of control: industrialized, agriculture, nature, and food safety." *Agriculture and Human Values*. 2008. 25: 177-181.

environs as well as the general health of its population. It has finally come to light that prolonged exposure to pesticides can have a devastating impact on one's health. Long-term exposure to pesticides can lead to birth defects, toxicity to a fetus, production of benign or malignant tumors, genetic changes, blood disorders, nerve disorders, endocrine disruption, and other negative reproductive effects.²⁶

The overwhelming drive to maximize farm outputs goes hand in hand with questions of future food security. For centuries, agriculture in India and other developing countries has been characterized by subsistence farming.²⁷ Subsistence farming is generally found in rural areas of developing countries. These farmers grow just enough food to survive, leaving them vulnerable to environmental and economic fluctuations such as drought or falling market prices for cash crops. Pure subsistence farming is defined as the complete self-sufficiency of an individual or household.

²⁶ College of Agricultural Sciences. *Potential Health Effects of Pesticides*. N.p.: College of Agricultural Sciences, 2009. *Pesticide Education*. The Pennsylvania State University. Web. <www.pested.psu.edu>.

²⁷ Chakravarti, A. K. "Green Revolution In India." *Annals of The Association of American Geographers* 63.3 (1973).

However, all farmers with any produce that is not sold to market are called “subsistence” famers.²⁸

In addition to environmental consequences, the industrialization of agriculture also has negative social implications. In rural India, the move from traditional subsistence agriculture to a more industrialized system has caused a great economic imbalance and is contributing to interregional disparities within the farming community.²⁹ The rich farmers are getting richer while the poor farmers are falling deep into debt as they struggle to afford the new farming technologies. Industrial agriculture requires more external inputs, such as machinery, GM seeds, pesticides, and fertilizers to produce high outputs. There has been an increasing number of farmer suicides as a result of economic pressures. There is also pressure on farmers who are not able to use the industrialized technology, and who consequently have difficulty

²⁸ Miracle, Marvin P. "Subsistence Agriculture": Analytical Problems And Alternative Concepts." *American Journal Of Agricultural Economics* 50.2 (1968): 292.

²⁹ Chakravarti, A. K. "Green Revolution In India." *Annals of The Association of American Geographers* 63.3 (1973).

competing with others at the marketplace. These farmers are not able to make enough money to support themselves and their families.³⁰

Large-scale farms are reminiscent of factories, focusing on quantity and profit over quality. This “factory” strives to separate itself from the natural environment and stresses uniformity. A certain branding of produce has accompanied this industrialized setting. The best produce to be stocked in a grocery store is no longer determined by optimal taste but, rather, on ideal size, weight, color, and symmetry. Since nature is incapable of producing factory-like perfection, it is deemed unworthy of sale. Industrialized agriculture lacks the dynamic relationships found in the home gardens of Sirsi, Karnataka, India. There is a permeable boundary between these home gardens and the surrounding environment. Nature is an important part of the growing process; gardeners constantly adapt to and learn from nature. The foods produced in these gardens are “imperfect,” wearing their relationship with nature on their skin. Despite current agricultural trends, traditional knowledge and practices are essential to the future of the gardens.

³⁰ Shiva, Vandana. *Stolen Harvest: The Hijacking of the Global Food Supply*. Cambridge, MA: South End, 2000

Background Information on the Study Area

Uttara Kannada/ Western Ghats

Sirsi is located in the southern Indian State of Karnataka called the Uttara Kannada district (see Image 5).³¹ This is part of the Malnad (hilly region) of the Western Ghats, which has one of the lowest population densities in the state, with fewer than 200 people per square kilometer.³² This low population density is part of the reason that 25% of the



Image 5 Map of Western Ghats from keystonefoundation.org

³¹ Palm, Matilda, Madelene Ostwald, Göran Berndes, and N.h. Ravindranath. "Application of Clean Development Mechanism to Forest Plantation Projects and Rural Development in India." *Applied Geography* 29.1 (2009): 2-11.

³² Government of India Ministry of Home Affairs. "Alphabetical List Of Towns And Their Populations." *Census of India*. Government of India, 2001. <www.censusindia.gov.in/towns>

area is classified as forested. The region is also home to one of the world's twenty-five biodiversity hotspots: the humid tropical forest called the Western Ghats.³³ The Western Ghats is a hill chain with a length of 1,600 kilometers (approximately 990 miles), including a narrow coastal strip that is 105 kilometers (approximately 65 miles) wide.³⁴ It boasts an annual rainfall of 2,000-6,000mm (approximately 79-236 inches), the majority of which occurs during the monsoon season from June through September.³⁵ This area is famous for its rich array of spices (cardamom, cinnamon, and pepper) and unique ethno-culinary tradition with many local foods that utilize domesticated and wild ingredients. This region includes an area 100 kilometers (approximately 62 miles) wide, from the western to the eastern slopes of the Western Ghats.³⁶

³³ Myers, Norman, Russell A. Mittermeir, Cristina G. Mittermeir, Gustavo A. B. Da Fonseca, and Jennifer Kent. "Biodiversity Hotspots For Conservation Priorities." *Nature* 403.24 (2000): 853-58.

³⁴ Daniels, R.J.R., Madhav Gadgil, and N. V. Joshi. "Impact of Human Extraction On Tropical Humid Forests In The Western Ghats In Uttara Kannada, South India." *Journal of Applied Ecology* (1995): 866-74.

³⁵ Ibid

³⁶ Flickinger, Donald I. *Rehabilitation of Degraded Tropical Forests In India's Western Ghats: Silvicultural and Socio-Economic Implications of Multiple Species Plantations*. Thesis. University of Florida, 1997.

The Malnad region enjoys a seven-month-long dry season between November and May, followed by a five month period of heavy monsoons from June to October. The monsoons consist of very heavy rains that are virtually continuous throughout the entire season. During the last week of my stay, I was able to experience an early thunderstorm spread over three days. The storm had short bursts of extremely heavy rainfall, rolling thunder, and brilliant flashes of lightning. I was told to imagine experiencing those heavy bursts of rain for months on end during the summer. There were already power outages and flooding after three days of rain; one could only imagine the effects that 150 days of such weather would bring.

Sirsi

Sirsi is a relatively small town, with a population of 65,335 people.³⁷



Figure 1 Map depicting Sirsi's location in India

The main cash crop is the Areca Catechu Palm, a nut (similar to chewing tobacco) that aids digestion and turns the chewer's teeth a bright fire-engine-red.

Sirsi is comprised of a small town surrounded by villages within a 40-kilometer radius. Its close proximity to the forest provides access to wild varieties of certain plants, trees and flowers, and firewood as fuel for homes that have traditionally cooked on wood stoves.³⁸ Cow dung found along the roads is also collected and used as fuel.

The area is known for its adoption of utilizing methane generated by cow dung as

³⁷ Government of India Ministry of Home Affairs. "Alphabetical List Of Towns And Their Populations." *Census of India*. Government of India, 2001. <www.censusindia.gov.in/towns>

³⁸ Flickinger, Donald I. *Rehabilitation of Degraded Tropical Forests In India's Western Ghats: Silvicultural and Socio-Economic Implications of Multiple Species Plantations*. Thesis. University of Florida, 1997.

cooking fuel. I stayed in the village of Karkolli, which I imagined to be a clump of houses with little kids running around, laughing, and playing. While there were some villages set up in that manner, including one I was able to visit during my garden study, Karkolli was composed of houses situated throughout the forest, relatively far apart. Tight-knit villages with homes clustered together have communities that are more involved in one another's day-to-day activities. There is always a neighbor around to lend a hand or to share his or her knowledge or resources. I witnessed a neighbor giving Bharti a domesticated variety of brinjal to be grafted on to a wild brinjal plant.³⁹ By doing this, Bharti will be able to produce more brinjal to feed her family. The house I stayed in was isolated from the rest of the village, situated behind another's rice paddy field. I believe this speaks to the relatively low population density of the area, as homes were not seemingly on top of one another, as were those found in cities like Mumbai or New Delhi.

Many of the villagers (both men and women) work as hired laborers, in addition to working in their own small farms/gardens and Areca nut orchards. Foods they are unable to grow themselves, or acquire through trade with neighbors, are

³⁹ The domesticated variety of brinjal produces a larger, tastier vegetable, and is much easier to grow.

purchased from nearby villages or from the markets in Sirsi. There are two large outdoor markets in Sirsi that are open throughout the week. Carts set up along the streets sell a limited variety of fresh produce such as grapes, oranges, potatoes, and coconuts. In addition, there are small stalls, similar to convenience stores, selling packaged foods like cookies, chips, and soft drinks. Up until recently, supermarkets common in the United States were foreign to the people of Sirsi. This is no longer true; Sirsi has recently installed its first super market, complete with the processed and packaged foods popular in the United States, as well as an array of imported products. By providing these items, the supermarket has increased access to unhealthy processed foods as well as inexpensive foreign products including fruit juices and potato chips, replacing traditional snacks and foods unique to the region. Where once street vendors sold items like a crunchy puffed rice snack, served warm and seasoned with a variety of flavors and nuts, they now sell packaged candy and chips.

The supermarkets sell the same produce that can be purchased on the side of the road for less money, thus creating competition for local vendors—much like Walmart competes with “mom and pop shops” in the United States. Sunita was quick to point out the shops that she and past interns frequented to discourage patronizing the supermarket. During my time in Sirsi, I never noticed many people in the supermarket,

and none of the women in my study frequented it. They seemed much more comfortable buying from the local markets, and from sellers with whom they have a personal relationship. The presence of this supermarket signifies a step away from local foods, as Westernization sinks its teeth into the rural population. Supermarkets carrying imported foods may, over time, replace the traditional markets carrying local foods, which could then lead to increased economic hardships for the farmers currently making a living off of their land.

Vanastree

Vanastree translates to “women of the forest” in Kannada. The organization is dedicated to empowering women while teaching them techniques to boost their income. Sunita Rao created Vanastree in 2001, by bringing together women gardeners to endorse the productivity of small-scale home gardens and sustainable food systems.

Sustainable food systems are defined as

“a collaborative effort to build more locally based, self-reliant food economies— one in which sustainable food production, processing, distribution and consumption is integrated to enhance the economic, environmental and social health of a particular place.”⁴⁰

Traditional varieties of plants are integral to maintaining the traditional diet and culture of the area, as oftentimes food and culture go hand in hand.

Saving the seeds of indigenous food varieties guarantees their use for the coming season, and also ensures they are not lost to new, high yielding, varieties of crops. In contrast, GMO seeds force farmers to buy new seeds each season. The seeds cannot be saved and planted the following season; they will not germinate. Vanastree’s promotion of open-pollinated seeds is a direct reaction against the use the GMOs. Sunita recognizes the danger of losing small-scale food production to the forces of

⁴⁰ Feenstra, Gail. "Creating Space for Sustainable Food Systems: Lessons from the Field." *Agriculture and Human Values*. 19.2 (2002): 99-106

globalization. The home gardens serve as a refuge for biodiversity and provide nutritional food and educational tools, as well as extra sources of income. The organization promotes local culture and maintenance of indigenous and traditional seed security through agrarian and economic development programs.⁴¹

Vanastree holds a number of educational workshops to teach the women involved new skills to add value to their garden produce. These skills include seed saving and new gardening techniques, such as grafting plants, or making natural pesticides by boiling down toxic plants. Since women do the majority of garden work in this area of India, it is especially important to empower them with such skills. The organization encourages the use of open-pollinated seeds,⁴² in order to maintain local varieties of plants and the subsistence of the garden, and traditional gardening practices to maintain a high level of diversity in the gardens throughout each growing season. Since the women consume the foods that they grow, their diet varies from season to season. For example, there are a variety of gourds and pumpkins available to eat throughout the year.

⁴¹ Keystone Foundation. Vanastree. Securing Seed Diversity and Local Community Empowerment in the Western Ghats. 2003

⁴² Seeds that have been cultivated by farmers in an open, natural environment; they can be saved, sown, and grown each year.

The women collect the seeds from their gardens to save and exchange them. The way seeds are saved varies among the plant varieties. For the ivy gourd, the best gourds are left on the vine to dry out, leaving the seeds encased in the vegetable where they can be easily harvested. Some seeds are sorted by placing them in water: the seeds that float to the top are unviable and are thrown out while the rest are dried and placed in an airtight container to be saved. Since 2007, Vanastree has bought excess seeds for the seed bank. The seed bank allows for the preservation of local biodiversity and traditional culture. Vanastree's seed bank is a collection of plastic jars—one for each kind of seed—in a locked cabinet. The jars are airtight, so as to preserve the seeds and keep insects and animals from eating them. The seed bank holds on to traditional seed varieties of the area, maintaining quality and local biodiversity, and ensuring their continued use.⁴³ Because of their seed-saving practices, there is an extraordinary amount of biological and species diversity within each of the gardens. Vanastree has distributed over 3000 packets of open-pollinated seeds to surrounding villages and cities. They have documented 120 vegetable and 60 flower varieties unique to the area. An important dimension of Vanastree's work has been the sharing of traditional

⁴³ Keystone Foundation. Vanastree. Securing Seed Diversity and Local Community Empowerment in the Western Ghats. 2003

agricultural knowledge of the region, including which plants are best suited to use as pesticides. There was a workshop in which about 60 women went to visit an organic village—one that reuses everything and does not rely on *any* external inputs. During this visit the women learned about a plant that is toxic to humans if ingested, but is extremely effective as a pesticide when boiled down to create a high concentration and applied to the base of the plants.

All of the women involved in the organization have forest home gardens of their own ranging in size as well as diversity. Much of the food grown in the women's home gardens is used to feed the family, but those with larger, more fruitful gardens are able to sell their produce in the market and bring extra money to the household. Vanastree helps these women augment their income by teaching them how to add value to the foods they grow.⁴⁴ In the past, middlemen have paid very low prices for produce, resulting in the exploitation of some communities. The local kokum fruit provides an excellent example of this exploitation. Originally, the women harvested the kokum fruit and sold them to proprietors at three rupees per kilogram (less than .001 USD). Middlemen subsequently sold the rinds for cooking purposes at more than a 100%

⁴⁴ Keystone Foundation. Vanastree. Securing Seed Diversity and Local Community Empowerment in the Western Ghats. 2003

profit. Once Vanastree taught the women to process the kokum to extract the nectar and dry the rinds themselves, they were able to earn more than *twenty times* what they originally made from selling just the fruit. On June 6, 2012 Vanastree opened its first store in Sirsi, Vanya. There, they are able to sell some of the products the women create such as local snacks like spiced banana chips. Once a week the store hosts a small organic market where the women are able to sell some of the extra produce from their gardens. Vanya is close to a bus stop, making it easy for the women to come drop off their product, come to help out at the store, and have a place to congregate.

Vanastree provides a valuable service to Sirsi and its surrounding area. They have reached over 500 home gardeners through their seed exchange groups. Vanastree emphasizes the traditional role of women in conservation and believes that “*any biodiversity conservation plan aimed at arresting genetic erosion must recognize the role of women as gardeners, seed savers, and sources of knowledge.*”⁴⁵ By bringing together different groups of women, exposing them to new gardening techniques, and helping them preserve tradition, Vanastree provides them with the opportunity to actively contribute to the preservation of the local biodiversity.

⁴⁵ Rao, Sunita. "Vanastree." *Vanastree*. Vanastree. 2011 <<http://www.vanastree.org/>>

Vanastree and India

Vanastree is extremely local in its outreach, working primarily with the communities surrounding Sirsi. Vanastree is also working on building networking connections to other small-scale initiatives throughout India. It strives to spread its universal message: the conservation of traditional knowledge and biodiversity is extremely important. At the same time, Vanastree supports the idea that large-scale agricultural models are not sustainable, and that there has not yet been a large-scale agriculture model that solves food security issues. Vanastree supports the idea that attention needs to be turned away from monstrous agriculture systems and focused instead on creating a network of small group initiatives. Although Vanastree's work is mostly concentrated in the state of Karnataka, their work and achievements have traveled nationwide, grabbing the attention of the Indian government and the famed environmental activist Vandana Shiva who sent an e-mail out to Sunita expressing her support of Vanastree's mission and dedication to not only sustainability but women's empowerment as well. There are three main areas that Vanastree bases its networking upon: documentation/research, outreach/training/networking, and conservation oriented livelihoods.

In January 2009, the state government of Karnataka drafted an Organic Farming Mission in which they strive to make Karnataka an organic state. Ten million rupees (18,400.00 USD) were allotted to this mission to popularize organic farming in Karnataka.⁴⁶ The chairman of the mission paid a visit to Vanastree and was so impressed by their work that he offered Vanastree money to buy their own plot of land in Sirsi. Unfortunately, this agreement was never finalized, and although Vanastree is willing and eager to work with government organizations dedicated toward organic agriculture, they lack the necessary representation and knowledge about working with the government. This is something that they aim to improve in the future.

Vanastree has also participated in a research project funded by the Karnataka Biodiversity Board in conjunction with the Ashoka Trust for Research in Ecology and the Environment (ATREE). This project used the Geographic Information Systems (GIS) computer program to create a map of forest home garden biodiversity in the Sirsi area. This was the first map of its kind created for Sirsi. The Karnataka Biodiversity

⁴⁶ Bhivainfo Solutions. "About Organic Sector." *International Competence Sector For Organic Agriculture*. Bhivainfo Solutions, 2012.
<http://www.iccoa.org/About_Organic_sector.php>.

Board is dedicated to building an increased awareness of biodiversity in Karnataka.⁴⁷

The Western Ghats area of Karnataka has been victim of deforestation, so the preservation of local fauna is extremely important in trying to avoid further deforestation.⁴⁸ ATREE is an organization dedicated to promoting socially just environmental conservation and development through the implementation of various environmental conservation projects.⁴⁹ Sunita Rao is an adjunct faculty member of ATREE, thus enabling Vanastree to use the organization to recruit interns. Vanastree also works with the intern abroad program, IE3 (the organization that provided me with my internship) to bring in interns from different backgrounds and with a range of experiences to help the organization.

Vanastree has also captured the interest of Pandurang Hegde, the founder of the Appikko movement in Karnataka. The Appikko movement is committed to putting a stop to deforestation and the subsequent damage to people's lives. In 1985 the Appikko movement successfully put a stop to monocultures in Sirsi's surrounding areas by

⁴⁷ Forest, Ecology, and Environment Department. "Karnataka Biodiversity Board." www.karnatakaforest.gov.in. Government of Karnataka,

⁴⁸ Flickinger, Donald I. *Rehabilitation of Degraded Tropical Forests In India's Western Ghats: Silvicultural and Socio-Economic Implications of Multiple Species Plantations*. Thesis. University of Florida, 1997

⁴⁹ ATREE. "Ashoka Trust for Research in Ecology and the Environment." ATREE <<http://atree.org/>>.

educating the people about the consequences of deforestation.⁵⁰ Hegde was able to communicate the importance of the Western Ghats forest, and thus spurred an outcry from the local people to the government to stop deforesting the area. The Appikko movement is now working on spreading the word to small organizations— like Vanastree— about the potential environmental degradation of the area. Hegde is introducing these groups to new, locally adapted, sustainable agricultural techniques.

⁵⁰ Seabrook, Jeremy. "Interview with Pandurang Hegde." *Interview with Pandurang Hegde*. New Internationalist Magazine, Oct. 2004.

<<http://www.newint.org/columns/makingwaves/2004/10/01/pandurang-hegde/>>.

The Importance of Home Gardens in Rural Areas

Home gardens allow families to safeguard their household food security and income against the risks and uncertainties of monocropping⁵¹. The rich diversity of the typical home garden means that if one vegetable doesn't fair well in a certain season, the family won't starve because of the multitude of vegetables and fruits available to eat. The gardens are laid out in the open space around the household and can hold anything from spinach, ridge gourds, and carrots, to passion fruit, papaya, and jack fruit. The vast variety of food grown on one's property not only helps provide a family with food security, it also provides ecological security by reducing soil erosion and draining excess water from the area. The roots of the plants grown in the garden keep the soil intact and help the drainage of the area. This allows the families to keep their land viable and fertile, so that they may continue producing food. In this way, home gardens sustain high levels of agricultural production.⁵² Instead of sacrificing all of the land to grow monocultures of cash crops for market use, home gardens provide an array of crops that create a complex ecosystem with efficient use of resources. In some

⁵¹ Jose, D., and N. Shanmugaratnam. "Traditional Home gardens of Kerala: A Sustainable Human Ecosystem." *Agroforestry Systems* 24 (1993): 203-13

⁵² Ali, Abu Muhammad Shajaat. "Home gardens in Smallholder Farming Systems: Examples From Bangladesh." *Human Ecology* 33.2 (2005): 245-70

regions, families with successful gardens (those with high diversity and productivity) are able to use half of their annual produce for household use.⁵³ They are able to sell, trade, or gift the other half within their community.

The beauty of these home gardens is rooted in how they are able to coexist with the forest and optimize local resources. There aren't fences keeping the wildlife out; the gardens sit within the forest. There are wild and semi-wild plant species surrounding the home that the women are able to harvest to use in their cooking and home remedies. The most abundant of the cultivated plants are the coconuts and bananas, as they are found virtually everywhere.

In addition to warding off the local wildlife, villagers have had to deal with changing weather patterns that are capable of being detrimental to their monthly income. Erratic monsoonal rains affect both crop production and income levels for the families in the region.⁵⁴ If the monsoons do not occur at the opportune time, farmers are in jeopardy of not only losing their monsoon crops (crops grown between June and October), but the crops they grow after the rains as well. Sirsi has also experienced

⁵³ Mohan, S., J. R.R. Alavalapati, and P. K.R. Nair. "Financial Analysis of Home gardens: A Case Study From Kerala State, India." *Tropical Home gardens: A Time-Tested Example of Sustainable Agroforestry* (2006): 283-96

⁵⁴ Keystone Foundation. Vanastree. Securing Seed Diversity and Local Community Empowerment in the Western Ghats. 2003

economic hardships due to the fluctuation of cash crop prices.⁵⁵ These fluctuations are mainly due to government subsidies, crop availability (some weeks may produce fewer crops than others), and crop quality. The unpredictability of the rains and the market prices of cash crops drive some farmers to look for a different way to ensure income throughout the year. In many cases, the farmers look toward modern agriculture technologies to help generate more revenue. These more modern agricultural technologies include genetically modified seeds. The introduction of genetically modified seeds severely threatens the seed and lifestyle sovereignty.⁵⁶ Traditional varieties of plants are in danger of being lost with the increasing use of genetically modified varieties. In traditional Indian agriculture alone, women use up to 150 unique species of plants or fodder. In contrast, worldwide, we rely on 30 species to provide over 90% of the world's caloric intake.⁵⁷ This sharp drop in the diversity of our diet is due to the capitalistic nature of modern agriculture, which emphasizes profit. The emphasis on profit pushes farmers towards growing only produce that will have the largest economic gain.

⁵⁵ Ibid

⁵⁶ Keystone Foundation. Vanastree. Securing Seed Diversity and Local Community Empowerment in the Western Ghats. 2003

⁵⁷ Shiva, Vandana. *Stolen Harvest: The Hijacking of the Global Food Supply*. Cambridge, MA: South End, 2000

In Sirsi, economic and food security are maintained through *traditional* agricultural practices of the region, without the use of inorganic fertilizers and pesticides. Modern agriculture practices are not viable for the majority of rural farmers in India.⁵⁸

⁵⁸ Peyre, A., A. Guidal, K. F. Wiersum, and F. Bongers. "Home Garden Dynamics In Kerala, India." *Sustainable Agroforestry* (2006): 87-103

Results

The survey of the gardens showed a surprising amount of heterogeneity for their relatively small size. The gardens contained plants such as brinjal, ivy gourd, ridge gourd, carrots, amaranth, tomatoes, garlic vine, ginger, turmeric, and spinach. (See tables 1-1 through 1-4.) An average of 50 species was found in each of the gardens, many of



Image 7 Sunita's garden featuring red amaranth and carrots

which were local varieties such as the metre bean and kokum fruit. This diversity was



Image 6 Brinjal from Bhagya's garden.

achieved with minimal amounts of land. The average area of the four gardens was 166 m² (1786 ft²), which is less than a quarter of an acre. Each of the gardens provided the family with food security and a buffer in times of the drought, flood, or pest attacks that can negatively affect their sources of food.⁵⁹ Furthermore, the gardens provide the women with another source of

⁵⁹ Green Foundation. *Banking on Seeds, Community Seed Bank Network*. Bangalore: Green Foundation, 2005

food, so they are not reliant on what is available at market, or market prices. Despite their benefits, the gardens' sole purpose was subsistence, and there was rarely enough to sell at market for a profit (see Table 2 through 5).⁶⁰

⁶⁰ These tables were filled out in an interview format with the women. Sunita acted as my translator, and transcribed their aural answers to English.

Very few external inputs were needed to maintain the subsistence gardens.

None of the four women relied on industrial seeds, fertilizers, or pesticides. The women utilized open-pollinated seeds that they were able to save and replant each season. Cow dung comprised the majority of the fertilizer, and kitchen waste was composted and used to maintain soil health; dry ash and slurry (a mixture of cow dung



Image 8 Pest attacking a metre bean plant. The tobacco water mixture was used to keep these pests at bay.

and water) were two of the other fertilizers utilized in the gardens.

Pesticides consisted of cow urine and dry ash that could be sprinkled on top of the affected plants. Another

pesticide used was a concoction of tobacco and water placed in a bucket

underneath the infested plant. The sweet stickiness of the tobacco lured the insects into the bucket, where they eventually drowned (see Image 8). Animals that were known to come in and eat the plants, such as monkeys and bandicoots, were kept at bay with dogs. Invasive weeds that were found in the garden were pulled up by hand and either burned or composted, depending on the way the plants germinated. There was a specified method of removal for each weed, instead of reliance on a mere pesticide to

get rid of them all. Each weed was targeted individually, not just showered with a chemical concoction.

Preparing the land for sowing was done by hand using spades, shovels, baskets, wheelbarrows, and pick axes. Large machinery was not necessary on these small plots of land. Families with larger plots of land relied on water buffalo do to the plowing.

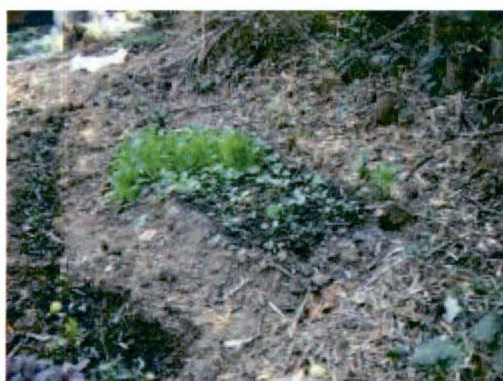


Image 9 Malabar Spinach in Bharti's garden.

The main constraints on the gardens were land, water, and/or time. Savatri's and Sunita's gardens were on the same plot of land which was rather stony and not naturally fertile. It has taken over ten years

to work the land and make it a viable place to grow food. This is an ongoing process that will hopefully lead to two very fruitful gardens. The women are constantly adapting to their surroundings, and slowly working on improving their land. They have no other option but to utilize their own plots of land, as there is currently no land available for the Vanastree collective to use. Bharti's garden suffered from low water input. Her plot of land is situated on a hill slope, and during the monsoon season the water rushes downhill, as there is nothing to stop it and allow it to stand and percolate, replenishing the water table. Bharti believes that if she can find a way to let the water

soak into the land during the monsoon season, she will be able to grow enough vegetables to open her own stand. (Sunita has suggested creating a percolation pit on Bharti's property but more research needs to be done before it is implemented).

There was no correlation between the amount of time spent in each of the gardens and its diversity. Although Bharti was only able to spend 15 to 30 minutes a day in her garden she had a greater variety of plants than Savatri, who spent up to three hours a day in her garden. This may



Image 11 Tomatoes, beans, and chilies in Bhagya's garden.

be due to the condition of land each of the women are growing on, and the size of the

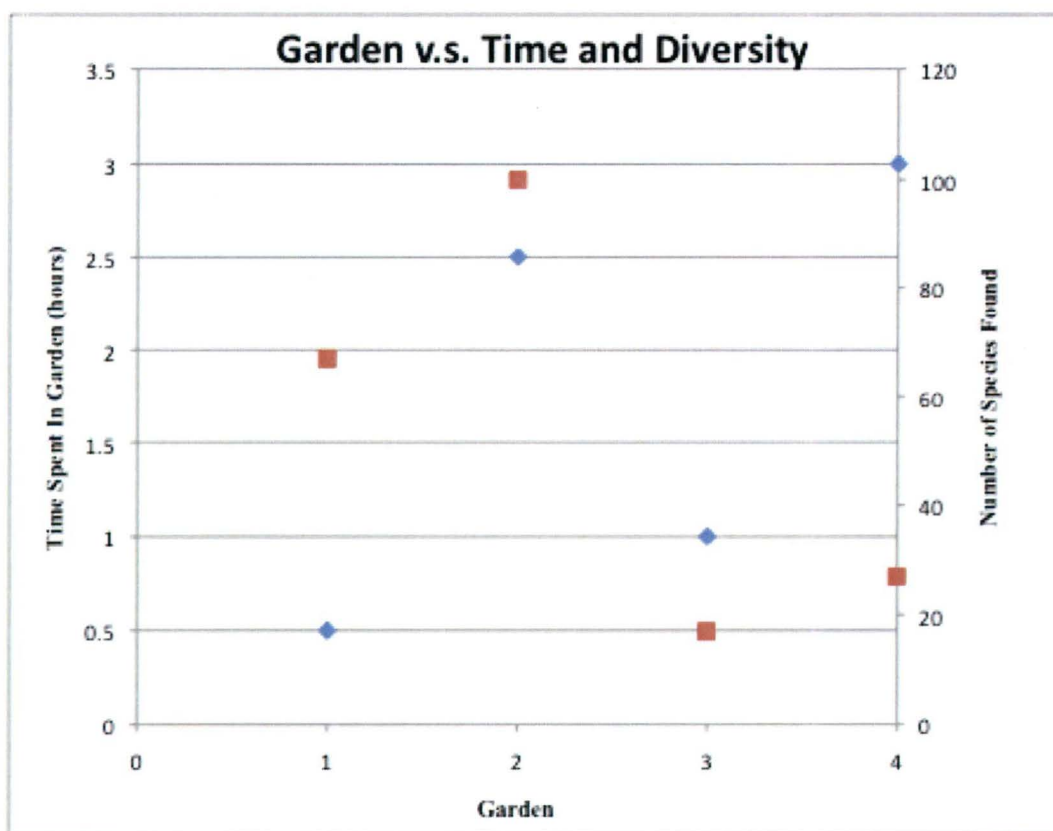


Image 10 Red amaranth from Savatri's garden.

plot available to them. However, the age of each garden needs to be taken into consideration. Savatri's garden is only a few years old, whereas Bharti's garden is a little more established. Bhagya has the oldest

garden, and it is the most plentiful and lush.

Bhagya's garden was able to produce almost all of the food her family consumes. Occasionally she would venture to market to purchase onions, garlic, and other things she was not able to grow, or has yet to attempt growing, in her garden. Hers was the only garden of the four that produced enough food for the household and enough surplus to use outside the home. What stood out most about the gardens was how well each of the women knew her garden and her land. Each of the women had a connection with her garden, and each of their faces would light up during our conversations. They were very eager to share their knowledge and information—an attitude that is integral to Vanastree's mission of creating a diverse network of small-scale agricultural initiatives. The women's attitude about their gardens and this project showed that there is a great need and desire to facilitate networking and communication between different agricultural groups. The women all believed that creating documentation about their gardens was an instrumental step in communicating with one another.



Graph 1 A plot depicting the amount of time each of the women spends in her garden and how much diversity is in each of the gardens. Garden 1 is Bharti's, garden 2 is Bhagya's, garden 3 is Sunita's and garden 4 is Savatri's. (The diamonds represent time, the squares represent diversity.)

Name(s): Lakshmi Ganapathy Chennaiah (Mother) Bharti Ganapathy Chennaiah (Daughter) Age: 65 years and 26 years Community: Dalit Village: Kammatagari Eco-Region: Malnad Region	
History of the Garden	The area they live in was originally forested but they were able to get the land sanctioned by the government. Bharti became interested in gardening 3-4 years back; Lakshmi has also been interested.
Organic	Has always been organic
Personal facts about the garden	They have very little time to tend to their home gardens. There is a group gardening spirit in the village; they exchange feed and gifts. They used to grow only Malabar spinach and brinjal, now the diversity has greatly increased. Their garden provides food and happiness. These women work as hired labor and spend most of their days working in other people's orchards and rice paddies, harvesting produce and dehusking the local cash crop, the areca nut
Tools Used	Pick-axe, spade, sickle, bamboo baskets, bamboo/wood stakes, fiber for tying things
Use	Home, gifting, exchange, sometimes for market sale
Constraints	Time is a large constraint; it is hard to manage both working as laborers and their garden work. They are often tired but they won't give up on their gardening. Water is the biggest constraint. If they had access to more water, they would be able to run a vegetable shop
Future Plans	Clean up garden. (There was a lot of trash and plastic debris scattered around the garden during my first visits. It has since been cleaned up with the help of a local school). Add more garden beds, start growing fruit trees, and add a percolation pit to help the water problem
Weeds	Eupatorium, Lantaa
Daily Effort	15 – 30 minutes
Topology	Slight slope from north to south
Number of Gardeners per Household	3: mother, daughter, daughter-in-law; sometimes the father will help with the digging and assembling frames for the climbers
Total Garden Area	140.03 m ² (1507.27 ft ²)
Livestock/poultry	Local breeds of cows (actual breed unknown): 2 regular, 2 small, 2 calves, and 1 buffalo. Livestock is let out to graze so they do not have to provide fodder and feed
Daily Dairy Output	2 liters a day (1 in the morning and 1 in the evening)
Water Input	Rain-fed during the monsoon season, grey water, well water, and when available government tap water
Irrigation	Areca trunk channels bring grey water from the house to the garden; also hand watered with pots
Soil Type	Slightly clay-like black soil, overall good quality
Soil Inputs	Cow dung (sometimes collected from the side of the road), cow urine, ash, compost (added as needed), dry leaves, areca husk (when available), coconut husk for mulching and overall soil fertility
Pests/Diseases Encountered	Monkeys, bandicoots, small birds that eat the beans and the flowers, picklaaray, aphids on the tomato and brinjal, insects on the angikase bean and the leaf, some in the tomato and chili plants

Pesticide Management	Dry ash sprinkled on plants is the major pesticide used, tobacco and water-sprinkled on top of plants or kept in vessels near the plants so insects will fall in and drown, cow urine and water (ratio 1:1), stychnos leaves, vitex leaves, and other bitter leaves are boiled and used as a pesticide
Money Invested	Only money input into the garden is with the purchase of seeds during the summer and monsoon season. The seeds are bought on the street and have poor germination (some seeds are bought from Vanastree)
Income	Have not really sold to market as they are not market gardeners. Recently sold some amaranth for 100 rupees, and received 500-1000 rupees from Maggay cucumber
Money Spent on Vegetables and Fruits	500 rupees per month, fruits bought from Sirsi, and vegetables are bought very rarely and are usually potatoes and onions, otherwise the garden provides enough food.
Where Food is Bought	Open markets in Sirsi

Table 1.

Plants Found in Bharti's Garden

Angikase	Cow Pea	Hedday Genasu (Sweet Potato)
Baji Beans	Custard Apple	Hibiscus
Bamboo	Dioscoria	Ivy Gourd
Banana	Elephant Foot Yam	Jambu-Big Variety (fruit)
Bird's Eye Chili	Fenugreek	Jasmine
Bitter Cucumber	Ficus	Kanakambara (flower)
Bitter Gourd	Flame of the Forest	Lakki Soppu (shrub)
Black Gram	(tree)	Malabar Spinach
Brinjal (eggplant)	Garlic Creeper	Mango
Caedalpinia (flower)	Gliricidia (tree)	Onion
Chili (other varieties)	Grapefruit	
Chrysanthemum (flower)	Green Amaranth	
Coconut	Guava	

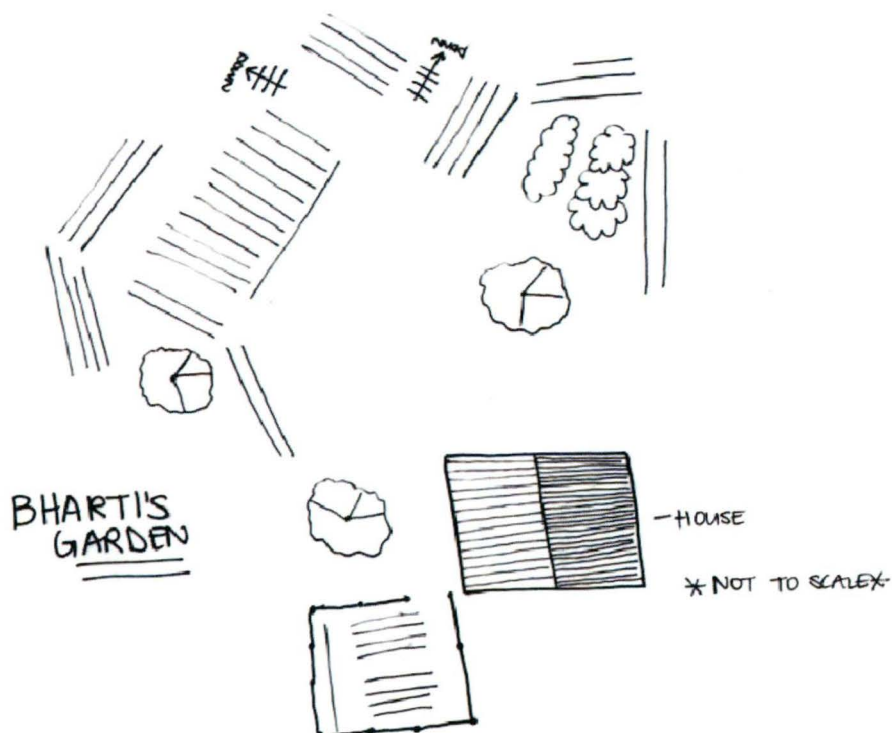


Figure 2

Name(s): Bhagya Bhat Age: 45 years Community: Havyak Village: Sampesara, Sonda Eco-Region: Malnad Region	
History of the Garden	Started years back as a summer garden with only maggay cucumber. (Exact start year unknown, although she thinks it is about 7 years old)
Organic	Organic
Personal facts about the garden	Greatly enjoys spending time in the garden. At times it can get frustrating when the insects and monkeys eat the plants.
Tools Used	Machetes, water pipe, fiber, shovel
Constraints	Poachers come in and take sandal wood trees
Future Plans	No major plans for the garden in the future; she may start growing potatoes and dahl.
Weeds	Bhadramushti, Eupatorium, Uralasopp, Nachikemullu, Shigemullu, Lemongrass, Nella Nelli, Kadukadle, Pulampureche, Tagate, Durve. Most of the weed names are unknown and some can be used for medicinal purposes.
Time Spent in the Garden Daily	Minimum 1.5 hours, and as much as 2.5 hours
Topology	Flat
Number of Gardeners per Household	Her plus hired labor, and sometimes her husband helps with tilling/digging
Total Home Garden Area	298.60 m ² (3214.10 ft ²)
Livestock/poultry	2 dairy cows (local breed, exact name unknown)
Daily Dairy Output	4 liters a day
Water Input	Rain-fed during the monsoon season, hand-watered the rest of the year
Irrigation	Hose pipe
Soil Type	Fertile soil
Soil Inputs	Leaf litter, cow urine, dung slurry, ash, compost
Pests/Diseases Encountered	Something keeps eating the roots of some of her brinjal plants and tomato plants, insects, bandicoots
Pesticide Management	Cow urine and water, ratio of 1:2, and ash
Money Invested	50 rupees per year on seeds
Income from garden	Garden is mostly for self-consumption and gifting. In 2011 she sold 10kg of brinjal and 15kg of tomatoes; seeds were sold to Vanastree
Money Spent on Fruits and Vegetables	Onion and garlic are bought from outside for about 20-30rupees per month, fruit (oranges and sweet limes) is only bought once or twice a year
Where Food is Bought	Local open market in Sirsi

Table 2.

Plants Found in Bhagya's Garden

4'oclock Plant	Hena	Sand Paper Tree
Amrutha Balli Plant (vine)	Hibiscus	Sapota Tree (fruit)
Aloe	Holy Basil	Soapberry
Angikase Bean	Hot Plum	Sour Greens
Ashoka (flowering tree)	Hydrangea	Spinach
Baji Beans	Ivy Gourd	Spiny Cucumber
Banana	Ixora Flower	Sweet Potato
Bird's Eye Chili	Jack Fruit	Taro
Bitter gourd, light long variety	Knol Kohl	Tomato
Black Taro	Kokum Tree	Turmeric
Brinjal (eggplant)	Lemon	Vatay
Butterfly Pea (flower)	Malabar Spinach	White Brinjal
Canna	Mango	Wild Coriander
Cashew	Marigold	Winged Bean
Cassia Tora (Legume)	Meesay Gantigay	Yellow Bauhinia (tree)
Champak flower	Miniature	Zinnia
Chilies	Bamboo	
Chrysanthemum	Nasturtium	
Cinnamon	Night Jasmine	
Coconut	Okra	
Coleus	Oleander	
Cosmos	Papaya	
Dahlia	Periwinkle	
Dhoop Tree	Pineapple	
Drumstick Tree	Pomegranate	
Field Bean	Purslane	
French Bean	Pumpkin	
Ginger	Radish	
Gooseberry	Red Amaranth	
Guava	Roses	

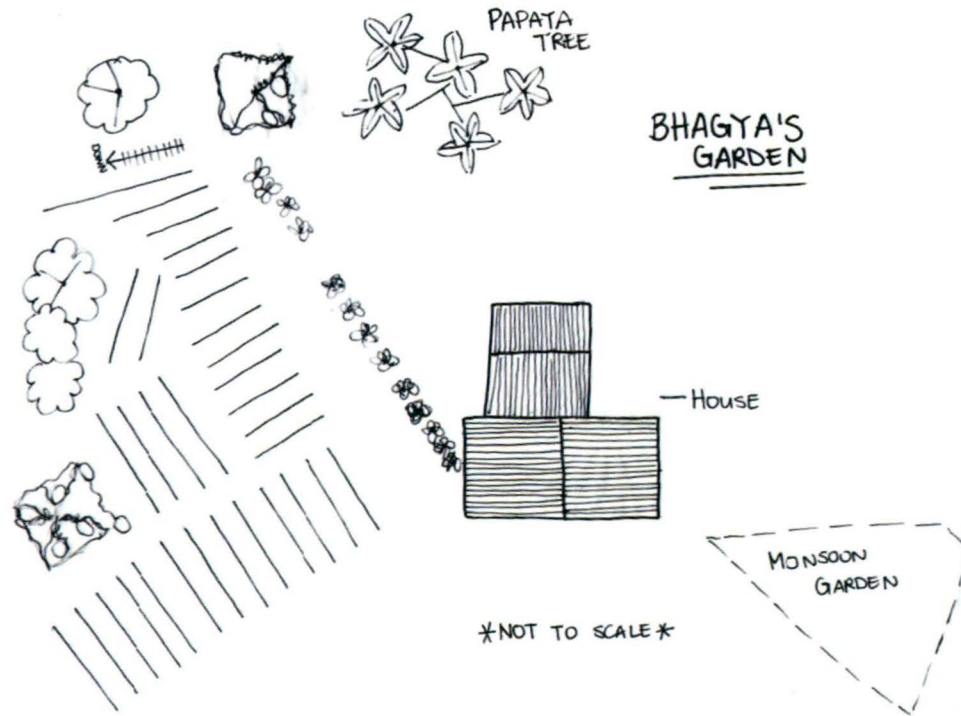


Figure 3

Name(s): Sunita Rao Age: 46 years Community: From Bangalore (Outsider) Village: Karkolli Eco-Region: Malnad Region	
History of the Garden	The land was derelict when it was bought in 2001. The vegetable garden came a couple of years later when terraces were made and some cultivation attempted in the stony terraces. It has been a source of great frustration.
Organic	Organic
Personal facts about the garden	Sunita has a sinusoidal relationship with her garden... it has both made her happy and very frustrated. Made her grow from a restless, impatient person to one who is not so restless anymore. She has not been a very diligent gardener. She has given a lot of thought about what to do in the garden, and how to overcome her inertia regarding physical work in the garden. Just watching her neighbors and fellow Vanastree members has humbled her, and she realized the immense possibilities of both outer gardening and tending the garden of one's own mind.
Tools Used	Irrigation system, machetes, spade, pickaxe, baskets (cane and recycled rubber), and small hand tools (watering can)
Constraints	Soil, topography of the land-things wash away during the rainy season and the west-facing lot can become desiccated
Future Plans	To have at least 60-70% of vegetables coming from the garden, further improve the soil, put in pineapple trenches for water run-off during the monsoons and also have an edible variety, start a forest nursery, increase the diversity of plants, make the garden a learning and educational environment with a map, keep a bee box, create a "blue box"- like a green house but can begin winter seedlings even if the rainy season goes on beyond the end of September like it did in 2011.
Weeds:	Eupatorium, Touch-me-not, other weeds not identified
Time Spent in the Garden Daily	0-2 hours depending on Vanastree office/travel schedule
Topology	Slope from east to west
Number of Gardeners per Household	1, 2 farm helpers, and occasional interns
Total Home Garden Area	204.79 m ² (2,204.34 ft ²)
Livestock/poultry	2 cows, 1 calf (Malnad Gidda, local breed; Malnad Gidda-Jersey cross)
Daily Dairy Output	~3 liters a day
Water Input	Rain-fed during the monsoon season, Oct-June micro jet sprinklers, sometimes bed is watered using watering can
Irrigation	Hose pipe
Soil Type	Evolved over time, 2002-2005 rocky/stony, 2005-present clayey, improving with additions of regular compost, sand, ash, charcoal, silt from check dams, mulch
Soil Inputs	Leaf litter, cow urine, dung slurry, ash, compost
Pests/Diseases Encountered	Early years there was a viral disease of the tomato, now that the soil is getting healthier there is no problem with the tomatoes. Knol Kohl, cabbage and cauliflower have caterpillars and other bugs have eaten the leaves, bunchy-top disease on the banana trees
Pesticide Management	Ash is sprinkled over with a dose of dung slurry (left over from the biogas) underneath the plant, which controls the pests nicely
Money Invested in the Garden	400 rupees on seeds (on average, not including startup and major inputs)
Income	None; strictly for home use
Money spent on Vegetables and Fruits	500-2500 rupees depending on the number of residents at Huthina Betta at any given time
Where Food is Bought	Open markets in Sirsi, and local food vendors

Table 3.

Plants in Sunita's Garden

Radish	Turmeric
Red Amaranth	Coconut
Brinjal	Pineapple
Mint	Tomato
Passion fruit	Cauliflower
Papaya	Cabbage
Carrot	Kohl Rabi (turnip)
Coriander	Dill

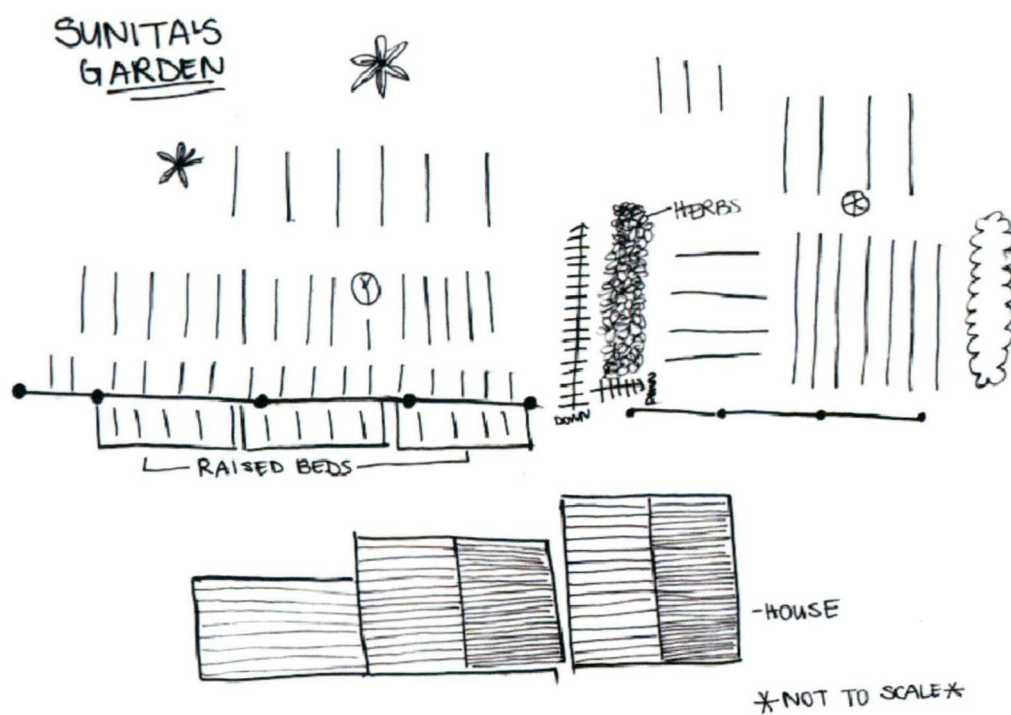


Figure 4

Name(s): Savatri Manjunath Naick Age: 28 years Community: Naik Village: Karkoli Eco-Region: Malnad Region	
History of the Garden	Garden was started in 2009, started with 4-5 different plants, started with the hope to have fresh vegetables for cooking and as a way to save money
Organic	Organic
Personal facts about the garden	Working in the garden provides a lot of happiness, have to deal with a lot of pests, including one dog who gets into the garden beds
Tools Used	Pick-axe, spade, baskets, sickle
Use	Home use
Constraints	Space, sunlight, sloping land, had to bring in outside mud to mix with existing soil
Future Plans	Wants to expand her home garden and see if she can start generating income with it
Weeds:	Invasive creeper weed (name unknown), need to burn after pulling so the seeds won't regenerate
Time Spent in the Garden Daily	30 minutes to 3 hours
Topology	Eastern side of the house, lots of shade, on a hill sloping from south to north
Number of Gardeners per Household	1
Total Home Garden Area	20.27 m ² (218.18 ft ²)
Livestock/poultry	None
Daily Dairy Output	N/A
Water Input	Rain-fed during the monsoon season, hand-watered the rest of the year
Irrigation	Hand watering with a hose or a watering can
Soil Type	Slightly black soil with some organic material, mix of red and black soil, friable and loamy
Soil Inputs	Leaf litter, cow urine, dung slurry, ash, compost
Pests/Diseases Encountered	Monkeys, rats, bandicoots, black-naped hare, the occasional dog
Pesticide Management	Cow urine and water, ratio of 1:2, and ash
Money Invested	50 rupees per year on seeds maximum
Income	Only for home consumption
Money spent on Vegetables and Fruits	Mostly spent on coconuts, fruits and vegetables that cannot be obtained from the garden, 150 rupees per week
Where Outside Food is Bought	Within a 5km radius from nearby villages, sometimes in the nearest city of Sirsi

Table 4.

Plants in Savatri's Garden

65

Radish	Coconut
Amaranth	Cinnamon
Spinach	Vanilla
Coriander	Pepper
Bottle Gourd	Sweet Lime
Cabbage	Cashew
Bitter Gourd	Jackfruit
Brinjal	Banana
Tomato	Cocoa
Caulacasia	Turmeric Ginger
Mango Ginger (Coccin Ginger)	Hog Plum

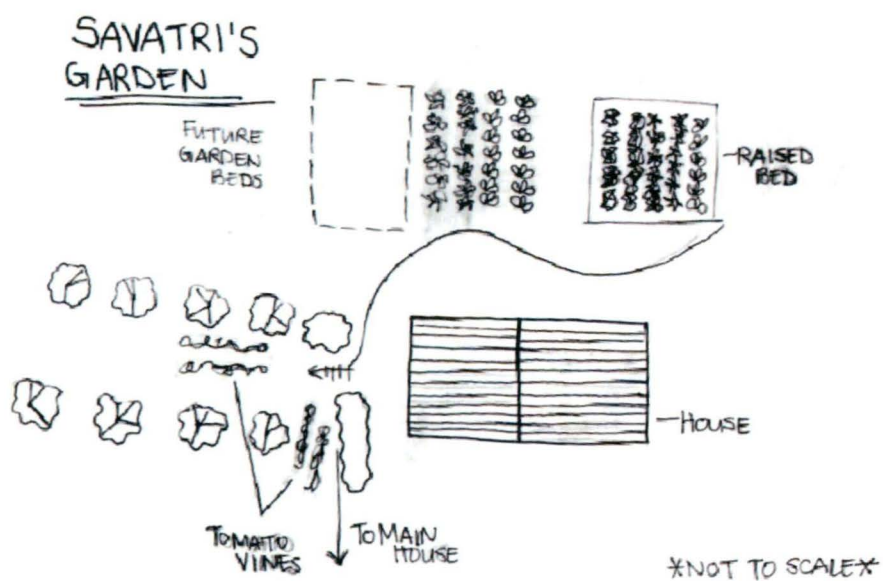


Figure 5

Discussion

This study shows that these women were able to supplement their diets with homegrown produce. The traditional methods utilized in each garden were able to support high levels of species diversity. This helped stabilize the household food security against the risks and uncertainties that come with monocropping, such as complete crop failure.⁶¹ Home gardens in Sirsi are intrinsically tied to traditional knowledge. The findings also show the high value these gardens have for the women's families. However, the gardens did not provide much extra income for the families.

Vanastree actively promotes the traditional knowledge and culture surrounding these home gardens, and it discourages the use of conventional agriculture practices. Vanastree members are able to preserve local varieties of food, local food culture, and share traditional agriculture practices with one another. The practice of saving traditional seeds maintains the seed quality, helps ensure the next planting generation, and makes seeds available to the members of the collective.⁶² The communities involved with Vanastree have recognized the importance of their knowledge and are

⁶¹ Jose, D., and N. Shanmugaratnam. "Traditional Home gardens of Kerala: A Sustainable Human Ecosystem." *Agroforestry Systems* 24 (1993): 203-13

⁶² Keystone Foundation. Vanastree. Securing Seed Diversity and Local Community Empowerment in the Western Ghats. 2003. Print.

trying to preserve as much of it as possible, from the open-pollinated local varieties of seeds used, to the use of dry ash as a pest management technique.

As invaluable as this knowledge of small-scale home gardening is, there is problem when the traditional/organic practices are applied to larger-scale farms. A recent study by Seufert et al., reveals that the yields of organic agriculture are unable to match those generated with conventional agriculture. Since industrial agriculture is capable of having higher yields on less land than traditional (or organic) agricultural practices, many believe that it is the solution for supplying the world with sufficient food in the future. Some believe that agricultural biotechnology is a critical technology if developing nations are to overcome the food security problems they currently face.⁶³ One study by Jewitt and Baker (2007) found that the farmers in the Western Uttar Pradesh, India who had access to fertilizers and applied them correctly were able to realize higher yields. The authors found that farmers in the area were harvesting an average of 4000 kilogram per hectare⁶⁴ (kg/ha) of a GM variety of wheat compared to the 1500 kg/ha of traditional wheat varieties they harvested in the early 1970s. These large harvests are unattainable at the small-scale home garden level.

⁶³ Kershen, Drew L. "Innovations in Biotechnology- Public Perceptions and Cultural Attitudes. An American's Viewpoint." *Global Jurist Topics* 3.1 (2003): 1-22

⁶⁴ 1 hectare is approximately 2.5 acres.

When applied on a large scale, traditional agriculture practices are not often able to compete with conventional agriculture methods, but that does not mean traditional knowledge should be tossed aside and forgotten. Though the gardens may not be able to produce enough food to feed a large population, they are able to produce enough food to feed the household. It is not reasonable to say that the future state of food is dependent on everyone in the world having their own garden, but it may be reasonable to think that communities of people should have access to their own gardens. This is still small-scale agriculture but it is not as individualized as are the home gardens of Vanastree.

Although in some cases modern agriculture reports increased yields over traditional agriculture, they do not occur without problems. One such problem is that there are inconsistencies with the reported yield increases. Knight writes in the paper *Biotechnology, Industrial Agriculture, and the Risk Society*, that there was a *decrease* in bushel per hectare of “Round-up Ready”⁶⁵ soybeans, while there was an *increase* of 8% in yields of GM corn in the United States. This inconsistency makes it difficult to fully believe that modern GM-based agriculture is the ideal way to provide increased

⁶⁵ “Round-Up Ready” soybeans are genetically engineered to withstand herbicides used to eliminate weeds.

crop yields. The many external inputs are expensive and therefore inaccessible to the poorest areas suffering from food insecurity.⁶⁶ With the reported inconsistencies the technologies may be undesirable to some.

The primary concern regarding industrial agriculture practices in the developing world is the destruction of the diverse sources of traditionally grown food.⁶⁷ In India, the application of modern agriculture is hyper-focused on augmenting the production of wheat and rice.⁶⁸ The new focus on grains rather than the more traditional dahls (dried lentils, peas, or beans) changes the country's diet and makes the usual diversity less accessible. If only grains are available, and a country's diet is more bean and legume based, their diets will shift significantly. This decrease in diversity is due in part to the profit- and yield-driven model of conventional agriculture.⁶⁹ These yield-oriented strategies work against the practices in organic agriculture. They focus on growing GM crops such as wheat and rice, but ignore their other varieties as well as

⁶⁶ Keystone Foundation. Vanastree. Securing Seed Diversity and Local Community Empowerment in the Western Ghats. 2003

⁶⁷ Shiva, Vandana. *Stolen Harvest: The Hijacking of the Global Food Supply*. Cambridge, MA: South End, 2000

⁶⁸ Freed, Stanley A, and Ruth S. Freed. *Green Revolution: Agricultural and Social Change in a North Indian Village*. New York: American Museum of Natural History, 2002

⁶⁹ Vasavi, A. R. "'Hybrid Times, Hybrid People': Culture and Agriculture in South India. *Man, New Series*" *JSTOR*. 29.2 (1994): 283-300.

traditional crops such as dahl. Dahl is just as fundamental to the Indian diet as rice. The traditional varieties of crops are highly valued in the rural community, and there is a strong desire to preserve them.⁷⁰ Conversing with the women in my study revealed that there is a high value placed on the indigenous foods of the area. These are foods that the women have grown up watching their mothers and grandmothers prepare. A strong sense of tradition and family ties are associated with these local foods. Some of the women who have families living in other villages and cities send care packages of their local and traditional snacks.

From the results of my home garden study, and the research conducted on industrial and traditional agriculture, it appears that neither type of agriculture provides a complete solution for the future of sustainable farming. Rather, creating an agricultural system that is a hybrid of each system would be a viable way of increasing production while maintaining crop diversity. This is further suggested by Seufert et al. (2012), who states that:

“There are many factors to consider in balancing the benefits of organic and conventional agriculture, and there are no simple ways to determine a clear ‘winner’ for all possible farming situations... In the end, to achieve sustainable food security we will probably need many different techniques– including organic, conventional, and

⁷⁰ Rao, Sunita. "Vanastree." *Vanastree*. Vanastree. 2011 <<http://www.vanastree.org/>>

possible 'hybrid' systems— to produce more food at affordable prices, ensure livelihoods for farmers, and reduce the environmental costs of agriculture."

This is the idea that needs to be taken into consideration when thinking about the future of sustainable agriculture. The garden study illustrates the importance of traditional agriculture practices not just for the culture but for the preservation of crop diversity, as well as local crops that may be in danger of being lost. Additional research shows that traditional agriculture is sustainable on a small-scale, but is not able to sustain as high of yields as conventional agriculture.⁷¹ Conventional agriculture, however, is also not considered sustainable because of the detrimental environmental consequences of chemical inputs, the consequences of using GMOs, and the overhead costs to small-scale farmers.⁷² The conclusion, then, is that traditional agriculture is an integral part of the solution to finding a sustainable agricultural system in India. Preserving local varieties of crops and certain planting methods has a high cultural value to rural Indian farmers, but may also have a high value in the sustainability of future agricultural systems.

⁷¹ Seufert, Verena, Navin Ramankutty, and Jonathan A. Foley. "Comparing the Yields of Organic and Conventional Agriculture." *Nature* 485: 229-32

⁷² Knight, Andrew J. "Biotechnology, Industrial Agriculture, and the Risk Society." *Society and Natural Resources* 20 (2007): 21-36

Applied Value

This study will serve as a preliminary baseline for more future, more detailed research of Sirsi. Another Vanastree intern working on her master's thesis will continue this study. She will be able to add more in-depth questions and survey more gardens. The questionnaire and data tables I have developed can be applied to other groups with which Vanastree is collaborating, such as the western buffer zone of the Biligini Randaswami Temple (B.R.T.), tiger reserves, the Andaman and Nicobar Islands, and other areas in Karnataka. The data sheets I created can be developed into a comprehensive record book for individual gardeners to log information about their gardens. They can also contribute to participatory research on small-scale food systems, providing an example of how to include the *women*— not just their garden data— in their studies. A version of this report will be translated into the local language of Kannada, allowing the data to be shared with the community at large.

This study, and the data I collected and documented, will help Vanastree keep a record of the diversity in each of the four women's gardens. The survey I created will also give the women the opportunity to share their gardening experiences, whether it be the joy gardening brings them or the ways they manage pests and weeds. Continuing the records this study began will also help Bhagya, Bharti, Savatri, and

Sunita monitor and potentially improve upon their own gardens. With a record of what techniques they are implementing in their gardens, the women will have a way at looking at what methods and crops have been working well in their gardens and which have not. If distributed to the other groups Vanastree works with, this study will provide a way for them to intercommunicate and display information about each group member.

Conclusion

With the localized data gathered in this study, it is difficult to come to an overarching conclusion about the state of the battle between industrialized and traditional agriculture. This study offers a glimpse into a conservation organization's efforts to preserve tradition. The women involved in this study and those involved with Vanastree are just a small part of the larger environmental movement in India. I found that most of the women I worked with were contributing to Vanastree not because they are fiery environmental activists but, rather, because they seek to increase their gardening knowledge, their economic profit, and sense of community support.

By itself, Vanastree is not an organization making huge leaps and bounds against the onslaught of industrialized agriculture. Their tactic is to quietly reinforce the importance of keeping agricultural tradition alive. The women in the organization greatly benefit from keeping the local biodiversity alive in their gardens, as it helps keep both their financial and food security intact. Vanastree plays an important role in the debate between industrialized and conventional agriculture in that they effectively spread information and knowledge on a small scale by reinforcing the importance of traditional knowledge and practice. The women who are a part of the organization get the chance to communicate with the population at Vanastree's various *melas*

(exhibitions), have access to seeds from the seed bank, and see firsthand the population of Karnataka's genuine interest in their work.

Sunita hopes to facilitate the creation of a large communication network between small-scale agriculture in India, discouraging the use of modern pesticides, fertilizers, and seeds. The movement represented by Vanastree has the potential to play a major role in the future of agriculture in India. Networking between farmers may be part of the key for finding a solution toward feeding the future population. "*Vanastree recognizes the importance of forest home gardens as refuges of biodiversity, providers of nutritional food, extra sources of income, and educational tools.*"⁷³ The small-scale home gardens that are a part of Vanastree are important keepers of the local biodiversity in danger of being lost in the wake of industrialization.

⁷³ Rao, Sunita. "Vanastree." *Vanastree*. Vanastree. Web. 14 May 2012.
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