

## Environmental Degradation: Challenge to Food Security, local context global perspective, A case study of a village in Bangladesh

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**Abstract:** - Water, land and lights are three important and integral parts of food production. Pollute land, water and inadequate light/energy have sequential negative affects on total food and yield production. Bangladesh called the land of water as many as 310 rivers crisscross all over the country and source of surface water use. However, these natural resource base has been neglected in policy as a result many rivers in the country are about to dead and some are biologically dead because of anthropologic cause. Further, irrigation water used from this river and direct disposal of industrial chemicals and other waste polluted the land and reduces productivity and seems to ominous link to food insecurity. The present paper focuses and try to explore land and water pollution and its relationship with food security. The findings and outcomes of this paper is a research in a riverside village in Bangladesh and the methodology used for this study are focus group discussion (FGD), individual interview, observations, secondary information and review of literature.

**Keywords:** - *food security, environmental degradation, Industrialization, land, pollution, water*

### I. INTRODUCTION:

Bangladesh having a small land area total 14845 million hectares of land and cultivable land area is only 8.44 million hectares (Ministry of agriculture 2013) while the total population is 150.5 million (population census 2011). To feed these huge population always been a challenge for the country. However, because of the productivity of the lands, crop diversity and unique natural resources that is huge surface water base i.e. A network of rivers in Bangladesh are an opportunity for the country. Again all these are in threatened due to irrational behaviors of human and policy inadequacy of the country. In question of food security, land and water issue come first, further without land and water there is no questions about food production hence 1) physical availability of food 2) economic and physical access to food 3) food utilization and 4) food stability (FAO, EU 2013) which called food security. But without production there is no questions about availability, stability or distribution. Therefore once the productions are disturbing whole food security systems affected and thus challenge for food security at a local or national level.

The origin of agriculture, human settlement and civilization are linked with the water course and fertile land mass. Water, land and agricultural productions are in close linked. Isolation or infecting/pollution one has an automatic effect on others. Following of the domestication of plants and animals, the next advance in agriculture come with the control of water. Irrigation arose in the Near-East around the 5000BC and in Mexico shortly after 1000BC. With irrigation more food could be produced by fewer people. Which considerably free the other people in a community or family to work in another sector (Heiser JR 2006)

Bangladesh is a low-lying riverine country. Hundreds of river intersects all over the country including three great rivers the Ganges, Brahmaputra, and Megna (GBM). The importance of rivers in general Bangladeshi lives and culture is inseparable. Some specific types of culture and livelihoods pattern are mutually exclusive with water and food security, i.e. Bede (Nomadic snake charmers) and traditional fishing folks. Polluting water means reduce fish production and availability of fish and also have an impact on other aquatic resources in the water, irrigation with polluted water from Bangshi river claimed to reduce yield production and loss of daily of agriculture labor (Mallick 2011).

By default agriculture all over the world accounts for 70% world water use followed by 20% for industries and 10% domestic use (UN,UNIESCO,FAO 2013). However, global water statistics completely differ

with Bangladesh water use trends such as in the year 2008, 88% water of the country's water consumptions was used for agriculture 10% domestic use and only 2% for industrial use vice-versa 79% of the total water withdrawal comes from underground and 21% of surface (BBS 2008, FAO/Aquastar 2010), while Bangladesh called the land of rivers, therefore its clear indication of policy lacks in water use and plan for the country. Again, while the actual water use by industries in Bangladesh 2% but the virtual water use by these industries may be more than 80% as rivers around Dhaka i.e. Water of Buriganga, Shytlakha, Turag, Dwaleshari and Bangshi are completely unusable for any purpose. This assumption gets some authentication by the words of *Charles Depman*, Asia regional coordinator of the New York-based water keeper alliance "I have never seen such a polluted river, the water looks lifeless and toxic emitting a strong stench in the area" (the daily Star p 20, Dhaka April 18, 2013)

In many river basins, the rate of socioeconomic change and the accumulation of environmental problems indicate institutional inefficiency. Though environmental policy has had some influence in high-income countries, but has had far less effect so far on the development agenda of poorer countries (FAO 2011) such as Bangladesh does have environmental law river commission and water policy but rivers and wetlands are being polluted and degraded due to indiscriminate disposal of solid and industrial waste into the rivers Bangshi and many others.

According to an FAO study on "The State of the World's Lands and Water Resources for Food and Agriculture" (2011) projected that existing water use trend in agriculture will increase 10% between now and in the year 2050 to feed a growing world population. Further, undermining the interdependency of land water resources and intensively used river basin for commercial purpose i.e. industries and other municipal waste dumping into river Bangshi (Mallick 2011). The interdependency and stability of land and water will not be achieved without more effective natural resource allocation and environmental regulation at national and international level vice-versa existing land and water systems that are threatened by the depletion and degradation of natural resource endowments totally ignored at least in the country's low enforcement of law, absence of governance and from regulation perspective.

In regards to discussions on environmental degradation and food security in Bangladesh, the water issue come into front line, because of its diverse relation with human lives, livelihoods and food security. During 1990s government adopted policy to accelerate country's economy and more employment hence to establish an export processing zone (EPZ) at Savar near river Bangshi. The main objective was to utilize more human energy particularly of the women who constitute almost half of the country's population. While the immediate impact of these exports oriented industries are to create much employment mostly for unskilled women. Vice-versa the long term impacts of pollution released from these unplanned industrialization is to pollute water at river Bangshi, degraded land fertility and reduces yield production.

Thousands acres of productive land go out of cultivation because of industrial pollution. Such as special economic zone (DEPZ) established in a 355 acres hectares of land and there are 300 industries built and many other in process, whereas its seriously polluted more than 1000 acres of highly productive paddy field at Dholai Beel (Roy 2009) is a clear indication of declination of food production, hence to food sovereignty at local level.

The environmental degradation in major river systems and increasing population, increases chances of more food insecurity in the society, again agriculture remain the predominant water user and missing link with non agriculture water use on earth (Coke et al 2009). The development will be constrained if increased demand for irrigation deprives other users and the river system loses capacity due to pollution or over-exploitation.

The behavior and attitude of general people and polluters i.e. industries are factors. The existing policy and policy guidelines for national and international river management and pollution control seems to have inadequacy in control and regulate pollution of rivers. Such as the largest water reservoirs Ganges Brahmaputra is being polluted due to inadequate policy guideline, slow implementations of law, regulations, corruption and unregulated industry (Anwar 2006)

## II. VILLAGE GUGUDIA AND THE RIVER BANGSHI:

The River Bangshi is one of the 330 rivers flows throughout the country (FAO 2011). This very river is the source of agriculture and domestic water supply for thousands of people of riverside villages i.e. Sukundi, kunda, Nalm, kakran, Hajipur, Pathalia, Bejir Tek, Chakalgram, Nayrhat, Gupinath pur, Amgachia, Safi pur, Gugudia, Sinduria, Chay baria, Bari gaom, Kauja Kundu, Pura bari, *Guradia*, Savar, Foot Nagar, Vagalpur, Fulbaria, Kanar Char, Mushuri Khula (Mallick survey, 2011). People of Ghughudia villages and many other are being historically depended on this river for their agriculture watering, fishing, bathing and other use of water, further that, total of 60,000 traditional fishing people (Roy Mohan) were exclusively dependent on the river Bangshi in other words were secured for their water, food and livelihood means.

During 1990s the government of Bangladesh set up a special economic zone called (EPZ) at Savar, near river Bangshi to increase country's GDP and employment. From then, the EPZ along with many other local

industries are just discharging their untreated chemical and other waste directly into open water and then drained into the river Bangshi. Gradually fish and other aquatic resources are disappearing. Working in paddy field is irritating and burned and skin disease, agriculture labor loses their daily and employers has to count more money and use of sticky polluted water from the river causes less yields of their crops (Mr. Samad, elderly people, FGD at Ghughudia village).

### III. CHANGE IN LAND USE AND THREATENED AGRICULTURE:

Population increase along with many other anthropologic factors i.e. Urbanization, industrialization and pollution of land and water pushes to change. Such as following the establish of the special economic zone (EPZ) near river Bangshi, many other local industries and so many small enterprise developed. Number of new and additional employments were created by these industries i.e. EPZ and other industries. But its impacted land use pattern and traditional livelihoods too. In one hand total agriculture lands reduces and on the other pollution in the fertile cultivable land force to keep uncultivated or other non crops framing i.e. high yields grass, fish cultivation.

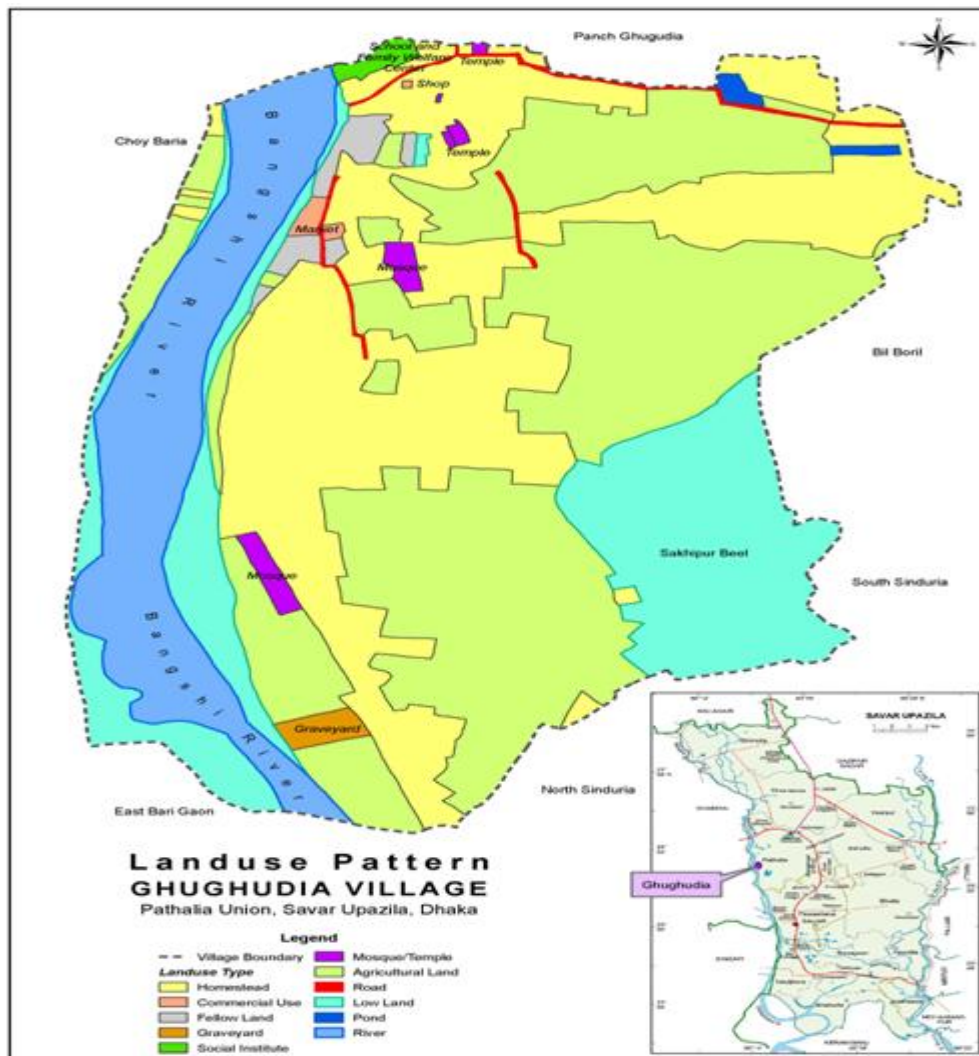


Figure: 1 Land use pattern of Ghughudia

### IV. DECREASED AGRICULTURE LAND:

Total demands of foods comply with total population and food consumptions. Availability of cultivable fertile land water is important for food production to meet domestic needs and surplus demands. Again, food security is nevertheless satisfy the availability of food only, rather it has multidimensional impact and cause i.e. Production, distribution and availability of cultivatable land mass too. Increasing population and country's policy and acts are not favorable to conserve country's agricultural or wetland area as encroachment/grabbing are going on. World wide the transnational and national economic actors from various big business sectors (oil and auto, mining and forestry, food and chemical, bioenergy and biotechnology, etc.) Are eagerly acquiring, or

declaring their intention to acquire, large swathes of land on which to build, maintain or extend large-scale extractive and agro-industrial enterprises (Saturnino M.et.al 2012). Again these multinationals and corporations i.e. Industries at EPZ are discharging its untreated chemicals and other waste into river Banghsi or its links resulting pollution of water and land.

National governments in ‘finance-rich, resource-poor’ countries are looking to ‘finance-poor, resource-rich’ countries to help secure their own food and especially energy needs into the future. The land in global south was attractive historically for multiple reasons, but new momentum building behind the idea is to long-term control of large landholdings beyond states’ own national borders is needed to supply the food and energy needed to sustain their population and society into the future (Sturnino M. et al 2012). So, always there are factors behind the seen i.e. local, national, and international factors involved in land grabbing or reduction of total agriculture land. Cultivable land mass in Ghugudia village are in decreasing trends as it was in other village in the union (the lower unit of governance), significant amount of cultivable lands are lose or transform into other use (fig.2, total land and agriculture land in Patgalia union)

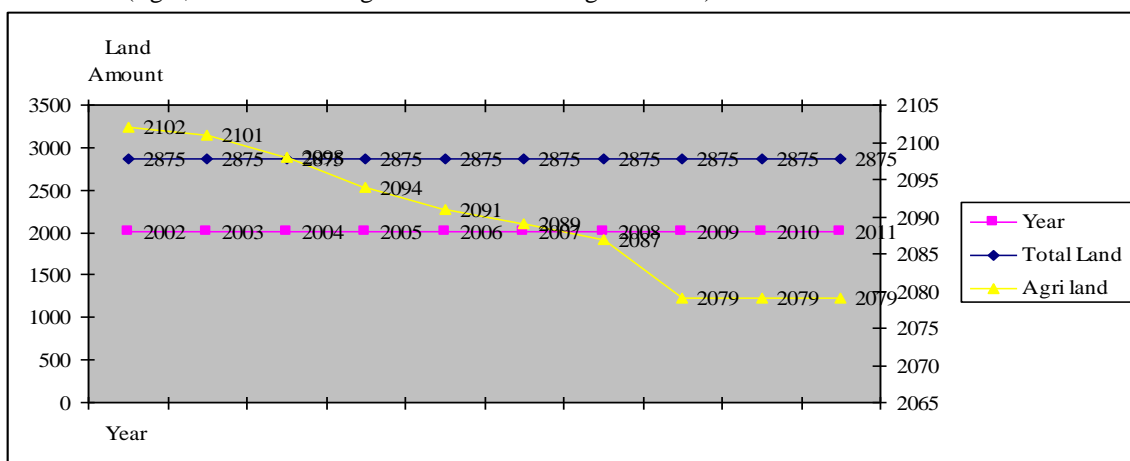


Figure:2 Decreased agriculture land, Mallick filed survey, Source: Savar, Upzila Agriculture office (2012)

In case of agriculture land change at Ghugudia and other villages in savar other than degradation of agricultural lands, immigrations, grabbing of lands by local and national housing company are also a factors. In figure 2 its clearly indicates the agriculture land are gradually decreasing in the area such as in 2002 total agriculture land was 2102 hectors and in the year 2009 its reached in to 2079 hectors. Therefore direct impact on total food production in the country backed with pollution reduces yield productions (Duhlai beel, Ghughudia village) thereafter availability, distribution and accessibility to foods.

**V. POLLUTION IMPACTED INDIVIDUAL AND COMMUNITY:**

Pollution have both individual community impact such as when any one infected with disease caused by pollution its incurred loss his/her daily and wages. Pollution causes for reduces fish in the river then whole fishing community affected, traditional livelihoods threatened as well as impact on total fish production. In response to questions how pollution affect individual and community following responses where documented. Responses of individual groups i.e. farmer, fishing, small business Goula/milkman and others/students were described in bellow ‘Table’ 1.

**Table: 1. Impact of pollution, N= 30**

	Farmers	Fishing	Service	Small business	Guala/ Milkmen	Others/ students	No of response
<b>Number of informants</b>	10	6	5	4	3	2	
Reduce water access	8		4	3	3	1	19
Health and disease	6	6	2	1	1	2	16
Livelihoods loss	4	5	3	1	2	2	15
Agriculture	6	6				2	14
Few fishes in the river and fish not eatable	6	5	4	3	2		20
Bad smell/degradation of environment	2		1	2	2	1	8
Land pollution and productivity reduce	2	1	1	1			5
No of response	34	23	15	11	10	10	103

Mallick, survey 2011

Data "Table1" shows that pollution has multidimensional affect on community i.e. reduces accessibility to water/river, affect health and causes to disease, loss of livelihoods of the traditional/fishing livelihood, agriculture that is degradation of land reduces production such as 63% of all respondent groups mentioned that pollution restricted their access to river Bangshi followed by health and diseases 53%. Pollution affected their livelihoods and agriculture mentioned by 50 & 47% respondent of all groups. Availability of fish in the Bangshi is very few and if they catch any are not eatable and overall environment of the riverside village degraded mentioned by 67% and 27% of all respondent groups. Finally degradation of agricultural lands and its consequences is to reduction of yield production none the less insignificant that is 27% of total respondent. Therefore cumulative affect of pollution in the community is degradation of environment and ecological niches affect individual livelihoods and reduced productivity of lands.

## VI. CHANGE IN AGRICULTURE AND CROPPING PATTERNS:

### High yield commercial grass:

Riverside agriculture plots which use to produce vegetables and other winter crops in Ghughudia trans in to grass field or cultivate high yielding grasses. Farmer opinioned that cultivate paddy, vegetables and other crops require systematic nurturing, use of fertilizers, pesticides and having every things in place there is uncertainty of production of good yields further using polluted water from Bangshi doubled the risk of bad production. In compare with regular crops cultivation of grass is more profiteering and risk free. The estimated cost for growing grass in a 1 decimal of land is about 200-300 taka that, is 4-5 US dollars and sold at around 14 US dollar equivalent Tk. 1120, whereas to cultivate vegetables or other crops in a same amount of land its need almost 21 Us dollar and there were risk of natural calamities (FGD with farmers). But in case of grass cultivation there is very little risk and no problem with polluted water too.

### Guava as cash crops:

Guava usually water tolerant and can survive in seasonal flooding when in rainy season, monsoon floods, flooded the riverbank area. Thus the shift framing and crops pattern at Ghughudia and many other villages around river Bangashi, when traditional and usual agriculture is being hampered due to many external factors that is industrial pollution and natural calamities.

### Fish pond:

The low land area of Ghughudia and other local village around the river Bangshi which was flooded during monsoon period and used for cultivate paddy one season in a year now converted in to fish ponds as these land are no longer suitable for cultivate paddy because of polluted water intuited in these lands and slug concentrated in the filed. Now huge vast area of lowland area (locally called beel) in Ghughudia and other village around the Bangshi riverside converted in to fish ponds or force to sell to housing company.



Figure: 3 Low land with paddy was converted to fish pond and latter sold to housing company (picture, Shohel Rana, JU 15 Batch)

**End note/discussion:**

Food security is never the less a unilateral or a single issue, rather it is comprehensive issue and need to address holistically. Degraded environment has immediate and long term impact on food bank that is production, thereafter all other aspects of food security issue.

**VII. DISCUSSIONS:**

In generally people of this deltaic land are diversely related with rivers. While origin of civilization is link with origin of agriculture, conversely sustainability of agriculture is related with source and availability of water. Therefore inaccessibility or polluting water source is synonym to food insecurity. The river Bangshi is the source of water for domestic and agriculture use for long. It was the means of employment for occupational groups. Contrarily, at present river Bangshi appeared as fate to the people of Gugudia and many other village as pollution in the water just affecting everything i.e. agriculture, health, water access as well as livelihoods of traditional occupational groups.

Local and national politics are involved with the pollution issue. Local people along with organized civil society groups organized protest against pollution, demonstrated in various occasions but was demolished by political influence of government back political people and local administrations. Interestingly problem is being acknowledged by the all government, political party. Again there is law and policy and new law and policy on the table to control pollution and save rivers. Government along with high level Bureaucracy seems very positives about the problems but no fruits yielded at last. Whatever the scenario at national level, local people suffer from the pollution most. The sequence of pollution of land water and generally degraded environment has end link with food insecurity of the country.

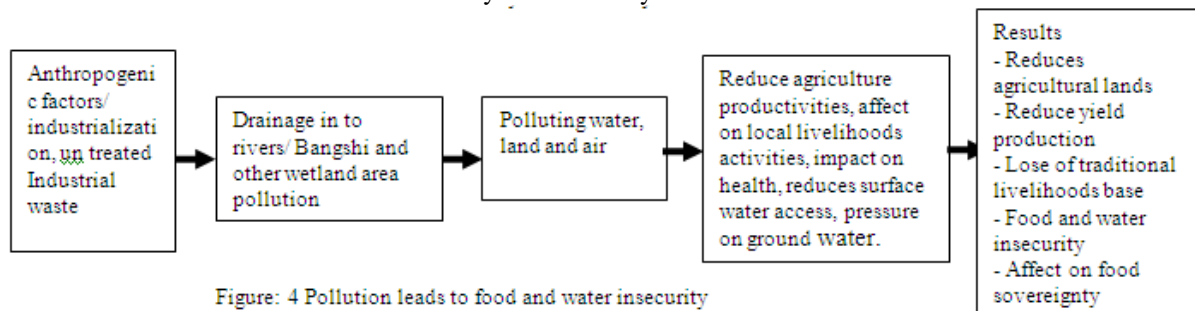


Figure: 4 Pollution leads to food and water insecurity

Waste is a by product of any production and it was not problem until those are not create obstacle or impact on other activities on earth. Industries are creating employment and by processing natural products make people lives easy. Of course responsible and environment friendly industrialization is one step ahead to food security but in regards to above the whole process “fig. 4” show how its sequentially leads to food insecurity.

Industries have ability to reduce pollution by processing of their waste in different way such as use of effluent treatment plants (ETP) doing more responsible and environment friendly business. But the attitudes of industries at least in the focused area are to profit by any means. They just ignoring the rights of people and even violate the existing law of the country by disposed their untreated industrial waste and drainage to the river and nearby water body and wetlands. Consequences are pollution of water, land and air at local area. Once its reach to the farmland in the form of watering for agriculture it’s unfertile and toxic the land reduce productivity. Once surface water become toxic and un useable for any purpose, in an alternate people go for ground water use.

The whole pollution chain land water and degradation of ecology are related with food insecurity issue either its at local, national or international aspect. Such as traditional river based livelihoods affected directly when resource depleted in the river either its from natural of anthropogenic cause i.e. fisherman of Bangshi riverside area. Both push and pull factor work for reducing agriculture land in the country such as pollution reduces productivity vise-versa increase population demands for more housing in the area. Ultimate impact is reduction of cultivable land and reduces total food production and food sovereignty in the area.

**VIII. CONCLUSION AND RECOMMENDATIONS:**

Creation of additional jobs and wage employment is an advantage for food security. However, in the age of globalization and climate change era, every adventure to food production has to very cautious i.e. green revolutions (1940-late 1970) As we have already damage a lot to our motherly earth. According to international plane on climate change (IPCC) the warming we have already dome (co2) will affect us next 30 years if we just start zero emission right now. Climate change will affect just every thing such as due to global warming glacier

will molted fast and more. Raise of sea level will inundated more fertile land; salinity in the river water will increase further. Change in the river course is not impossible, which is some time very natural one.

Therefore, polluting of local and national water basin by industrial and other waste is just suicidal. When many of the global issue (global warming, global trade), which we are not part but affecting most. Bangladesh itself is one of the densely populated country in the world such as 1100 people live in per sqm of land and 79% of its population live in rural area (BBS 2010). While in the year 2030, 60% of the world population will live in the urban area (UNFPA 2010) means lose of agricultural land and more demand for domestic water use.

Therefore to have just and sustainable development, there is need of rethinking of whole development approach. Advancement of science and technology still is in hands and use for service to the minority reach people will have to change. Local, national and global policy has to be redefining and change. At local level to control pollution and conservation of agriculture lands, demands stick implementation of exiting law, if not cover new law and policy should be adjusted to meet requirement of the food security.

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