

A 2000 World Food Prize Intern in Tamil Nadu, India

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I have experienced so much personal growth during my stay here and have made many new friends. I will never forget the time I spent here or the dedication of the staff. The M.S. Swaminathan Research Foundation is a shining example of how hard work can change the world for the better.

Growing up in Iowa made the idea of global hunger seem distant. We are blessed with a home that has rich soil, ample water supply, and the direct access to labor saving technologies. The Iowan farmer today can produce a bushel of corn with only four minutes of time invested in labor. With field after field of golden corn how could anyone go hungry? Yet, around the world other farmers have continued the practices that their ancestors have used with little improvement. Their drudgery may not guarantee a large enough yield to feed the entire family. A person cannot imagine the dramatic differences between these two agriculturists. The World Food Prize has given me an opportunity few people have ever truly experienced. It was a chance to see at the farmer's level the trails, struggles, and successes of agricultural programs in a region where the new and the old are coming together to produce hope. The internship has changed my outlook on the human spirit and the need for global understanding of agriculture.

Agriculture is in my blood. My grandfathers both raised their families on Iowa farms sharing the rewards of the bountiful times and the hardships of poor times. But farming has changed in Iowa. The size, scale, and price volatility has redefined the family farm in the past decades. As a student at Independence High School in Independence, Iowa, my teacher, Mr. David DenHartog, introduced me to the World Food Prize. This program interested me because it allowed the participants a chance to explore farming practices and concerns from around the world. The idea of being able to see the work of so many world-renowned agriculturists was a gift. It was not only the chance to learn about other people's work, but it was an opportunity to see how different interests and strengths could be combined to solve a common problem. During my junior year in school I assisted a classmate of mine, Aysha Chowdhry, prepare for her presentation and report for the 1998 World Food Prize Symposium. The following summer she took part in the summer internship program and worked for two months at the M.S. Swaminathan Research Foundation. She returned to Independence a changed person and strongly endorsed the experience. In the 1999 World Food Prize I took the opportunity to prepare a report on the logistics of food security. I have always loved biology and history and the

World Food Prize internship offered me a chance to continue my studies with the ultimate study abroad program. After the symposium I began the process to become a summer intern and was awarded the opportunity to go to the M.S. Swaminathan Research Foundation.

I was ecstatic about the prospects of traveling around the world to Chennai, India. I had always wanted to visit the sub-continent to experience the rich cultural and historical tapestry which India has to offer a visitor. With a population of over one billion, India also has its work cut out for her. How this nation handles the new challenges in this new age will impact everyone in the world. India represents a country where the unexpected is an everyday occurrence, and the mundane is a new adventure. Aysha too helped me in my decision. She returned to our small town with stories and images which seemed as remote and exotic as anyone could get in this world. No matter how much a person researches, or how much they have seen on film; it can never prepare you for what you will witness in the field. I had no idea what I was going to do when I got to the foundation. I had no idea what to expect. I had no idea what I would miss. Yet, all of those concerns were overshadowed by the prospects of visiting a new land and see a side of life few Americans have an opportunity to see.

The M.S. Swaminathan organization has a diverse set of roles in the pursuit for the creation of sustainable agriculture. The father of the Green Revolution in India, Professor Monkombu Sambasivam Swaminathan, established the foundation in July 1988 as a non-political Trust. His hope was to create a center where farmers and scientists could meet, where technology could be integrated, and where a partnership could be forged to create a sustainable agriculture for India. At the center of the foundation's work are the ideals to be pro-poor, pro-nature, and pro-women. Pro-poor concept was to serve to add value to the work of the poor and create new income opportunities through a partnership that blends the new technologies with the traditional farming knowledge. Pro-nature was designed to have the foundation serve as a center for research and training for conserving biodiversity. The pro-women approach was created to increase the interested in women development, and to receive better benefits from new technology. Through these facets the foundation has found innovative methods to bring about food security. The M.S. Swaminathan Foundation has the dual

role of being a field organization working with the farmers and rural poor creating new avenues for food security as well as being a leading scientific research center.

In the vast amount of work that was being performed I played a small part. I worked at examining the pro-women position the foundation had taken. How could the empowerment of women correlate to greater food security? This was a learning experience not only in the agricultural sense but also in the understanding of a different culture. When I worked with the villagers I needed to remember that their very society was completely foreign to our own. But instead of judging it, I needed to examine it and determine how things could be improved for everyone. I worked with the talented staff of the foundation and developed a case study approach. Much of my information has come from interviews with the villagers themselves. They were eager to learn and even more eager to try. The spirit of these beautiful people combined with the talent of the foundation's staff mixed with hard work has created remarkable success.

The interaction I received with the staff at the foundation offered vast amounts of information that often can not be duplicated by studying in the classroom. Ms Mina Swaminathan acted as my chairperson directing my case studies to the appropriate departments. Her passion for the plight of the women in rural India drew me to her ideas and compelled me to study gender issues in more depth. She has determination and commitment to see the situation improve. With the aid of Prof. P.C. Kesavan, Dr. K. Balasubramaniam, Dr. M. S. S. Mohan, Dr. R.D. Iyer, Shilpa Patel, Annie Jennifer, and Professor Swaminathan, I was able to examine the work done at the foundation. Using the resources available, I designed a program to examine the relationship between empowerment of women and food security in India. I compiled my findings in the following report.

Introduction

Women have been a value asset through out history. They were the creators of civilization. While some may argue great men built the ancient wonders. Women were the first to cultivate crops changing man from a nomadic society into a sedentary people. Without their input none of man's

achievements would have been possible. The Greek playwright Aristophanes knew the importance women played in the lifestyles of the Greek world. In his comedy *Lysistrata* the women of Athens refuse to do anything for their husbands until they stop the war with Sparta. Needless to say, the war was stopped to restore the order within the society. But women have rarely enjoyed the power that men appear to be born commanding. They have become prisoners by social and economic restraints. These barriers run deep within the very cultures of many. Even the *Bible* tells the creation of Eve as a subordinate to Adam. So it is not surprising that women have had to face the hardships of being invisible. While the male children are expected to expand their skills and develop their minds, women are forced to be content with the designated roles that society has given them. Yet, these roles may not bring the recognition. They carry a heavy responsibility. Just as Aristophanes points out, women control the domestic needs of the entire family. They are the farmers, care givers, healers, and food providers for the world. In short it has become a woman's responsibility to foster in a new generation. Without the invisible labors of women, the societies of many would face the same trials that the Athenians had. The only difference would be the outcome is not a laughing matter.

To define food security is a difficult task because it means different things to different people. The FAO defines food security in the following terms. "Food security is when all people at all times have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life."

There are three dimensions to food security.

--Availability: sufficient supplies of appropriate quality consistently available to all.

--Access to adequate resources for appropriate food for a nutritious diet.

--Utilization: proper biological use of food through adequate diet, water, sanitation, and health.

How then do you create food security for everyone? Food security is no longer a mere question of production. Even if a region has become self sufficient in agriculture production it may still have problems with the equal distribution of food. A problem which must be overcome is the

access to foodstuffs and the cost relationships. Food has fallen into the age-old dilemma formed between the haves and the have-nots. Nearly one quarter of the world's population earns less than a dollar a day. This poor income prevents them from obtaining the needed resources like land, crop inputs, or credit to have greater production. What must be done is to improve the conditions of the "have-nots" by empowering them with knowledge to bring about greater food security.

When examining food security certain terms are repeatedly used. These terms have been defined by the FAO in order to prevent confusion during discussions. The following words hunger, malnutrition, and low-income food deficit countries would incorporate many different views if clear definitions were not created.

--- Hunger also known as "undernutrition" means intake below 80% of the recommended daily calories. The recommended daily calorie intake is between 2200-2300 calories.

--- Malnutrition means a pathological state due to absolute or related deficiency of essential nutrient(s).

--- Low-income food deficit countries have per capita GNP (1993) of US\$1345 or less and a net deficit in cereal trade over the last five marketing years.

It is obvious that in order to examine food security in India a person must look at the women aspect. They are the producers, procurers, and preparers of the family's diet. Though this may be an important responsibility, they often have no control over the family's income to buy food. This means that whatever a woman can obtain in terms of funds will have a direct impact on the family's food security. We also see another side of the social pecking order. Though women are the preparers of the family's meals, they are traditionally the last ones to eat. This means the nutritional value may be lost because the food has become cold, or if there has not been enough to eat the woman is the first to feel the pains of hunger. A woman's health can be severely compromised by the lack of needed nourishment such as vitamin A, iodine, and iron. If she becomes ill who will carry her burden allowing her time to recuperate? Women do not get sick days. Even young girls suffer from social views when it comes to health related concerns. A girl is four times more likely to suffer from

malnutrition than boys, but they are 40 times less likely to be taken to a hospital. (FAO, 1998) An even more sinister problem has evolved due to the poor diets of many young women. Women carry and nourish the future generations. When mother suffers from lack of nutrition; baby will suffer as well. This has led to low birth weight babies. These babies are immediately at a disadvantage due to possible physical and mental handicaps that can arise from low birth weight children. (Carr, 1991) The lifestyles of the rural poor will challenge even the most fit of persons. Anyone who has not the full use of his or her abilities may find life continuously overwhelming. That is why it is imperative that women are recognized for their importance, and why they need immediate assistance.

Employment vs. Livelihood

As an American I have a different view of what is the definition of employment. My definition of employment is the standard "working nine to five." Everyone receives a paycheck on Fridays, and vacations are a two-week holiday every year. By that definition I would find that many women in India are not employed. They have no set working hours, they have no concept of a standard payday, and vacations are an alien idea. The majority of women in India are self-employed or work at non-income generating duties.

Being self-employed does not mean that they do not have a strenuous workload. A study conducted by the FAO discovered that women in Africa and Asia work 13 hours a week longer than men. In the Eastern European nations and members of the Commonwealth, the average is seven hours a week. In Latin American the average woman labors six hours longer than her male partner. Western Europe sees a difference of five to six hours. Even in Japan women work two hours more a week than the men. When these numbers are multiplied by all the women in those areas the amount of extra hours women spend laboring beyond their male counterparts becomes staggering.

They work in the fields, raise the children, and tend to the household needs. While these jobs are demanding, they often do not provide income to the family. Even during harvest the men get

to do the marketing and see the income in his hands. It has also been the men who have become employed. They are the ones who have the freedom to leave to find off farm employment. Sadly, this freedom is achieved through the drudgery of women. Since men have the benefits not to be tied to the home and children, they leave. However, what they leave is not only their homes, but they leave the entire family's responsibility to their wives. Now she is alone and it is uncertain whether he will even be able to make enough to send home. If a woman needs to be employed immediately the concerns of who will care for the children are raised. They could either stay home alone or accompany their mother to her work site. Both options bring risks to the children. (Vishwantan, 1994) Instead of employment options, women need ways to increase their livelihoods at a home level. The new sources of income would correlate to new avenues to purchase the needed food items. These programs do not need to be large or labor intensive. In fact due to the busy lifestyles of women the programs which work the best are simple, easy, and require as little capital as possible. Even if the returns are not a large sum, it will be used to the fullest potential. The poor women are experts at making every rupee count.

Case Studies

As a part of my work at the M.S. Swaminathan Research Foundation, I looked at several case studies to determine some of the work that has currently been undertaken to alleviate food insecurity concerns.

Biovillage Program

The Biovillage Program is a program designed by the M.S. Swaminathan Research Foundation with the support of the Pondicherry government and the United Nations Development Program. It has a mission to improve the livelihoods of the villagers in the 19 program villages by offering new enterprises to bring in new incomes, showing the power of cooperation, and expanding the

availability of knowledge to the village people. It is the hope that the programs begun at the Biovillage sites will be able to continue even after the foundation has withdrawn from the area. (MSSRF, 1999)

The forum in which I examined the Biovillage Program was a personal one. I visited the villages of Kizhur, Agaram, Sivaranthagam, Mangalam, Ramanathapuram, and Pillayarkuppam. At all of these villages I visited with both men and women over what they have done and how their lives have changed. These people have become leaders in their communities. Some of them have a very limited educational background; yet, through the confidence gained at these programs they have become leaders and innovators.

There have been a number of programs initiated at the Biovillages. The income generating activities have included dairy production, goat rearing, fodder production, home poultry production, integrated crop management, floriculture, and mushroom cultivation. The foundation has worked with all members to form cooperatives and find market linkages.

The dairy project has continued to grow as the number of milch animals is increasing among the participants. The foundation has helped the formation of several cooperatives to increase the scale of the total production and allowing the villagers to benefit from a larger operations. The women of Ramanathapuram, where the milk cooperative is 18 members strong, said that if they were on their own then they each would have one cow. But together they have 18 cows. Now if each member care for two cows then they begin to have the size of a dairy operation with 32 animals. Since the dairy cooperative consists of several landless women then the procurement of fodder may become difficult. The foundation has begun to address that concern through the introduction of commercial fodder programs.

The production of high quality fodder has begun to pick-up as villagers begin to see the demand. There is now a commercial fodder cooperative designed to grow fodder for the markets in the city or to the landless women of the dairy cooperative. While the fodder has not been harvested,

many of the farmers are hopeful of the success of the new operation. They have even expressed an interest in expanding their production if it is profitable.

The goat rearing operation have continued to grow as the Telicherry breed introduced into the herds of traditional goat rearers have become established. The Telicherry goats have many benefits over the local varieties of goats. One benefit is the larger birth weight. While the local goat kids are born weighing about one kilo, the Telicherry cross are almost two kilos. The Telicherry goats also will grow larger and have a higher yielding carcass. This has meant that their price per goat has increase when it comes time for the animals to be sold to the meat traders. Perumal from Kizhsathemangalam said that before the Telicherry variety he would receive 400-500 rupees per goat. Now he receives 800-1000 rupees per goat. The goat rearing operation is a family affair where all the member of the family work to feed the animals and take them to grazing lands. Perumal's wife said that the reason for other people failing at goat rearing was the fact that they lacked the experience. She continued to say that through their work with the Telicherry variety they found that it requires more water and needs to have an opportunity to graze. One way in which they hope to expand their operation is by selling goats at a price per kilo in a similar fashion to the way chickens are sold. This would help to reduce the amount of lose a goat rearer gets when dealing with the local meat traders.

Mushroom cultivation has continued to be a popular enterprise as a number of women have seen the possible increases in income that mushroom production can bring. Cooperatives are formed and larger scale operations are in the planning. The Mushroom Training and Demonstration center at Kizhur is being running by local educated youth and has begun to produce spawn. Work is being done to find new models to produce large quantities of mushrooms, drying, and processing options. The essential role model to the mushroom project has been Kathanayaki who has been with the program the longest. She has become a leader training others in the proper ways to cultivate and harvest mushrooms. She demonstrates the ability the villagers have in conveying information to each other.

The Biovillage program has also work to promote the floriculture projects in several villages. The floriculture has included the raising of jasmine and crossandra. These flowers were selected due to the local demand for these flowers for hair use and religious purposes. The floriculturists plant both crossandra and jasmine in the same plot. The crossandra will begin to produce flowers after three months. The jasmine will take about a year. By multi-cropping the villagers are able to create a yearlong income.

The new enterprises are not the only way in which the foundation has been assisting the villagers in the Biovillage Program. The second half of the program is designed to establish market linkages with local markets or markets in larger cities. This has significant importance because a new skill or enterprise can not increase a villager's livelihood unless they are able to transform their work into monetary returns. In fact, one of the first steps in creating a new enterprise or cooperative is to determine whether there is a substantial demand. With the fodder production it was clear to see the demand for urban livestock food, but what about the mushroom cultivation? After all a family can only eat so many mushrooms. If a buyer can not be found then the produce will not reach its fullest potential economic value. In some cases the villagers have means to create a direct market to the consumers, however, the cooperatives have proven to be successful again by offering easier market linkages. Because the cooperative can split transportation cost among the group members the cost burden to the individual will be lessened. The Biocenter has also and will continue to offer a forum for the creation of market linkages. At the center the World Wide Web has allowed villagers the opportunity to examine costs and prices to ensure they receive a fair price. It has also offered a location where the buyers can communicate directly with the producers. This focus on market linkages has facilitated the success of the new enterprises and creates a sustainable flow of commodities.

All the villagers discussed how their diets have changed as they have seen an increase in their incomes. Member of the dairy cooperative were pleased that now as a part of their diet the children could have a little milk. Before the family owned a cow it was nearly impossible for the family to

enjoy any milk on a regular basis. One man in Pillayarkuppam was able to buy a refrigerator and now has better quality food which will last longer. Overall, the people have found that they felt their diet has more variety and better taste. However, some have found that they now have to buy more food than they needed to before they began their enterprises. Viruthambal of Ramanathapuram found that when she changed her lands over to floriculture she needed to buy more food for her family. She now plans to lease some land to grow paddy for her own family's consumption. When asked about the concern about taking land away from food production to commercial production many villages were a little concerned, but said that if they started small and kept the production diversified then they would still have enough food. The participants are interested in expanding and diversifying their enterprises.

One of the strongest trends throughout the villages besides the increased in food variety is the desire to diversify the income enterprises. Nearly everyone had plans to expand current operation or create new ones. Padmini from Ramanathapuram felt that now her milking cooperative was beginning to grow that they should begin an ornamental fish breeding operation at the Bio-Center. Her story is not alone. From the mushroom cooperative in Mangalam to the goat rearers in Kizhsathemangalem, everyone has plans to expand. This attitude concerned me in the fact that the villagers were working an equivalent to a full time job before the new enterprise; how would they find the time to expand their operation? Yet, the villagers did not seem to be concerned many had the same story as Viruthambal. She claimed that before the MSSRF they were labors working in the hot sun. Now their drudgery has been reduced, and they are able to do more. She even claimed that she enjoyed working in her floriculture plot. Many of the women have also found that their husbands have begun to help them more as they realized income can be created from these new endeavors. However, the strongest fact which kept them from worrying about being over burden was the fact that they were cooperating. Sulochna stated that if one of the members in the mushroom cooperative had a problem they all could help each other. Together they can get more work done and produce more to meet larger market demands.

The new confidence which has been created has made the villagers determined to work through the Bio-Center and continually expanded their operations. Many have found that their lives are better and have gain great joy to see their enterprises succeed. One villager, Rani Nagappan, was facing an uncertain future when her husband left her. But because of the foundation assistance and her hard work, she has been able to educate her sons and buy three cows. She has even begun to build a home for her family. The success of the Bio-Center have not gone unnoticed as new villagers from outside the original 19 villages approach the new leaders to learn how they have created a better life for their families.

The importance of women can be seen in how the villagers spend or plan to spend the new income generated. The men of the village always wanted to build a house, prepare a dowry, and establish a business for the sons. They never once mentioned purchasing better foods. The women on the other hand almost always put food on the top of the list as items which they spent their income on for the family. The second most important thing to them was education. Both ideologies have their benefits and drawbacks. Yet, it is clear that the women are the ones who are responsible for feeding the family and take this responsibility very seriously. This also strengthens the importance of women in food security issues throughout the world.

Kolli Hills

The region of Kolli Hills is a part of the Eastern Ghats mountain range. The region is located in the Namakkal district of Tamil Nadu. The elevation of the highest point at Kolli Hills is 4662 feet above sea level, however, the general height is about 3500 feet above sea level. The inhabitants of the Kolli Hills region are from the Malayalis tribe. The tribe has had a rich history at Kolli Hills, as the region has become an important center for Tamil literature and mythology. The Malayalis tribe does not consider themselves tribals, but the government of India recognizes them as a Scheduled Tribal group due to their different lifestyle. As tribals they are not a part of the scheduled caste

system which divides the rest of the Indian population. (Singh, 1997) My purpose for the trip to Kolli Hills was to examine the role that women have played in the food security of the region. I was particularly interested in whether an increase in livelihood at a beneficial impact on the food security of the entire family.

The main occupation for both men and women at Kolli Hills is agriculture. Women's contribution to the family's agricultural operation is significant. They are an active part in nearly every aspect of farming. Women prepare the soil, plant, weed, harvest, process the grains, store the grains for the next year, and take care of the family's livestock. Apart from their agricultural duties, women in Kolli Hills must also take care of the domestic chores, which include cooking, childcare, fetching water and fuel, and general maintenance of the household. One specific skill that the women at Kolli Hills have is the ability to identify, harvest, and use a vast assortment of wild plants for medical use. While I was visiting the region several times a woman would point to a plant and explain the medicinal value it had. Headaches, stomach problems, and wound treatment are just a few of the ailments that the tribal women can treat naturally. This skill accounts for the primary health care of the tribals at Kolli Hills. These tasks demonstrate the importance women play in the labor force of Kolli Hills.

Women are also responsible for the family's seed management program. This means it is her work to insure that there will be enough viable seeds for the new planting season. To achieve this task women have developed techniques for selecting the seeds, sun drying grains, and storing in a pest free environment. Some of the seeds are stored in large sealed clay jars or a structure called a "Thombai" is used to store more seeds for a longer period. This structure will also be coated with cow manure to prevent insects from entering the structure and damaging the seeds. Because of the importance of the seeds they have become sacred and are respected. Through these age-old techniques, the women of Kolli Hills have found a cheap effective way of preserving seeds and ensuring a new harvest. In the process they have also become the protectors of the biodiversity in the region. (MSSRF, 1999)

Though the tribals of Kolli Hills are still focused mainly on agriculture that has not meant that they are not interested in expanding their incomes. One way in which they have been actively attempting to improve their livelihoods is to change the crop that they cultivate. The traditional crop of the tribal farms is a group of cereal crops known as minor millets. These crops were used to feed the families of the region and had little commercial value. Because the minor millets were the staples of the tribals, they ate one form of the grain nearly everyday. However, the lure of greater profits has driven farmers away from cultivating minor millets. They have changed from growing food that is used for home consumption to growing commercial based produce. This produce includes crops like pineapples and tapioca. The effects of these commercial crops have been seen on the cultivation of minor millets. Every household said that they once grew minor millets. Even 10 years ago 35% of the household were still cultivating the cereal crop. But today only 8.91% of the households are cultivating minor millets. Kolli Hills is seeing a transformation in their agriculture which has brought greater income, but what have been the effects of this increased livelihood of the families at Kolli Hills?

If you think that just increasing the livelihood of the family's agricultural operation will bring greater food security then a conclusion would be drawn that Kolli Hills would be seeing an increase in food security. However, the opposite has occurred. The people are actually facing problems due to micro nutrient deficiencies. Micro nutrient deficiencies are classified when a person gets enough food volume, but the food that is consumed lacks in certain needed vitamins or minerals. Why has this happened? It is because they have changed their diets along with their cultivation. The diets of the tribals no long consist mainly of minor millets. They have used their new incomes generated from tapioca and pineapple production to create diets which have more rice and other more expensive foods. There are several reasons for this transformation. The first reason is the fact that they prefer the taste of these foods to minor millets. When they had a very limited income taste was not an option of great concern, but as incomes increased taste move up to a higher priority. Tribals have even said that the cattle would prefer to have something other then the straw from these millet crops.

The second reason for this transformation has come due to the fact that to process minor millets is difficult. The job of dehusking minor millets is the job of the women of the household, so if a home continued to consume minor millets it would mean an increase to the workload of the women in the family.

The second problem that has occurred which will jeopardize the food security of the region even further is the loss of bio-diversity. As the commercial crops have flooded the fields of Kolli Hills, they have caused a disinterest in the minor millets. This means that the seed management and preservation is stopping. The problem with the loss of biodiversity and the threats of mono cropping was seen in the Irish potato famine of the 1840's. When blight destroyed the food and economic staple of a whole country starvation and a massive exodus was the result. Today the population of Ireland is still not at the same level as it was before the famine. So in order to create greater long-term food security for Kolli Hills the bio-diversity must be maintained.

These are the situations that the MSSRF has to deal with while trying to create solutions to the tribal's problems. How do you recreate an interest in minor millets in order to preserve the bio diversity without decreasing the livelihood improvements that cash crops bring? The solution is to try to make the minor millets a commercial crop like the pineapple and the tapioca. To do this the foundation has worked to combine minor millets into local breads. This would accomplish two things. The first effect would be that these millet fortified breads would alleviate the micro nutrient deficiencies by bringing new sources of the lacking vitamins and minerals into the tribal's diet. The finger millets, for example, has 189 times more calcium than rice and 175 times more iron than rice. The second effect would be that there would be a commercial demand for minor millets. This demand would then be able to be met by the tribal's production. So the tribals would have new market avenues for their production, and millets no longer would have to be a home-consumed crop. Work is still being done with a regional bakery to find the proper percent of the fortified breads should be made of minor millets. It is hoped that the taste will be accepted and the consumer will buy this new bread.

Kolli Hills represents an interesting irony in terms of food security. We see the livelihoods of the whole family increase because of the advent of cash crops, but we see new problems arise as a direct result of the increased livelihoods. The MSSRF solution does have some promise, but will have several problems yet to overcome. The first problem will be whether the minor millets will be able to maintain their profitability. If the markets should cycle then the situation may again be the tribals going to the other cash crops in order to "cash in" on the favorable markets. We have not seen how minor millets will be able to compete against these other more established crops in the commercial markets.

Another problem deals with the domestic usage of minor millets. If the tribals continue to use minor millets in their everyday diets then new ways will be needed to process the grains. If there are not new ways developed and implemented, the women of the region will be the one who have to pay in yet another chore to add to their list. We would also see a problem with the usage of women labor. Minor millets have been usually grown with little hired labor. While crops like tapioca require larger amounts of labor so hired workers are used. The problem is that many of these hired labors are women. By decreasing tapioca production in the region there may be a reduced need for this hired labor. This could correlate into a loss of income of the women members of the communities. Since women are responsible for feeding the family this loss may also have a direct impact on the whole family's food security.

Kolli Hills has seen the effects of income and food security. I am reminded of the United States situation. We have very healthy incomes but unhealthy diets. Why? Because we have chosen to spend our money on faster and better tasting foods rather than the traditional "good for you" diets. We solve our nutritional problems by taking vitamin and mineral supplements or fortifying foods with nutrients. At Kolli Hills we see the early stages of this trend. Hopefully, with the help of the MSSRF the tribals of Kolli Hills will be able to develop a variety of crops which will produce a well balanced diet that has the taste of their growing livelihoods.

Conclusion

The M.S. Swaminathan Research Foundation has accomplished a great deal to insure the villagers within their programs have seen an improvement in the quality of their lifestyles. The benefits can be seen everywhere from the new homes being built to the number of children being educated. The foundation has discovered the key to developing food security. The first step was to focus on women and the second step was to become a partner with the villagers.

The World Bank reports that an investment in a woman's education has the highest return then any other type of investment in developing nations. They continue by stating that it has been estimated that if women received the same education as men farm yields would rise 7-22%. The education also has a direct impact on the growth of population in a region. According to the Indian census of 1991 a woman with no education has on average 5.1 children. A woman with primary education has 4.5 children. If they received the upper primary educational level then the average children per woman is four. If a woman reaches the secondary level the average became 3.1. When women are educated in the higher levels the fertility rate falls to 2.1 children per woman. The foundation's focus on the women of the region has inspired confidence in a sector of the community that was facing the hardships of daily life alone. The women now have the experience and self-worth to try new enterprises and to strive to better their entire family. With this attitude the true rewards will be seen when the next generation is raised in the presence of a strong enterprising women role models.

The foundation's approach to be a partner with the villagers has also increased the success of the programs. This is the major difference between the foundation's work and previous government programs. As Sulochna pointed out the government will come in and show you something or give you something. Then the government will go away never to be heard from again. That is why the programs fail. The foundation will work with the operation to find answers to questions and

concerns. That is why we have succeeded and expanded. Through this approach the foundation has created confidence in the villagers in themselves and their abilities.

The issue of livelihood is not just a money issue. If it were just money then an organization could easily send money to a region and the problems would be solved. Livelihood is about empowerment. The best way that the foundation has empowered the women of the many programs is to create the cooperative societies. When the women form a society they are stronger. Through saving methods the societies have been able to get credit and loans where as an individual would have been denied. They have been able to share skills, resources, and labors in order to create an enterprise that will not add to the continuation of their standard drudgery. The societies spread the knowledge and skills to all members. And with that knowledge make well informed decisions. As the number of cooperatives grow and more individuals become involved the prosperity of the community will grow. Women in the villages are not afraid of losing the foundation. They have gained so much. They feel that as a group they will be able to make wise decisions and develop their enterprises to new levels. This was a feeling that was not even thought of before the foundation's work. The dreams of these people are slowly becoming realized. They are aware that there is more hard work ahead, but the pride they have in their accomplishments will carry them through it. They are used to work, and the determination they have will ensure success.

In order for the programs to be a true success story, they must be able to be propagated to other villages. Already the program has raised the interest of other villagers who want to take up their own enterprises. The new leadership abilities many of the villagers have gained will be an invaluable skill in teaching other villagers and the next generation. The villagers stated that they felt they had an easier time of relaying information among themselves than any other group. This is because they understand the concerns that the villagers will have. Perhaps the villagers will be able to spread the knowledge faster and farther than any foundation could ever do. Knowledge is power. A power that can bring healthy diets and better lifestyles for the whole family.

I often felt that I received more of the benefits than the foundation did from my internship, however, I hope that I may have given the foundation a new avenue to pursue. When I was visiting a goat rearer in the Biovillages I asked who milked the goats. They had no answer because no one milks goats in India. I learned from these villagers that a majority of the goats were used for meat purposes. This surprised me because in the United States we milk goats more than we eat them. When I mentioned this to Dr. Balasubramanian, he became interested. I told him that goat's milk could be processed into cheese and stored for a substantial amount of time. Since the Indian cuisine is full of rich spices the cheese could take on an Indian flavor. They actually began a proposal to look into producing an Indian goat milk cheese. I am hopeful it may be a success and open new markets for the millions of goats in India.

I once heard from a professor from the University of Northern Iowa that a person has never lived until they have visited India. This is truly the case. The country is beautiful and the people are warm and friendly. However, I am constantly reminded of Gandhi's quote "We are poor people living in a rich country." Seeing such poverty has to leave its mark on a person's personality. Some of the hardest images I have seen came from my experience in India. I once saw a young girl dressed almost like a doll selling flowers to earn a few rupees. This child should have been playing and enjoying her youth not forced into the role of wage earner burdened with the financial responsibility every adult must carry. A young boy stands out in my memory too. As I was going to the hotel he approached me. He had suffered from polio, and his right leg was crippled and hung limp as he hopped on his single strong leg. He begged for a few rupees for something to eat. That is his role in life. These images have been burnt into my being, but another image is present also. The smiles of the villagers. They had nothing by American standards, but they were pleased to see me. An American visiting their homes. This was true joy. It was the purest emotion I have ever felt because it was free for any gift or object. These smiles are the rewards of working to advance the villagers of India. I now have a clearer vision of what truly matters in life. It is not money, degrees, or assets. It

is the simple thought of being well fed and happy to have friends and family members enjoy each other's gifts and hospitality.

The challenge of food security has not been fully met. While the efforts of the World Food Prize laureates and many more have greatly improved the situation more can be done. It must be the new generation who can combine our skills, technologies, ideas, and hearts to create a better planet. As Dr. Iyer once told me after we enjoyed our evening meal of sambar, rice, and chapattis, we have only about fifteen years of life in us once we subtract childhood, studies, and sleep. Why not use those precious years to make the world a better place instead of always demanding something from society without giving anything in return. He was right. No matter what anyone's interest maybe there is a place for you in the fight against hunger. This struggle is far from over, but because of my experiences I now know what is at stake- real human life and happiness. Living in Iowa it seems hard to imagine the idea of a food shortage but because of the World Food Prize internship I no longer need to imagine the struggle anymore. I have seen it first hand.



The beautiful smiles of the Indian people shine through as these young students stop to have their picture taken. They enjoyed having a photo taken so much that I soon had many children around me wishing to see the camera. Their smiles demonstrate the power the foundation has had within this region. Due to its work the villagers have more hope for the success of their children.

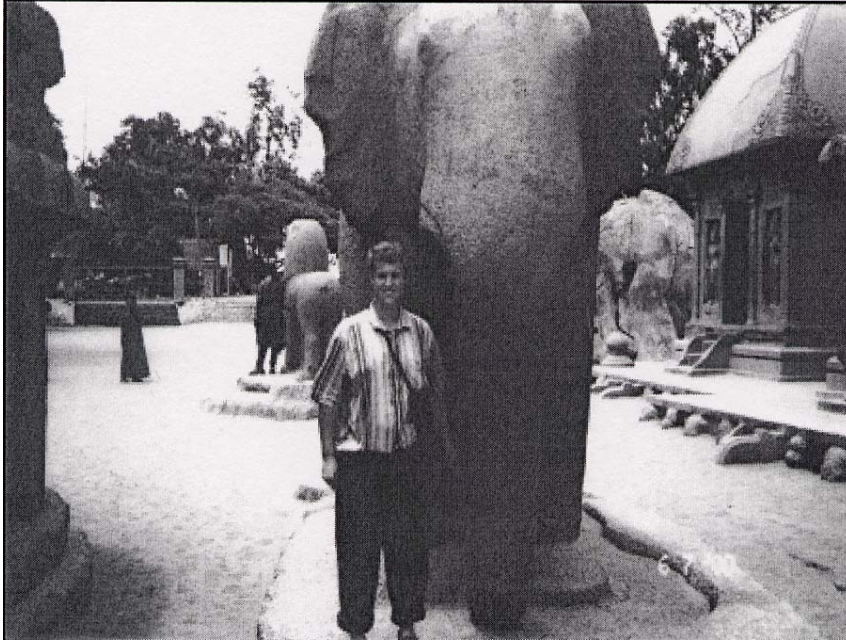
Fieldwork in India has not enjoyed the mechanization that has occurred in the United States. Here a woman near the Bio-center in Pondicherry is planting tapioca. The process to plant tapioca involves cutting parts of the stems from last years crop and placing that segment in a hole dug by a hand hoe. The amount of labor required to plant one field is immense. When this picture was taken the women had been planting for eight hours.





Livestock production plays a vital role in the agriculture setting of rural India. Cows, buffalos, goats, and chickens add to the food security of the region. Traditionally it has been a women's role to care for the family's livestock. At the bottom a woman gives fodder to a mild cow. Often this fodder needs to be collected away from home and is a time consuming activity that must be done every day. Above, a traditional goat rearer shows one of his new Telicherry crossbred goats. His family has been raising goats for generations, and when the foundation introduced the new variety to the village it offered greater economic returns. With the new Telicherry bloodlines in their local goats, the villagers have seen a greater rate of growth and higher prices at market time. It is hoped that soon goats will be purchased by live weight instead of by the head to reduce the loss goat rearers suffer at the hands of meat traders.

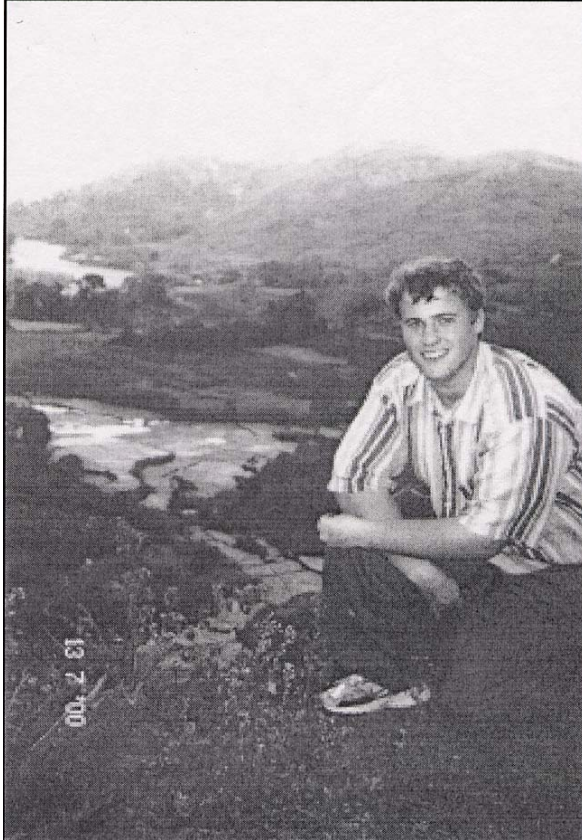




At Mallamumpuram, a site 40 km south of Chennai, I was able to visit some of southern India's temple ruins. The entire complex was over 1000 years old. All the stone that was used came from one rock, which was carved out to make the elephant statue as well as several temples.

I enjoyed eating a true south Indian meal with my hands. The food was prepared and then served on a banana leaf. This picture was taken by one of the guesthouse staff while I visited his home and family for dinner.





The Kolli Hills region of Tamil Nadu was breath taking as the cool breezes blew up the hillside and the rice patties followed a valley stream. Here the tribals of India grow rice, pineapples, jackfruit, and minor millets. The minor millets were the focus of the foundation's project here. The mission was to preserve the minor millets for its nutritional value as well as preserving the Biodiversity of the region.

Professor Monkombu Sambasivam Swaminathan has been an inspiration to many and a humanitarian to the world. His efforts have brought his nation from a state of hunger to a nation of surplus. He continues the momentous task of bringing the benefits of the Green Revolution to everyone in India and beyond. His hope to create sustainable agriculture can be a model for every nation as the global community works towards a hunger free future.



Bibliography

Carr, Marilyn: Women and Food Security; IT Publications; 1991; pp. 1-4

FAO: Rural Women and Food Security current situation and perspectives-Rome; 1998; pp. 2-4, 36-47

FAO: The State of Food and Agriculture-1998; Food and Agriculture Organization of the United Nations- Rome; 1998; pp. 47-60

FAO: Women Fed the World; Food and Agriculture Organization of the United Nations-1998; pp. 2, 5, 16, 17

Jain, L.C.: Workshop on Women in Agriculture-New Delhi; 1988; pp. 27-31

MSSRF: Conservation and Utilization of Minor Millets; J.R.D. Tata Ecotechnology Centre MSSRF- Chennai; 1999

MSSRF: Sustaining the Biovillage Programme the Prime Movers and Doers; M.S. Swaminathan Research Foundation- Chennai; 2000

Samanta, R.K.: Women in Agriculture; MD Publications PVT LTD- New Delhi; 1995; pp. 104-115

Singh, K.S.: The Scheduled Tribes; Oxford University-Calcutta; 1997; pp. 736-738

Vishwanathan, Maithili: Women in Agriculture and Rural Development; Printwell- Jaipur; 1994; pp. 1-16

Website: www.acdi-cida.gc.ca/xpress/dex/dex9705.htm