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BLUE REVOLUTION, PROMISING SMALL-SCALE RURAL AQUACULTURE AND SEARCH FOR PRO-POOR SOCIAL BUSINESS ENTITY IN BANGLADESH

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ABSTRACT

The people in rural Bangladesh are engaged in a difficult developmental struggle, the enormity of which has been amplified by the persistent pressure of population growth on a limited land base. This empirical cum conceptual paper is to untapped potential insights than the usual of blue revolution (BR) in aquaculture systems. The prime focus here is on BR in two different promising dimensions of aquaculture, namely, (1) The pond-based small-scale "Integrated Farming Systems (IFS)" for the small and marginal producer (SMP) groups, and (2) The "Floating Cage-Culture (FCC)" in flowing water bodies for the riverside landless fish producer groups. In development culture, one of the main reasons of poverty is that the resource poor people are not yet accustomed to working together and/or policymakers failed to mobilize the vast depressed target groups collectively. Besides ecologically sound sustainable production strategies, we need innovative ways of collectivizing small producers in co-operative means, specifically formation of a Social Business (SB) entity of their own to run their individual enterprises efficiently. The ultimate research goal of this paper is to develop the vision of a cooperative-like system, a much needed entity of the poor producers by which they can collectively grow and harvest fishes and other agro products at high but sustainable rates, while not causing unacceptable environmental damage.

KEYWORDS: Aquaculture, Bangladesh, Blue-Revolution, Cage-Culture, Cooperative, Farming-Integration, Nutritional-Security, Productivity, Social-Business, and Sustainability

INTRODUCTIONs

Situating the Problems

In densely-settled Asian countries like Bangladesh, because of rapidly growing population, the average degradation of resources is higher than the other parts of the world. When assessing the adequacy of basic resources, such as land or water over time, population is the universal denominator - as population expands, per capita availability of those resources shrinks. Size limitations, land redistribution and productivity, and owner-tenant relationships are crucial concerns of government and development analysts alike. The people in Bangladesh are engaged in a difficult developmental struggle, the enormity of which has been amplified by the persistent pressure of population growth on a limited land base.

Bangladesh has the lowest per head and most fragmented land than any other agrarian territory in the world without any efficient reform (Hossain 2002a). Around 65% of the rural people are landless and near- (functionally) landless, most marginal and small farmers are at the subsistence level, and the non-farm sectors have remained underdeveloped. The unbalanced intensifications for land productivity increase (*e.g. 3 rice crops yearly in the same land*), overuse of natural resources (*e.g. underground water for irrigation*) and dwelling with vicious cycles of lows (*low resources entitlements*, *low purchasing power, low productivity, low soil quality, low nutritious food-intake, low-weight baby and so on)* have jeopardized the life of the rural poor; and many of them are vulnerable to increasing natural

calamities *e.g. flood, cyclone, tornado, etc.* The malnourished poor are facing severe environmental health hazards, like arsenic contamination in drinking water (Hossain 2002b).

The principle of chronic poverty is basically a low level of nutrition, ultimately due to inadequate food availability. The food security in many territories is now a far more complex issue than it was a generation ago. Even if per capita food grains production has now increased nearly three folds compare to the level five decades ago, the severe food insecurity and undernourished people are increasing rapidly due to new industrial demands for grains, such as grains use for the farming meat production known as "Calorie for Calorie" and ethanol or bio-fuels production for vehicles known as "Food for Fuel" (Hossain 2008b). Further, poor access to water, especially perennial water, reduces option for agriculture-based livelihoods. Agriculture itself also has suffered from highly uneven distribution of input resources, and numerous uncertainties and exploitation have characterized production processes (Hossain 2002a). Traditional resource management practices, like collecting natural fishes and crustaceans from canals and paddy fields for nutritional need, are threatened by agricultural intensifications, over use of resources, pollution, and so on. There is no short-cut to the problem rather we need some comprehensive ways to ensure livelihood security of the poor rural dwellers, as their poverty is now a multi-dimensional phenomenon.

The rural poor in Bangladesh are not a homogenous group in respect to their socio-economic conditions, agro-ecologies, religious, and cultural patterns. They also have common features: they are landless or have small subsistence holdings, isolated from the mainstream economy; they lack organization and leadership; they own little capital of their own to invest, wanting in marketable skills, and so on. Hence, they tend to be in a dependency trap, looking for subsidies and handouts, caught in the snares of fatalism and factionalism.

In the development culture of Bangladesh, one of the main reasons of high poverty persistence is that the people are not yet familiar with the practice of working together. Likewise policymakers have failed to mobilize the vast depressed target groups collective (2001). The rural entrepreneurial spirit released in the small or informal sector through micro-credit provisions is not enough to pull the country out of poverty. Grameen Bank (GB), even if well known worldwide as a successful micro-credit provider through small group formation, has not been successful in collectivizing the poor in viable cooperative means for large scale investment (Figure 1). Notwithstanding further promotion and modifications of such strategies, it is becoming clearer that some comprehensive policy approaches are necessary, specifically for food and nutritional security of the vast depressed rural dwellers. These elements essentially translate into lack of capacity of the rural poor to change their own lot. However, their plight is remediable, if social, political and operational environments support them.

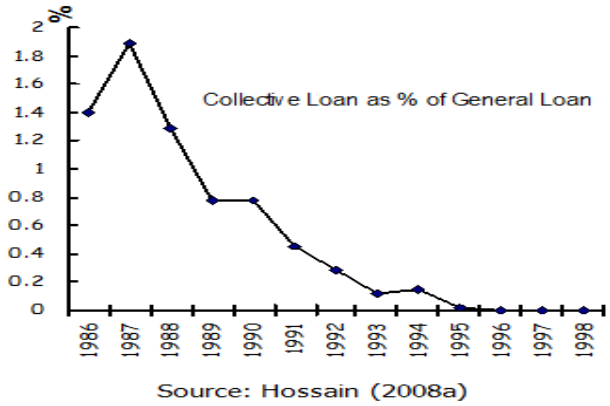


Figure 1: Collective Loan of Grameen Bank

There is no short-cut to ensuring livelihood security of the poor dwellers. We need some comprehensive programs, because their poverty is now a multi-dimensional phenomenon. The aim of this paper is to find ways to increase the productivity of different resources and thereby increase farm production, so that a beneficial change can be made for the landless, marginal and small farmers who are around four-fifths of the total farm households in rural Bangladesh.

The principal goal here is to develop a cooperative-like system by which the poor producers can collectively get inputs at reasonable rates as well as grow, harvest and market various products of the agro subsectors at high but sustainable rates, while not causing unacceptable environmental damage. Besides ecologically sound sustainable production strategies, we need innovative ways of collectivizing small producers through co-operative means.

BLUE REVOLUTION, POTENTIAL AQUACULTURE FACETS AND PURPOSE OF THE PAPER

Many new pro-poor developments in the last three decades have been reported, such as promotion of job creation, both non-farm self-employment and wage employment, for the vast depressed *rural women*; most of these are important for rural livelihood improvement, but not adequate enough for sustainable food production and nutritional security. Based on long grassroots hand-in-experience in various wings, we have realized to focus future research areas in highly productive pro-poor and ecologically sound aquaculture systems, as untapped insights of the blue revolution (BR). Evidence suggests that *blue* is joining *green* of green revolution as an environmental buzzword. This paper primarily offers rationale for agricultural sub-sectors integrations, which basically obligated for balanced-diets of the depressed rural dwellers.

In the BR concept, water is originally equivalent of the green revolution and primarily refers to the need to get water for drinking and crop irrigation to the millions of people worldwide who do not have it. This BR phrase has been in use for some years. However, it came to be noticed in densely settled territories that the need is not simply to provide water, but to diverse ways of ecologically sound and sustainable production strategies in the fishery sub-sector. This empirical and conceptual paper is based on empirical evidence, focuses on BR in two different promising dimensions, namely – (1) The pond-based small-scale "Integrated Farming Systems (IFS)" for the small and marginal producer (SMP) groups, and (2) The "Floating Cage-Culture (FCC)" in flowing water bodies for the riverside landless fish producers.

Poverty is a multi-dimensional phenomenon, and to root out poverty from a society many other tactics are needed. As mentioned earlier, besides innovative production strategies we need to find out ways to collectivize the small producers

in a co-operative system, if possible through formation of a different type of Social Business (SB) entity of their own for necessary supports.

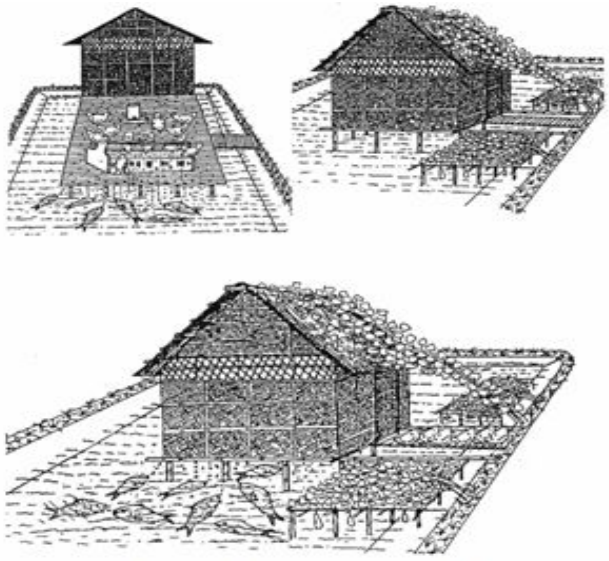
The SB yet is in its infancy, the implications yet in an experimental stage; and it would be better admitted that SB theorists tend to be generic and hortatory in preaching "learning by doing". We want to propose here a different type of SB entity from Professor Yunus's SB. So let us start thinking about new ideas of SB and convert those ideas into practice!

THE POTENTIAL PRO-POOR AQUACULTURE FACETS AND PRIME RESEARCH CONCERNS

Aquaculture refers to all forms of active culturing of aquatic animals and plants, occurring in marine, brackish and fresh waters. Aquaculture has long been practiced in China and other places in eastern Asia, where freshwater fish have been grown as food in managed ponds for thousands of years. In recent decades, however, the practice of aquaculture and a host of allied activities have been spreading as sources of livelihood around the world, specifically densely-settled territories. In Asia, as a densely-settled continent and for its diverse socio-cultural and agro-ecological characteristics, traditional farming resources interdependencies are ubiquitous, and numerous Integrated Farming Systems (IFS) have been practiced for long. Here we may provide some overviews on such promising aspects.

Promising Option#1: ***Aquaculture-Centered Integrated Farming System (IFS)***

The IFS combines Aquaculture, Animal Husbandry and Agriculture and forms a self-reliant system which recycles organic wastes, such as weeds, crop by products from fields, wastes from poultry and livestock, and natural food production from photosynthesis within the farm itself (Hossain 2003). In this system, substances that may otherwise be considered wastes are viewed as resources. Their wastes are taken daily to the field and also used as raw fertilizers for the fish ponds to produce various plankton as fish feeds, and the only supplement was either rice barns for livestock and fish. Sometimes fast growing elephant grass is also grown on the edges of the ponds to feed the grass carp or other herbivorous fish that has been usually observed in many areas of China. Traditionally, they have interrelated their resources among different enterprises for their survival.



Source: Hossain (2008a)

Figure 2: Pond-Based Small Scale IFS Model

In fact, the whole life style was based on cycles and recycles. No external input was provided for the livestock, fish or plants. A typical small farm produces neither specialized crops nor only rice crops, but combines other enterprises such as cattle, poultry, and fish activities through which farm families maximize their returns and family satisfactions. So far, as of some explanatory research findings, socio-economically the most viable way would be to recycle all wastes and residues obligated as means to maximize rural farming productivity, both subsistence and commercial types, at the lowest cost. The aquaculture-centered IFS demonstrates that the poor can have more viable agro-industries, with their wastes used as inputs in surrounding farms, while solving the waste and pollution problems effectively and efficiently and making local enterprises highly rewarding in a healthier environment.

During late-1980s, some studies were undertaken in 0.1 ha earthen ponds in order to determine fish species combinations that would result in optimum production levels in integrated broiler raising systems (*see* Figure.2). Chicken sheds were constructed over ponds, and hybrid chicks were raised. The ponds were stocked with fish fingerlings, and four combinations of fish-species were tested, each treated with two replications. The ponds were neither fertilized nor were the fish given supplementary feed, except for the chicken excreta falling into the ponds. In some cases fast growing elephant grass also was grown on the edges of the ponds to feed the grass carps.

As of investigations, production had reportedly increased several folds and revenue had increased four to five times than in the traditional fish culture only. One important point is - the majority of rural households have multi-purpose homestead ponds and/or ditches. Unfortunately such impressive results have not yet been replicated properly. Most marginal farmers have used on-farm and off-farm resources according to traditional patterns, but with the advent and adoption of aquaculture into farming systems, the resource use-pattern has been changing gradually in recent times. This paper hopes to provide a solid foundation for detailed investigations, specifically for some viability analysis (physical, economical and financial) on such types of rural entrepreneurs in Bangladesh and other densely-settled territories.

Another focus area emerging from recent trips with the aquaculture experts in various locations of Southeastern and Northeastern Bangladesh is “Floating Cage Culture (FCC)” in the flowing rivers - the khas (state-owned) water bodies. The author came out with very strong notes on creating cage-culture cooperatives of the riverside landless SMP groups.

Promising Option #2: The Pro-Poor Floating Cage Culture (FCC) in Flowing Rivers

The intentional confinement of sea fish in cages to increase their size is a technology dating back to the early 1900s. Today freshwater cage culture is practiced in many regions of the world, and is a thriving industry in some areas in Asia creating job opportunities and income generation, even if the cage culture is not popular in South Asian countries. Cage farming of freshwater fish has good prospect in vast freshwater bodies though it has not yet emerged as a significant economic activity. However, water pollution and accumulated sludge problems in land based fish farming and associated problems has created opportunities for alternative aquaculture e.g., the floating cage farming in flowing rivers, where fish are held inside floating cages while permitting water exchange and waste removal into the surrounding water. Bangladesh is blessed with huge flowing fresh water and perennial water bodies in big lakes and natural depressions suitable for FCC farming.

Cage culture in Bangladesh has started recently using mono-sex tilapia in Southeastern parts of Bangladesh. They use mostly bamboo or iron slats, nylon nets and plastic drums to construct floating cages as shown in Figure.3. Iron slats are relatively more durable and strong, but heavier and expensive compared to bamboo slats that are lightweight but do not

last long. Usually, two layers of mesh are used in a hanging cage, the fine layer a few feet deep to prevent floating feeds drifting away, but bigger mesh in main cage allows complete exchange of water volume based on flow of water. Meshed cage allow free passage of fish wastes, prevents escape of captive fish but does not stress or injure fish; flowing water prevents fouling of raised fish; feeding and harvesting process is inexpensive and fish can be harvested at will.

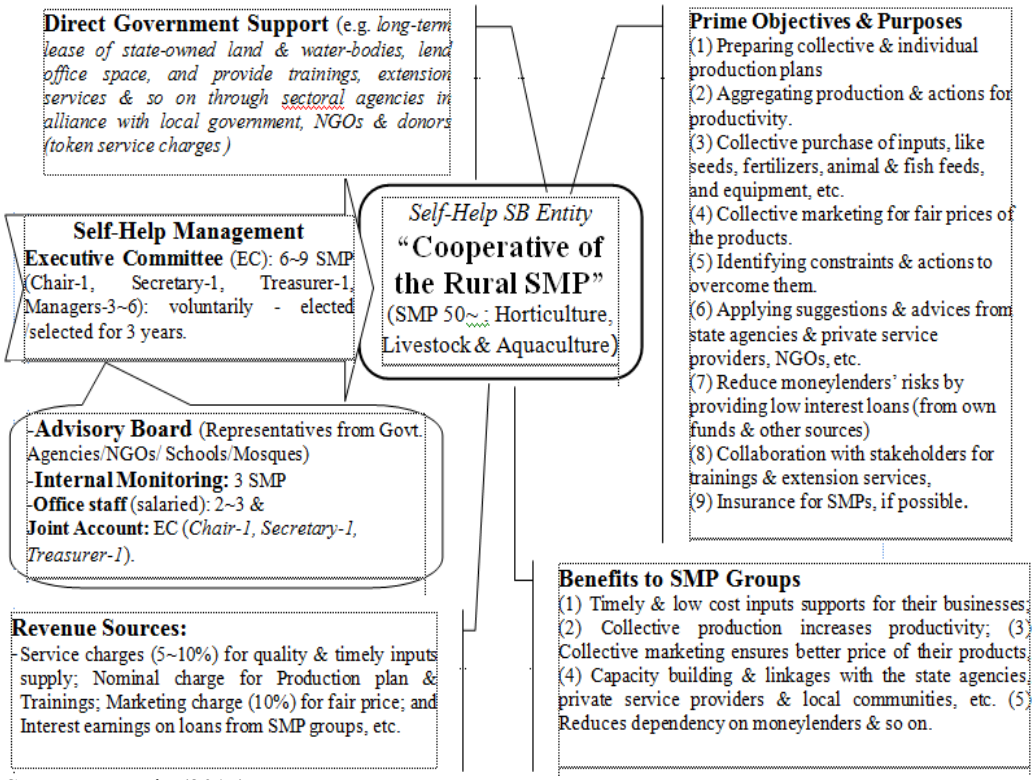
Figure 3: The FCC in Flowing Water in Bangladesh. Photos: Author (2014)

During group field trips, the author has identified and then visited several possible promoting areas of FCC in other flowing rivers out of some 231 in Bangladesh, many low lying natural-depression water bodies or lakes; and also came out with the positive note that under climate change and rise of sea and river level scenario, FCC farming will still be worth testing. We have talked with groups of FCC farmers about partnership to improve FCC farming interims of cage durability, maximizing production, species diversification, market linkages for export, and de-facto fish sanctuary and biodiversity protections in selected rivers. Bangladesh being a land of rivers can raise huge amounts of fish by cage farming. Coastal areas of the country are fraught with danger of cyclone and tidal bore; early warning of these natural disasters is helpless to protect land-based fish farming of farmers. However, floating cage with fish can be salvaged by quick harvest, if fish are of marketable size or may be towed to a safer place.

It may be mentioned here that while floating cages are used for fish farming, continuous feeding and excretion by captive fish release fragmented feed particles and lure wild fish at peripheral areas, enhance plankton growth and attracts wild plankton eating fish, and hanging cages create a sanctuary for wild fish to escape fishing nets. Consequently, cage culture in rivers will indirectly protect part of wild stocks in rivers from over exploitation which is a serious problem in Bangladesh. Land based pond farming in most cases are seasonal business as the vast majority of fish farmers trap and use monsoon water for farming and during dry season most ponds dry up. In case of cage farming water will not be a problem and farming could be done round the year. If, cage farming could be institutionalized, it will also create other supporting industries, like net manufacturing, cage construction, floating feed manufacturing, nursing of fish, supplying fingerlings and expand related business. There are enough scope in future to do detailed viability and impact analysis on IFS and FCC farming. For sustainable operations of such small-scale pro-poor schemes an essential proposition here is to create an organizational support framework of their own.

Promising Option#3: Creation of the Pro-Poor Co-operative for Sustainable Social Business

Reaching the rural poor, above all the marginal rural producer groups and undertake schemes conducive to their participation in development that ways that unleash their full potentials, is a matter of creating an organizational framework that ensures their direct access to and control of resources and freedom to design programs anchored in socio-cultural environments. The capacity-building of local communities to decide on their future and to implement action plans of their own is a key component of SB development. What motivates the rural poor to set up SB entity of their own?



Source: Hossain (2015).

Figure 4: Formation of the Self-Help Rural SMP Co-operative

The rural poor have proved many times that they participate easily and willingly in any development – if social and organizational environments are conducive to their participation. In an earlier article, based on donor supported project experiences, it has been shown that without organizing the poor in cooperative systems it would not be easy to form and run any sustainable rural SB (Hossain, *et al.* 2014). We propose here to form the multipurpose "Self-Help Rural Cooperative" of the small & marginal producer (SMP) groups, where the poor producers will do their own businesses with necessary supports from their own co-operatives upon payment of certain service charges (*Figure.4*).

With support from the advisory board, a selected or elected Executive Committee (EC) formed from among them covering the SMP representations may run their co-operative voluntarily for certain years with support of a small office staff. The EC essentially needs to work with all important actors of the Value Chain (VC) to easily access finance, skill-training and marketing opportunities, and assist the SMP groups to select specific enterprises suitable to them. The prime purposes of the rural self-help cooperative should be to help increase collective efficacy and competitiveness of the agro sub-sectors based enterprises in weak and exploitative rural markets. Some of the major support tasks from their self-help

cooperative would be – (a) Preparing various collective and individual production plans, (b) Timely quality inputs supply, (c) Marketing supports for fair prices, and (d) Extension services & relevant trainings, etc.

If all of Bangladesh's khas (state own) land could be distributed to the rural resource poor SMP and if these were supported in making collective and productive use their resources, a significant step towards the eradication of extreme poverty and nutritional insecurity would be taken. Albeit, our understanding of identification and management of khas land and distribution of the same to the poor has been challenged by a variety of ways and things, like cumbersome application procedure, corrupt official processing, land recovery complexities and various distribution challenges; and quite often the biggest challenge regarding khas land distribution is local elites getting involved; their influence is so great that they have to be made part of the distribution process, though they do not oppose it. Considering such challenges, it would be wiser and easier to use khas water-bodies for the proposed type of SMP co-operative because the flowing rivers water-bodies for the "Floating Cage Culture" need only special user-deed with the nearby poor fishing communities for certain or long term use in a cooperative manner rather than permanent and individual ownership like khas-land, which a principal concern of this paper, as mentioned earlier.

DISCUSSIONS AND CONCLUDING REMARKS

Poverty is a multi-dimensional phenomenon, and to root out poverty from a society various tactics are needed. The poor people in rural Bangladesh are engaged in a difficult developmental struggle, the enormity of which has been amplified by the persistent pressure of population growth on a limited land base. The author in this paper has tried to throw light on the untapped potential strength of a Blue Revolution (BR) in aquaculture systems.

The recent surge of interest in pond-centered small farming *integrations* is due to the growing concern to maximize productivity through optimum resources utilization in a world undergoing rapid population growth, severe malnutrition, low productivity, and diminishing per capita resources. Our exploratory research indicated that in the pond-based IFS, the production and revenue increases several times more than the traditional fish culture alone. Unfortunately such impressive results have not yet been replicated properly as farmers lack basic knowledge and do not get enough support for farming integrations. Toward such ends, in future we need to do an in-depth countrywide viability study on existing farms. The positive results we shall try to replicate in other areas in collaboration with government and other relevant stakeholders.

Another focus-area emerging from the recent field trips to Southeastern Bangladesh was seen observe the prospects of "Floating Cage Culture (FCC)" in the flowing rivers - the khas (state-owned) water bodies in various other locations; and the author noted the need for creating FCC farms for the riverside landless SMP groups. If most of Bangladesh's suitable khas (state own) water bodies will bring under Fish SMP production, significant steps towards the eradication of extreme poverty and malnutrition would be made. Our future research target is to make a detailed feasibility study on all existing FCC enterprises to replicate such FCC in other flowing rivers.

Besides the above mentioned pro-poor production strategies, we have here also provided views on forming a self-help rural SB cooperative – a much needed organization of the SMP of their own, where any individual producer can do his own businesses for profit with justified service charges payable to their own co-operative for the production and distribution related supports (*e.g. inputs, technical and marketing supports).* As we have proposed here new ideas of SB different from the SB concepts of Professor Dr. M. Yunus, we need to make careful observations, experimentations and

evaluations with necessary supports from the relevant stakeholders to convert proposed ideas into practice!

Some conceptual and review works on self-help SMP co-operatives are in progress. This conceptual paper is believed to be a strong foundation for future in-depth research in various wings in collaboration with the relevant stakeholders. There is enough scope to do detailed viability and impact analysis on IFS and FCC farming as well as on self-help co-operatives, a much needed pro-poor social business entity in rural areas.

REFERENCES

1. Hossain, M. A. (2015) : Self-Help Coopératives for Sustainable Social Business in Rural Bangladesh, an article for Social Business Academic Conclave (SBAC), 1 July 2015, Eastern University, Dhaka: pp48-53.
2. Hossain, M. A. (2014): Rural Small & Marginal Producer Groups, and Formation of Social Business Entity at Grassroots – Conceptual Cum Empirical Glimpses, Social Business Youth Convention Brochure (2.7.2014), Eastern University: pp25-29.
3. Hossain, M. A. *et al.* (2014): Mid-Term Evaluation Report on Rural Enterprise for Alleviation of Poverty (REAP-II), Matrix, Dhaka, June 2014 (*Report prepared for USDA & submitted to Winrock Intl., Dhaka*).
4. Hossain, M. A. (2008a): Faces of Poverty, Financing the Poor, Novel Management Props, & the Nobel Peace Prize: Modus Operandi of Grameen Bank, *Social Sciences*, 44(3), Research Institute of NGU, Japan: pp 111-173.
5. Hossain, M. A. (2008b): Milieu Features of Food Insecurity and Potential Facets of Rural Aquaculture-Centered Asian Integrated Farming Systems, *Social Sciences*, Vol.45, No.1. July 2008 (University Res. Institute, NGU): pp.187-250.
6. Hossain, M. A. (2003): Land Reforms and Integrated Farming Systems for Rural Development - Strategies Used for Asian Aquaculture, Training Course on Land Planning and Rural Integrated Development in Western China: (Xi'an:18-23 Mar. 2003), Organized by the UNCRD, Ministry of Land & Resources, and China Association for Science & Technology.
7. Hossain, M. A. (2002a): Grassroots Agrarian Problems in Bangladesh and the Modus Operandi of the Grameen Bank & Grameen Krishi Foundation: A Focus on the Landless & Functionally Landless Poor, *Regional Dev. Studies (RDS)*, Vol. 8, UNCRD: 71~98.
8. Hossain M. A. (2002b): Arsenic Contamination in Drinking Water, Environmental Threats and Mitigation Perspectives, *Regional Development Dialogue (RDD)*, 23(1), spring 2002, UNCRD.
9. Hossain, M. A. (2001): Rural Poor and the Formal Credit Market in Bangladesh: An Empirical Analysis, *Social and Cultural Studies*, Vol.8, Feb. 2002, Kyushu Univ. (Fukuoka): pp39-55.