

Mythili Prabhu, Student Participant
Ames High School
Ames, IA

Improving Food Security in Rural India: Education and Effective Water Management

Introduction

A large number of the poorest of India's rural population lives in the country's semi-arid tropical region. Although the Green Revolution has transformed agriculture elsewhere, shortages of water and recurrent droughts are a constant barrier in rural India. A major impediment to improving agricultural productivity and farm income is the lack of access for both individuals and communities to the proper resources and markets needed to obtain agricultural stability.

The lack of technological resources and poor water management by the government creates a continuous struggle for farmers to produce enough food for a marketable surplus. Farmers usually have a hard time producing enough crops to feed their families and do not have markets within close proximity. Another factor creating this struggle is the lack of knowledge as to what crops can be grown for the emerging biofuels industry and how crop residues that would ordinarily be wasted can be converted into income-generating produce used in the manufacture of ethanol and electricity.

Education is one of the key factors to improve food security and income of the Indian farmer. Methods from research results in sustainability and agricultural yields can educate farmers in three areas: (1) what crops to grow in the emerging biofuels market, (2) what farming techniques to use, and (3) how to solicit government support for effective water management. This research paper describes how effective water management policies and Internet and communication technologies can improve food security of Indian farmers by providing them access to expert knowledge so that they are able to grow marketable crops with high and sustainable agricultural yields.

Background

About two thirds of India's 1 billion people live in rural areas, and almost 170 million of them are poor.¹² Many rural people are starting to migrate into urban areas, but three out of four of India's poor live in the rural parts of the country. For more than 21 percent of them, poverty is a chronic condition.⁹ One of the most important sources for economic growth and food production in India is the family farm. A typical family farm is about one hectare. Whole families usually run the family farms, but because of their rural location they are not always aware of the products needed in the open markets.

Farmers in India simply do not get the proper education about how to create sustainability on their farms. Most of them do not receive any formal education beyond elementary school. In rural India, the literacy rate among males is 58 percent while among females it is 30 percent.⁶ Women in general are the most disadvantaged people in Indian society, though their status varies significantly according to their social and ethnic backgrounds. According to Dunlop and Velkoff, "Women account for a small portion of the Indian labor force. Since Indian culture hinders women's access to jobs, 90 percent of working women are involved in the informal sector which includes jobs such as domestic servant, small trader, field laborer on a family farm and other unskilled and low paying jobs that do not provide benefits to the worker."² The Indian government, through a program called Sarva Shiksha Abhayan (SSA),¹¹ is committed to improving the educational attainment of women so that they can be employed in higher skilled and supervisory jobs on farms and in other sectors of the economy.

There are three major growing seasons for crops in rural India: *kharif* (autumn), *rabi* (spring), and summer. The *kharif* crops are raised during the monsoons, paddy being the perfect example. *Rabi* crops, like wheat, do not require as much water and so are raised in the months outside the monsoon season. Other crops grown in India include rice, bajra, corn, sugarcane, soybean, mustard wheat, rapeseed, and groundnut.

The current agricultural yields of the rural farms in India are far too low to meet projected demands for biofuels production, while still growing enough to feed rising populations. Moreover, the Indian farmer does not know what crops to grow to meet the demands of the biofuels industry. Because farmers are not able to grow and sell their crops and they are not always aware of what crops should be grown, they are unable to generate the money to pay for education, buy medicines, and pay for regular living expenses.

Educating Family Farmers

The definition of education used in this paper is quite narrow in scope, and is limited to providing farmers access to expert knowledge about crops, markets, and farming and water harvesting techniques needed to achieve sustainability. With this definition, one can hope to implement a successful support system that actually delivers this knowledge to the family farmer.

Education is one of the most powerful tools in reforming a system. In *The White Man's Burden*, William Easterly describes a soap company which used education to increase its profits.³ The soap company educated a village about the dangers of bacteria, and why hygiene was of the utmost importance for preventing diseases. The villagers eagerly bought the company's products – which improved the hygiene of the village and also created a profit for the soap company. Easterly then translates this idea into the AIDS problem. Educating villagers about AIDS, and stressing the importance of contraceptives, is bound to save many more lives than spending money on medications for the cure. Similarly, educating farmers about the benefits created by growing the right crops for the biofuels market is a promising way to increase their income stream and improve food security.

India has over 630,000 villages, each with an average population of 1,200.⁷ A distinctive feature of rural India is a rather high population density compared to other parts of the world. Most states in the country have a population density of 250 people per sq.km., and in some states the figure is as high as 700. A significant proportion of villages do not have a single reliable telephone connection today and less than one percent of villages have an Internet connection.

Rural areas in India are also characterized by very low incomes, most households earning less than Rs. 3,000 per month (about \$70). Providing telephone and Internet service to such populations has always been a challenge.⁷ Since telephone and especially Internet connectivity are known to be powerful tools of empowerment by giving people in low-income areas access to a wide range of resources, the Internet overcomes several socio-economic and geographical barriers. It provides people with better education and access to information, thereby expanding their horizons unimaginably. Therefore, a support system using the Internet can be used to deliver expert knowledge to rural farmers.

Another significant problem preventing increases in yields is the lack of water. Much of the annual rainfall in most parts of India occurs in less than 100 hours, which are not necessarily consecutive. Agriculture in India is mainly rain fed and the majority of farmers have little access to alternate sources of irrigation. Farmers are still dependent on the monsoon to sustain their livelihoods. Dependable irrigation devices are a major factor behind a large number of farmers being drawn into a poverty spell.

Professor Asit K. Biswas, President of the Mexico City-based Third World Centre for Water Management, is an expert on the technical and scientific aspects of water management. When asked if there is a water crisis in India, he responds: “Globally, we are NOT facing a crisis because of actual physical scarcities of water. However, we are facing a crisis because of poor management practices of the past.” He continues, “The main water problem facing India is how best to manage the country’s available water resources efficiently and equitably so that its economic development continues, along with poverty alleviation and environmental conservation”.¹

Farmers can be taught techniques for rainwater harvesting – that is, collecting and storing water so that it can be used for the rest of the year. But the many political issues that surround ownership of water and public access to it must be addressed through government policies.

Implementation of Internet Technology to Access Expert Knowledge

An innovative business model to deliver Internet services to rural areas, including the family farmer, was the Internet Kiosk incubated by the Telecommunications and Computer Networking Group at the Indian Institute of Technology, Madras. The idea was put into operation by the state Government of Tamil Nadu and a company called n-Logue. An Internet Kiosk consists of a multimedia PC, an Uninterrupted Power Supply with battery, a digital camera, printer, and a wireless subscriber unit with related accessories. Once the kiosk is in operation, the Kiosk Operator (KO) can access a host of services. These include computer education, adult literacy programs, agriculture-related services, health services, and e-Government services.⁷

Thus, in many communities the Internet Kiosk has become a “business center” for the village, providing access to multiple technologies. Through these kiosks and their KOs who are computer savvy, farmers are given advice on farming methods and animal diseases. They can also get access to various agricultural portals to find weather information, crop prices, and improved farming techniques. These kiosks can help with water problems and provide long-term predictions on crop prices, demand, and rainfall.

By providing these resources for farmers, they can become educated about different ways to farm, and thus can increase their yield and prevent harvests from dying. In one well-known case in Tamil Nadu, a rural farmer encountered a disease with his Okra crop and contacted a KO through a cell phone. The KO, who was a woman, contacted remote experts via the Internet, and from the advice that was obtained and communicated back to the farmer via his cell phone an entire harvest was saved through timely detection and diagnosis of crop disease.⁷

The water problem can be temporarily solved, because farmers will know when to expect rainfall and can collect the water to irrigate their crops. By educating the farmers about the results from agricultural yield and irrigation systems that they themselves can put in place, and by providing a means for the farmers to convert wasted crop residues into useful biofuels produce, it can greatly increase the income of the family and hence improve food security. Women could be given higher skilled jobs such as interacting with the KOs, and supervisory roles in transporting the goods to the markets.

Through the implementation of such technological solutions and through proper advice as to what crops to cultivate and market for the biofuels industry, a family could improve its quality of life and livelihood for generations to come. By educating a generation of family farmers about irrigation systems and the benefits from increasing their yield, the information passed down to their children will be extremely valuable. Many more people will become educated about this system, giving rise to an improvement in the livelihoods of the subsistence family farmers.

Implementation of Water Management Policies

International organizations such as the International Development Enterprises, India (IDEI) are trying to help the rural populations to come up with an irrigation system.⁵ The technology offered by IDEI frees the farmers from the limitations of rain-fed farming, enabling them to grow a wider variety of crops, cultivate all year round with higher cropping intensity, and to engage in priority farming. Good irrigation technologies and agricultural practices coupled with enhanced participation of the poor in the open markets are the keys to income generation. There are, however, flaws to this system. Organizations such as the IDEI are business oriented and profit driven, and do not have programs that are affordable for subsistence farmers. This does not create the necessary food security for farmers.

Dr. Biswas has a better approach to this problem. Coming up with a solid solution to this problem is not easy; knowledge of the climatic, physical, social, cultural, economic, environmental, and institutional conditions of rural India is necessary for implementing a system. Dr. Biswas believes that first and foremost, political support is needed before any ideas can be implemented. He says, "The probability of any policy being accepted, let alone implemented, without the support of high-level policy-makers is almost close to zero. Thus, political support is a pre-requisite for acceptance and implementation of any water policy".¹

Dr. Biswas and the Mexico City-based Third World Centre for Water Management consider interactions with the policy-makers a large part of their work. In July 2006, Dr. Biswas met with the Prime Minister and Water Minister of India to discuss how to build up the technical and managerial capacities of the existing water professionals in India. Dr. Biswas says, "Many, if not all, water problems of India are because of poor management practices. In order to solve and manage seemingly technical problems, we need a new breed of water professionals who not only have expertise in technical areas, but also are knowledgeable on the social, economic, legal, environmental, and institutional issues within which technical solutions are to be applied".¹ Thus, Dr. Biswas's solution is to formulate a multi-institutional program which will produce enough new professionals who can become water management experts and address the water needs of both the farmers as well as the biofuels production plants.

Conclusions

To improve the food security and incomes of impoverished family farmers through biofuels production, I recommend that (a) farmers be educated and provided with technological resources such as cell phones and free access to the Internet through kiosk operators (KOs), and (b) water management policies be formulated by a new breed of professionals who understand the water problem and come up with a means for efficiently managing and distributing water.

The water management problem must be addressed before any biofuels production can be implemented. Large amounts of fresh water are essential for increased yields of crops. Professionals need to be trained to come up with a system to better manage the water. Most water projects in India are now not progressing because of interstate water disputes. Each country has its own method for water management, and those methods are not often directly transferable to other countries. Political interference and corruption is rampant in most Indian water supply corporations. Furthermore, not a single institution in India is now conducting applied research. Developing a multi-institutional program that can meet the water needs and challenges of the country is not going to be easy, but it is certainly doable. In order to carry out biofuels production, management of water is of the utmost importance.

Water management can also be facilitated through education. Since water scarcity is such a significant problem, farmers can use the kiosk operators to learn better farming techniques and when to expect rainfall. They can also be educated about the types of crops that are needed in markets. This kind of access to expert knowledge, made possible through a simple technological device such as the cell phone to call a Kiosk Operator which is both affordable and cost-effective for people in rural India, can

go a long way towards really helping farmers improve and sustain their crop yields and earn a decent livelihood.

Part of the crops will be used to feed their families; part of the crops will be sold in markets; and part of the crops will be used in biofuels production. In order to get the crops to the market, the farmers can take loans from a bank similar to the Grameen Bank¹⁰ to buy a vehicle to transport the excess crops. Once they have earned enough money to pay back the loan, they can become a self-sufficient unit.

Such a support system when properly implemented has the potential to create the food security that the farmers want, generate a higher income to increase their standard of living, and show them a way to use the crops for biofuels production. While one key factor (namely, education) was explored, other factors may be equally important in increasing agricultural productivity and improving food security.

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