

Fish for all – Food for thought

A social entrepreneurial approach by The Blue Revolution Pioneer, M V Gupta

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Abstract

Social Entrepreneurship is a tool to solving the problems of Food Security. It is a sustainable development issue linked to economic development, environment and trade: the physical ability to access and the financial capability to afford food to meet people's nutrition and diet in sync with their preferences. Dr M V Gupta, recipient of the World Food Prize in 2005 and the Sunhak Peace Prize in 2014 is hailed as the pioneer of the Blue revolution wherein aquaculture and freshwater fish farming is an alternative solution to the food crisis of the future. Working with NGOs, poor women and a bottom-up approach helped in mitigation of poverty, malnutrition and self-reliance were addressed effectively and helped poor farmers and rural families in large parts of South and Southeast Asia, covering Bangladesh, India, Vietnam, Thailand, Cambodia, the Lao PDR and Indonesia.

Keywords: Social Entrepreneurship, Blue Revolution, Food Security, Non-Governmental Organizations, Women Empowerment

"There can be no peace without food security in the world. You cannot talk peace to a hungry man," – Dr Modadugu Vijay Gupta

Food Security

Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life – 1996 World Food Summit

Generally speaking, food security encompasses the physical ability to access and the financial capability to afford (economic access) food to meet people's nutrition and diet in sync with their

preferences.

Food security is built on three pillars:

Food Availability: Sufficient quantities of food available on a consistent basis

Food Access: Having sufficient resources to obtain appropriate foods for a nutritious diet

Food Use: Appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation.

Food security is not a temporary solution but a sustainable development issue that has to be addressed linking it to economic development, environment and trade. As prevailing in all countries, agriculture is the largest sector providing employment to the majority of population in almost all the developing countries. While global focus remains on liberalization of food and agricultural trade, economic and social policies, the basic issue of food production and sustainable ways of stability in food production has been sidestepped, or left to individual Countries and their States.

There are several risk factors like natural calamities of drought and floods, political disruptions of war and strife, economic instabilities leading to fuel shortages that affect the production and supply of food. In the years 2011-13, an estimated 842 million people were suffering from chronic hunger. This represents 12.5% of the global population, (or 1 in 8 people) and about 15% of the population in developing countries.

Apart from food production, food access is another aspect. It refers to the affordability and allocation of food. The UN Committee on Economic, Social and Cultural Rights noted that the causes of hunger and malnutrition are often not a scarcity of food but an inability to access available food, usually due to poverty.

“Feed the Future” program is an initiative by the government of the US in coalition with global partners, the G8 countries and donors towards reduction of global hunger and stabilize food security conditions in the world. They approached this issue by addressing issues of economic growth, that would lead to higher levels of income, which will in turn eradicate the twin problems of hunger and poverty, indirectly malnutrition too. Food production was addressed by looking into the factors influencing it, namely land ownership and use, soil management, crop selection, breeding, livestock breeding and harvesting.

Well, this is atypical route. How about the road less travelled? How about shifting the focus from tapping land resources to water resources? Access to a small source of water is the premise for fish cultivation. What is called for is an out-of-the-box strategy.

Modadugu Vijay Gupta

Born in 1939, Gupta began his career in 1962 from the Indian Council of Agricultural Research, ICAR in Kolkata, India researching on how fish production can bring solace to the Indian farmers. His work in India in early 1970s resulted in breaking the yield barrier in aquaculture, leading to

doubling of production, laying the foundation for what we call as “Blue Revolution”, which at that time (in 1970s) was termed as “Aquaplosion”.

He assessed the physical and social resources that were accessible in the impoverished areas before developing techniques suitable for the poor. First, he trained the poor and landless people in recycling methods. Farm wastes such as rice bran, weeds and manure were used as feed for large fish stock. Next, he taught them the polyculture technique of breeding multiple species of fish in a single pond habitat. This was an effective technique wherein the farmer is able to harvest more varieties of fish with higher nutritional value.

This technique resulting on the pioneering research by Dr Gupta and his team, helped poor farmers and rural families in large parts of South and Southeast Asia, covering Bangladesh, India, Vietnam, Thailand, Cambodia, the Lao PDR and Indonesia. They were able to use abandoned ponds, roadside ditches, seasonally flooded fields and any water bodies as small as 300-400 Sq Mts and make them into “mini factories” of fish, providing income and solace to their families. Eg, 150,000 seasonal ponds in Bangladesh that were unused are now abundant in fish.

Bottom-up approach in the words of Dr M V Gupta

Generally, research is undertaken in research institutions/organisations and then efforts are made to transfer the results to the farming community – which some people call as “top-down approach”. Under such circumstances it has been often found that the technologies so developed do not meet the needs of the farming community as the scientists have taken in to consideration only the biological aspects of increased production and have not considered the social, economic and cultural aspects of the farming community for whom these technologies are meant.

My approach which is called as “bottom-up” approach involves understanding the social, economic and cultural aspects of the community, their resources and constraints (physical, technical, financial) and then plan research taking in to consideration all the above mentioned aspects. Then adoption of technology is fast as the technology developed suits their needs.

For this to take place the methodology used is:

- (i) first to have group meeting with the farmers to understand their economic situation, technical knowledge, their needs and constraints
- (ii) explain the technologies that could be suitable for them and get feed back from them on the relevance of the suggested technology, modify to suit their needs based on discussion;
- (iii) undertake research in their farms which is called “on-farm research” or “farmer participatory research”. Once the technology under farmers’ conditions is demonstrated, then not much effort is needed by government agencies (extension department) for transfer of technology as nearby farmers see the results for themselves and try the technology – farmer to farmer extension.

This is my working at grassroots level with farmers that made some people in the early stages dubbing me as a development worker rather than a scientist/researcher. My response to them was “I am a development researcher” and my research is not for research sake, but for development. Now they understand after seeing the impact the research has made and is being followed in many countries. As I was doing things that were not conventional, some people even dubbed me as “rebel scientist”

Dr M V Gupta is the recipient of the World Food Prize in 2005 considered as Nobel Prize in Food and Agriculture and the Sunhak Peace Prize in 2015 dubbed as alternative to Nobel Peace Prize. He is hailed as the pioneer of Blue revolution. He has spent his entire life in developing sustainable aquaculture and freshwater fish farming as an alternative solution to the food crisis of the future. These techniques are not only sustainable but also environment friendly, incorporating use of agricultural wastes and by-products along with innovative practices. Poverty, malnutrition and self-reliance were addressed effectively with this technique.

He enthusiastically taught these methods to the rural women with low levels of income and social status, leading to enhancement of their rights and truly empowering them, financially and socially. It may be placed on record, his voluminous service in war-torn conflict areas, risking his own life. Farmers and consumers, looking towards recovery from the Vietnam War is an example of direct beneficiaries of this unique technique. He trained farmers and scientists to breed new species and identified new carp species that were native to India but suitable to the Mekong River environment in Southeast Asia.

He has thus been able to create a solution that would solve problems of population explosion and impacts of climate change.

Dr Gupta identified over a million ponds, roadside canals and ditches and seasonally flooded pools as potential water resources that were untapped. He enlisted non- governmental organisations (NGOs) in extending this technique to small farmers and women in order to ensure the practice of effective aquaculture.

Working with NGOs beneficial – Dr M V Gupta

In 1980s I closely worked with a number of NGOs as research partners. There was concern that I am working with development NGOs rather than working more with government agencies and other research organisations. My response to them was I am strong in science (biological aspects) while the NGOs working at the grassroots level know more about social, economic and cultural aspects of farming communities. Joining hands with NGOs resulted in bringing together the strengths of the NGOs- and me: me in science and they in social, economic and cultural aspects.

Another positive aspect from this collaborative effort was sustainability. In general practice, whenever a research institute develops a technology, it is demonstrated in farmers' facilities by giving them free inputs in addition to technical knowledge. The drawback in such a system is once the free inputs from government agencies dry up, they go back to their own practices, since the farmer who was getting free inputs will not understand the real economic value of the technology and may not have access to the needed inputs.

In the system I practiced in collaboration with NGOs, we motivate and train the farmers and once they are convinced on the economic viability of the technology and the approach, the NGOs provide loans on interest and monitor their progress and ensure availability of needed inputs. Since they are paying for the inputs they take care and the rest is to ensure that they get financial benefits and the families getting fish to eat to improve their health and nutritional status.

His novel techniques have now provided Asia's poorest fish farmers the ability to provide nutrition for their families and bring in added income. Average annual fish production in India has increased from 0.5 tons per hectare in the early 1970s to between 2 to 10 tons per hectare. The carp varieties he introduced in Vietnam make up to 40 % of all freshwater fish production. In Bangladesh, fish yields grew by 300% during the 1990s.

With women beneficiaries growing from zero to 60% in fish farming, Dr Gupta has provided the path towards long-term economic, and social empowerment of men and women in rural communities.

Women Empowerment and Dr M V Gupta

Another focus area of my work is empowerment of women. We have witnessed the status of women in poor rural households in developing countries, especially in countries where traditionally women do not work outside their houses due to religious beliefs. In such households, families have to depend on the earning of one male member who has to feed 4-6 persons in the family. In such houses, the man gets the food followed by children and if any thing is remaining, then the women eat – usually boiled rice and salt. In collaboration with NGOs we started working with women, especially the destitute women – widows or women abandoned by their husbands. They have been trained and proved to be as good as men in fish farming and some cases they exceeded the performance of men.

In the labor system of developing countries, women get lesser wages as compared to men even though they do the same type of work. Does this imply that women are not as efficient as men? Our work has proved that they are as good as men or sometimes even better.

Our work with women has showed making them earning members not only lead to a status in the family and also in the society and has a voice in deciding household management. Also, families' nutritional status has improved and the women were spending on children's education – a multi benefit.

Under the aegis of the International Network on Genetics in Aquaculture, he coordinated the efforts of leading researchers under new biosafety protection protocols and trained nearly 300 scientists from developing countries in enhancing the development of sustainable and effective fish production strategies. He has been a catalyst for life in ensuring global reach and effective implementation of aquaculture.

Post his retirement from The World Fish Center in 2004, he has been advising numerous organisations and institutions; chairing research advisory committees of government and as a Member of the Expert Panel on World Food Security of UN. He has also been the recipient of honorary doctorate degrees and was elected as distinguished Fellow in many scientific societies and academies.

Socio-economic Profile of a fish farmer - The Indian Scenario

India is an agrarian economy with more than 70% of the population engaged in agriculture. A typical fish farmer is literate but not more than 10th standard, with an experience of 10 years and has to support a minimum family of 7. His annual income is around Rs 50,000/- per annum, fishery being attributed to more than half of it. 60% of fish farmers own an average of 4 hectares of farmland, showing that many of them have taken up fishery as a diversification of agriculture. This is a good sign.

The Fish Farmers Development Agencies, set up with World Bank assistance in the early 1970s, promoted the adoption of modern aquaculture through polyculture of various Indian major carps or combinations of Indian and exotic carps, and freshwater prawns. The All India Coordinated Research Project on Composite Fish Culture and Fish Seed Production initiated by the Indian Council of Agricultural Research in 1971 transformed the traditional polyculture practice from a production level of less than 1000 kg/ha/year to as high as 10mt/ha/year through fertilization and supplementary feeding.

As regards financial assistance, only 10% of fish farmers availed loans from banks. Many of the fish farmers relied on their own funds and borrowings from friends and relatives. Bank presence for credit is prevalent in the States of Orissa, A.P, and Kerala while the role of middlemen and moneylenders has been on the rise in Gujarat, Haryana, West Bengal and Assam. Lack of adequate financial access is the main deterrent for fish farming.

Aquaculture resources in India include 2.36 million hectares of ponds and tanks, 1.07 million hectares of beels, jheels and derelict waters plus an addition 0.12 million hectares of canals, 3.15 million hectares of reservoirs and 0.72 million hectares of upland lakes that could be utilized for aquaculture purposes. Ponds and tanks are the prime resources for freshwater aquaculture in India. However, less than 10% of India's natural potential is used for aquaculture currently.

Source: Wikipedia

Fish Polyculture and Aquaculture – Fish Farming

Any form of intervention in the rearing or breeding process towards increasing production is known as farming. It may be on an individual basis or on a corporate ownership. Both involve regular stocking, feeding, protection from predators etc

Cultivation of various species of fish by using the available food in the pond and increasing fish production to the maximum capacity is referred to as polyculture. Here, it is relevant to cultivate fish species that are not harmful to one another and can breed together. Usually rui, katla, mrigal, silver carp, mirror carp, common carp, grass carp, thai sarpumti etc are used for polyculture. The pond has to be maintained by stocking good quality minnow, supply of sufficient food and fertilizer etc thus creating a healthy environment. Ensuring this maintenance will result in atleast 5-6 times more than the general production.

Aquaculture, popularly known as aquafarming is the cultivation of fish, crustaceans, molluscs and aquatic plants. It involves farming freshwater and saltwater fish under controlled conditions. It is different from commercial fishing as it is basically harvesting of wild fish. Fish farming, shrimp farming, oyster farming, mariculture, algaculture and ornamental fish are all examples of fish farming. Aquaponics and integrated multi-trophic aquaculture are typical methods of fish farming.

The growth rate of worldwide aquaculture has been sustained and rapid, averaging about 8% per annum for over 30 years, while the take from wild fisheries has been essentially flat for the last decade. The aquaculture market has reached \$120 billion in 2012. Aquaculture is one of the fastest growing areas of food production in the world.

In 2012, the total world production of fisheries was 158 million tonnes of which aquaculture contributed 66.6 million tonnes, about 42%. It is estimated that another 68-78 million tons of fish will be needed by 2020, to meet the increasing demand. Since fish stocks in the seas and rivers are over exploited and little chance of increasing production from these sources, the future demand has to be totally met from aquaculture.

Integrated Multi-Trophic Aquaculture (IMTA) is another method wherein different kinds of species are bred and cultivated in such a way that the by-products (wastes) from one species are recycled to become inputs (fertilizers, food) for another. This is to create a balanced system. Environmental sustainability is enhanced by bio-mitigation; product diversification and risk reduction is achieved bringing about economic stability; and better management practices bring about social acceptability.

Incorporating species belonging to different trophic or nutritional levels into the same system is known as Multi-Trophic. All these organisms may share the same biological and chemical processes that lead to shifts in the ecosystem. There is more intensive cultivation of different species and they are connected by nutrient and energy transfer through water. Care has to be taken in the selection and proportion of different species that provide different ecosystems. Hence it is called as an integrated system. This method is suitable for greater production and improved ecosystems.

There are different ways to bringing about change for the better:

1. **Push/Pull or Trickle down effects of development policies:** Most developmental policies revolve around this principle. A particular sector or activity is initiated and in the establishment of that, other peripheral activities get developed automatically. For eg, if a hospital is set up in a remote area, roads, transport, housing, schools and colleges, and other business develops consequently.
2. **Integrate the poor into the mainstream markets:** Many a time, there is adequate production in the rural areas but the farmer is unable to sell his produce for a good price. Similarly, to produce at lower cost and competitive quality and quantity, the farmer does not have access to good quality and cost effective inputs, due to which his produce does not withstand competition. If this is provided, the benefits of marketing and competitive pricing are available to the farmer.
3. **Improve the Family's Nutrition needs:** It is a combination of non-availability, lack of access, lack of knowledge and poverty that denies the households to eat a healthy and

nutritious diet. If this is made possible, then they are in a better position to contribute to the economy.

4. **Intra-Household gender equality towards empowerment:** When all members of the household are empowered in the streams of education and finances, the dynamics of the family is transformed towards a better decision-making authority by itself. All members of the family are able to contribute to the kitty, and mutual respect amongst members is garnered. This leads to all-round happiness and a responsible household.
5. **Higher Yields:** Increase in the output leads to higher incomes and ability to eat better, sell better, save better, invest better and live better.
6. **Market Linkages:** Most developing countries are fraught with middlemen and unscrupulous margins and markets that thwart the direct benefits of increased production to the producer. If the producer-farmer has access to markets or if markets are established at the producer level, meaning direct selling, the margins are minimized and benefits accrue to the producer himself. This leads to better livelihoods of the farmers.
7. **Financial access and services:** The cost of credit, meaning the cost incurred to provide credit is higher than the actual credit disbursed. This is because the marginal farmer usually requires small amounts, like cash handouts to tide the moment, so to say. This high cost of transaction deters the banking sector to provide adequate credit to the farmer and small-medium entrepreneur. By taking recourse to the tool of microfinance and micro credit and utilizing the services of NGOs, the banks can provide timely credit to improve the lives of the poor farmer.
8. **Resource mobilization:** In finale, if all the factors for development are possible, then there is no deterrent to increase production and provide a higher level of incomes and livelihoods for themselves. These are what are required to enhance the lives of the poor and integrate them into mainstream population, making them economically and socially independent.

Prevalent Problems

Problems faced by fish farmers are disease, price fluctuation, electricity, poaching, declining production and management problems. As stated above with regard to the call for social entrepreneurship, the fish farmer is unable to access finance primarily from banks and other credit lending agencies due to the nature of fish farming.

Natural calamities like floods, droughts can wipe out entire investments making it a risky business for the banks and other credit agencies. Safeguarding the 'crop' is doubly challenging in the case of fish farming. Also, property rights as to ownership and leasing rights are hard to establish as regards ponds and other waterways. The question of providing collateral is equally challenging. Ponds are spread over vast areas that are not only far flung but inaccessible to the banks making it unviable and involving high transaction costs. The

financially illiterate farmer is wary of cumbersome banking procedures and hence feels discouraged.

There is thus a call for a socially and financially viable solution to the vagaries of the poor and marginalized farmer.

Concluding Note

The Blue Revolution pioneered by Dr M V Gupta has been instrumental in developing the regions previously facing economic crises. By dedicated training and educating the poor farmer in fish farming, aquaculture and integrated fish farming, Dr Gupta has been instrumental in bringing about their growth. By identifying the unused ponds and canals, Dr Gupta has gone a step further in helping the farmers to take up fish farming. Coordinating with financial agencies by using his good offices and lending credibility to the cause, Dr Gupta further aided the occupation of fish farming. By enhancing the economic, financial and social status of the poor farmers, Dr Gupta has been a true social entrepreneur and the awards he has received are an endorsement of the pioneering work he has done by investing his entire life in social entrepreneurship.

His successful work in Bangladesh is a live example for the Indian farmer to incorporate. Fish farming and aquaculture is highly suitable to the Indian economy and policy makers have to take cognizance of this. Requisite budgetary allocations can be made to develop fish farming and bring about a blue revolution in India.

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