Rejuvenating the nation's higher education system

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EVERY government that wants to gain the people's favour must establish a positive record of accomplishments. Such accomplishments do not materialize out of thin air; they emerge from a powerful vision and a focused agenda. Since the reality is that there will never be enough resources to fund every conceivable project, governments must confront the age-old conundrum: choice. Priorities must be established, some programmes should be targeted to grow rapidly, others should be maintained at their current levels, while still others should be gradually reduced or even uprooted.

The most long-standing contribution any government can make is to build a strong nation founded on the aspirations and skills of its people. These depend substantially upon the education system and its ability to develop the requisite human resources to man all relevant sectors and sustain the driving vision. That a strong and functioning education system serves as the foundation for national development is a foregone conclusion. Through education a country develops its productive human resources that serve as the engine of social and economic transformation. As Harbison said, "Human beings are the active agents who accumulate capital, exploit natural resources, build social, economic, and political organizations, and carry forward national development." Only when human resources -- their skills, talents, energies, and knowledge are effectively developed and harnessed, a nation attains the capability and credibility to bring about positive social changes and much needed economic growth. Clearly, higher education must be the government's top priority. This article is, therefore, a call to the government and the higher education institutions (HEIs) to engage in a true partnership to recreate, rebuild, restructure, and rejuvenate higher education with the objective of strengthening the country's human resource pool and equip them to take on the challenge of nation building.

The critical role of education

The critical role of education is aptly portrayed in the case of Taiwan, which initially made quick gains in technological prowess. Yet, its recent efforts to turn itself into a "high-tech island" have been hindered by a shortage of well-educated and creative people in the work force. According to Taiwan's Commission on Educational Reform, the government is insufficiently committed to educational excellence; consequently, its dreams of building a high-tech island have not fully materialized. The Commission recognized that building a high-tech island requires more than science-based industrial parks and tax incentives and urged Taiwan to nurture creative personnel through its education programmes and find ways to keep them in the country. Another study has shown the significant contributions of a university to regional development in Australia. According to the study, universities not only help develop a region, they also strategically position that area as a learning region in the knowledge economy.

The rapid expansion of education systems in the past 30 years in Asia, particularly East Asia, and the ascendance of this region in social and economic status in the community of nations, also testifies to the strategic role of education in shaping the future of a country. Some of these countries lead the world in cross-national comparisons of student achievement. According to the World Bank, the investments of these countries in their education systems were the largest determinant of economic growth. The World Bank also suggested "Other things equal, the more educated a nation's workers, the greater their potential to catch up with prevailing technologies and so achieve more rapid growth."

Higher education is of strategic importance not only as an engine for human resource development and as a facilitator of growth through forward and backward linkages, it also serves as an incubator and repository of knowledge with untold potential.

Higher education and accountability

Ultimately, the HEIs must serve their communities by being at the heart of contemporary learning and research. Thus, the important questions that must be continuously asked are "What do they deliver and how well?" In fact the HEIs, today, are under intense scrutiny in many countries. Governmental, as well as societal groups are taking a hard look, among other factors, at the performance of HEIs and the quality and value they deliver. The political rhetoric in many countries is also demanding greater accountability from the education system. In some instances attempts are being made to introduce industrial concepts, formulae, and techniques including TQM (total quality management) applications to the management of HEIs with a strong emphasis on accountability. Malaysia is a case in point where quality practices from industry (TQM, six sigma, ISO 9000) are being rapidly introduced.

In India also higher education is under intense pressure resulting from rapid economic growth and the country's transition to free markets. As a result, the traditional education system and its reluctance to introduce appropriate changes has become a big stumbling block. According to the Vice Chancellor, University of Delhi, "One of the biggest complaints of professors is that students don't attend classes." The reason is they are at private professional and technical schools being trained for jobs. In Hong Kong, interest groups have claimed that higher education is not aimed at excellence; rather it is aimed at dispensing degrees to local people at very high prices (US $26,000 per student), "locking in expensive mediocrity." Clearly higher education is being increasingly brought under the microscope in various parts of the world, especially where notable progress has already been made. This scrutiny is important because, as the world changes, the education system must either lead the changes or, at least, keep pace with them and reinvent itself to remain current and relevant -- there's simply no room for slack.

Consequently, in many countries, new regulations are being explored and old ones revamped to establish minimum standards of instruction through assessment and accreditation councils. Particular attention is also being paid to avoiding problems associated with rapid and unplanned growth in this sector. In the area of management of education in India, for example, a significant mismatch between demand and supply has been indicated. To alleviate this condition, the All India Council of Technical Education under the Ministry of Human Resource Development permitted a large number of institutes to start MBA or equivalent programmes. The consequence has been dire: Many of the newly minted institutes are beset by:

* Limited number of core faculty and heavy dependence on visiting/guest faculty.
* Poor quality of faculty on competence, qualification, and experience.
* Poorly structured courses with little or no guidelines for content, coverage, and depth.
* Admission norms greatly relaxed to maximize revenues and profits.
* Poor assessment criteria and emphasis on promoting students and awarding degrees.

While there are islands of excellence, one cannot help but feel a sense of disillusionment and disenchantment by this sorry state of affairs that is the fate of higher education today, a fate that must be altered without delay. This requires a strong helmsman unimpeded by political cronies and manipulators, a creative visionary who can chart out a rigorous and distinctive path, a strategic goal setter who can focus on achieving key outcomes while setting aside peripheral issues, and a diligent disciplinarian devoted to improving the structures and processes of education that promise rich returns.

Higher education in Bangladesh

Higher education in Bangladesh, especially in the government institutions, has remained in a state of crisis for a prolonged period of time. It is beleaguered with lack of vision, deteriorating quality, abysmal mismanagement, high uncertainty, poor standards, and continuing turmoil in campuses across the country. The traditional post-secondary institutions have very clearly lost much of their lustre and past glory, and their pursuit of excellence has been replaced by dismal mediocrity. Student unrest, lack of qualified teachers, the migration of many teachers and students, poor curriculum and course design, wide variation in student quality, political interference, low revenues, and a host of other problems sustain this mediocrity and its downward spiral as reflected in the quality of research and teaching in these institutions, and in the quality of students they produce as reflected in the percentage of productive and employable graduates. At the same time, private universities seem to be mushrooming everywhere. However, these universities also need to be assessed on quality, rigor, relevance, and value for money. That both types of HEIs (public and private) should come under greater scrutiny to provide much needed impetus for change and to better fit a dynamic and evolving global environment requires little elaboration.

Unfortunately, such scrutiny, especially on the performance of the HEIs in Bangladesh, is limited or not known to the public. But it is widely held that today's students in higher education in Bangladesh are, on average, less prepared in terms of reading, writing, and analytical abilities relative to the past. Exerting a high drag coefficient on the HEIs, these students reveal the decoupled linkages between pre- and post-secondary education and suggest serious anomalies in the planning and administration of higher education. The first step in improving the higher education system is to gain a clearer understanding of the key factors that continue to plague the system.

Based on my research, seven critical areas seemed to need the greatest attention if higher education is to be effectively nurtured and made progressively more relevant to Bangladesh. These include "teacher quality" as reflected in their academic qualifications, teaching experience, communication skills, research abilities, attention to students, and ability to impart knowledge to the students. The second factor is "method and content" and includes course content, curriculum, teaching methods, testing procedures, and the application of theoretical and practical knowledge in and beyond the classroom. The third factor is "peer quality" as reflected in the academic background and perceived merit of fellow students. The fourth factor is "direct facilities" comprising library facilities, laboratories, and classroom facilities that students use directly in their pursuit of knowledge. The fifth factor is "indirect facilities" comprised of hostel facilities, opportunities for extracurricular activities, scholarships, and recreation facilities. The sixth factor is "administrative efficacy" as reflected in whether the administration is effective in maintaining discipline on campus and whether departmental administration is effective in ensuring regularity of teaching. The seventh factor is "political climate" reflecting student involvement in politics and the general campus environment of strikes and violence.

These factors were derived from the "alumni" of Dhaka-based HEIs who are perhaps well suited to provide the requisite insight and understanding, given their experiences with higher education. A few key findings are briefly shared next.

Disturbing insights

Three disturbing findings are presented here. Based on a six-point scale, the mean scores associated with "teacher quality" was 3.59 while on "method and content" the overall rating was 3.32. If we consider the mid-point (3.5) as the neutral point between a positive and a negative evaluation, teacher quality falls barely in the positive territory while method and content falls in the negative territory, subject to technical considerations of sampling and non-sampling errors.

Given that higher education in the country was once regarded as the crown jewel, with the most brilliant minds seeking affiliation with it, the ratings that post-secondary teachers earned in the eyes of their protégés, the alumni, were disconcerting, to say the least. The composite score on teacher quality basically reflects how the alumni view the overall qualifications, experience, communication skills, research abilities, attention given to students, and the ability of teachers to impart knowledge. Ratings on the individual items indicated that while academic qualifications of teachers exceeded a score of 4.00, the rest of the attributes were rated materially below this number. The lowest scores were attained on two attributes: whether teachers pay attention to students and their research abilities.

As for "method and content," the alumni provided ratings on course content, curriculum, teaching methods, testing procedures, and the use of theoretical and practical knowledge in and beyond the classroom. The composite score reflected the mediocre education that the HEIs seem to be offering. For the individual items, the lowest scores were obtained on testing procedures and course content. These ratings confirm, to a large extent, the views espoused by many that the HEIs have deteriorated in their image and reputation over the years. These ratings raise deep concerns about the preparation of the nation's young and their ability to shoulder future responsibilities. The consequences are already apparent: The inroads of foreign experts and consultants, the flight to foreign countries for healthcare needs, the desire of the young to settle abroad and build a future, and the loss of competitive edge to better products and services from other countries swamping the country's markets.

The adverse and disruptive influence of campus politics received a high rating. This factor with its extreme factionalism and low tolerance for differing opinions has frequently claimed national headlines for its wanton disregard of the needs of the general students to pursue their education in a peaceful learning environment. Instead, campus politics has brought hate, incivility, and even brutal animal passions that are frequently let loose on campuses across the country to terrorize students, faculty, administration, and even the general public. While campus politics has effectively brought many HEIs to their knees, thereby crippling their ability to equip future generations, the political parties continue to ignore the wanton harm they are bringing down upon the nation as they continue to feed their selfish purposes.

Reflections

Higher education in Bangladesh seems to have evolved without a helmsman. Devoid of strategic vision, it appears to be groping for answers. It cannot be emphasized enough that its strategic role in national development stipulates that it must be carefully planned and nurtured. In particular, its backward linkages with secondary education and forward linkages with employment opportunities must be clearly and creatively articulated at the highest levels and energized with the right measures and incentives. To do so requires that its growth path incorporate the perspectives of multiple stakeholders: employers, employees, students, educators, policy makers, and society itself. The needs of each stakeholder must be identified and integrated to nurture, reposition, and rejuvenate higher education and make it more comprehensive, relevant, rigorous, coherent, and socially responsive.

Unfortunately, it appears that higher education is in a state of siege today -- by its teachers whose quality ratings are deeply troubling because they do not reflect the excellence they must inculcate and exhibit to gain the confidence of students, the academic community, as well as society itself; by its students, especially the unenlightened elements, who continue to infuse chaos and violence in the academic environment, not realizing the harm they are inflicting upon themselves, their peers, and society in general; by its administrators (including the government) whose lack of vision and incapacity to provide leadership have failed to deliver quality teaching, a vibrant curriculum, and a learning environment to equip future nation-builders; and by politicians who see the centers of learning as veritable battlegrounds to pursue very little other than their narrow personal interests.

Let us bear in mind that a quality education can provide tangible and long lasting benefits as evidenced in the advanced industrialized nations. It is their education system that has enabled them to dominate the rest of the world with knowledge that translates to superiority in social, political, economic, technological, military, and human affairs (I say this with some reservations of course). It is the same education that people from all over the world seem to crave today. In Bangladesh, unfortunately, the greater purpose of higher education seems to have been lost in the melee of petty interests and conflicts that have diminished its value to its stakeholders largely because of its failure to meet expectations. Consequently, hordes of good students are leaving the country to pursue their education, goals, and ultimately, their dreams. While there are islands of excellence, one cannot help but feel a sense of disillusionment and disenchantment by this sorry state of affairs that is the fate of higher education today, a fate that must be altered without delay. This requires a strong helmsman unimpeded by political cronies and manipulators, a creative visionary who can chart out a rigorous and distinctive path, a strategic goal setter who can focus on achieving key outcomes while setting aside peripheral issues, and a diligent disciplinarian devoted to improving the structures and processes of education that promise rich returns.

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A new era for childre

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AMID a new found hope and fervour that the post-September 11 world desperately needs, the United Nations General Assembly Special Session on Children started yesterday in New York is set to mark the beginning of a new era for children. After the 1990's World Summit for Children, this is the most important and unique event that brings together 70 heads of government, 300 children, 700 NGOs, private sector representatives, eminent citizens and celebrities to formulate a new agenda for children.

The last decade did see some spectacular breakthroughs in the reduction of Infant Mortality Rate globally, but Sub-Saharan Africa lagged behind. The South Asia, where initiatives for EPI, control of diahorroeal diseases were aggressively pursued, accomplished overall reduction of 32 per cent in infant and child mortality rate. Bangladesh fared much better and crossed the South Asian regional average by making almost 50 per cent reduction in its infant mortality rate.

The balance sheet for the world shows that disparities in access to immunisation still exist both in geographical areas and in the coverage of six major killers of children. Polio eradication efforts put a bright spot on the map with only 20 countries reporting cases of wild polioviruses. In the last 18 months, not a single case of wild poliovirus has been reported in Bangladesh and is close to achieving polio-free status. This by no means a modest achievement and is indicative of the potential public/private partnership to replicate this success in the elimination of measles and tetanus as well.

When the World Summit for Children took place in 1990, less than 20 per cent of the households in developing countries consumed iodised salt and more than one billion were affected by iodine deficiency. Even in the early 1990s, the IDD posed a major threat to children and women's health. Iodine deficiency is the world's single largest cause of mental retardation. Major increase in iodised salt consumption has brought a remarkable reduction in the incidence of deafness mutism, dwarfism and cretins. Bangladesh is a leading example of increase in consumption of iodised salt that has gone up from 14 per cent to 70 per cent in last 10 years.

It is in context of recognition of this gigantic leap that Bangladesh's Prime Minister addresses a side event of the United Nations General Assembly Special Session on Children to share Bangladesh's experience and insight in a session on "A Smart Start for Children". Speakers are expected to include key government ministers from Canada, the United States and the Netherlands, as well as Heads of State such as President Mbeki of South Africa. Salt industry executives from China, Europe and North America and UNICEF Ambassadors Roger Moore and Anatoly Karpov, are also expected to address the side event.

The promotion of Primary Education in the world proved to be an uphill task and broke very little new ground. Enrollment rates have shown marginal change over the decade, only 2 per cent increase globally, still 120 million children remain out of school. Against this grim backdrop, we have seen positive strides in Bangladesh with net enrolment taking a high point of 80 per cent with 70 per cent children reaching Grade-5.

On the eve of the new millennium some ugly deficiencies stare the world in the face. Apart from reviewing the past progresses the United Nations Special Session for Children offers a great opportunity to critically review the achievements of the last decade. With the unfinished agenda at hand there is also an urgent need for a renewed commitment and a pledge for action for children in the next decade.

The Special Session is the landmark event of the new millennium that is part of the Global Movement for Children in which there is a role for everyone. GMC is a collective global force and partnership devoted to creating a world where every child has the right to dignity, security and self-fulfilment. The goal of the Movement is to increase and broaden the level of action or children and to campaign for the end of discrimination against children and adolescents. Nelson Mandela and Graca Machel are the main spokesperson for the movement.

Another event that has been the flagship and forerunner of the Special Session is the " Say Yes for Children" campaign launched last year. Across the world more than 85 million people have, so far, said Yes for Children. Their message is loud and clear: the citizen of the world cares for children and they expect their governments to keep the promises they made to them.

These pledges would be presented to the Special Session by Nelson Mandela to inspire the world leaders, eminent persons and civil society representatives to strive harder and build " A World Fit for Children". A first signal of positive optimism comes from the Secretary General of the United Nations, Kofi Annan, who in his message on the eve of the landmark event said the children and the young people who are attending the first-ever UN Special Session on Children from 8-10 May will help find solutions for making the world better for children.

Let's remember that we have created a world in which children remain most vulnerable and there is no country in the world where children do not face the brunt of economic melt down, rapid urbanisation, growing poverty, political and social conflict. The canvass of new threats is being darkened by the looming threat of HIV/AIDS, fragile status of protection of children from abuse, neglect, exploitation and violence.

The best way to realise the dream of the rights of the children is to increase global and regional and national investment for child development programmes. The world needs a new vision and direction to put the children back to the centre of the stage. The only way to go forward is to start with children and go wholeheartedly for the befitting message of the Global Movement for Children that urges all of us to change the world with children.

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Declining hilsha fishery

GAZI NURUL ALAM

THE hilsha is our national fish. Among the various fishes of commercial importance, hilsha constitutes the most important single fishery of Bangladesh. It is a highly demanded fish in the market and contributes 22-30 per cent of total fish production in Bangladesh. The hilsha fishery also contributes in foreign exchange earnings and provides livelihood for 40 per cent (1.27 million) of commercial fishermen.

The popularity, socio-religious significance and traditional public knowledge of the fish are well reflected in the proverbs and ancient sayings as recorded by Hora (1954c) on the basis of which it would appear that there is no other dietary fish so well relished and so prized in Bengal as the hilsha.

Habitat: The fish live in both marine and fresh water. In the Bay of Bengal, they are found in abundance. They are found to occur in large scale in the Meghna and Padma rivers and on a smaller scale in other rivers of Bangladesh. In other parts of the world it is found in the western shallow seas of the Indian and Pacific Oceans, estuaries, lesser saline lakes and fresh water rivers. It is also found in the saline areas of the Persian Sea and Arabian Sea. In the Bay of Bengal, it is found in the Palk Bay, occasionally along the Madras cost and Chandipur (Balassore-Orissa) and Midnapore (West Bengal) coast and it is also found along the inshore region near the deltaic areas of Burma down to Margui archipelago (Pillay and Rossa-1963). It has also been reported to have been recorded from the coastal waters of Sri-Lanka and Cochin-China (Pillay and Rossa, 1963).

Feeding habits: Hilsa is essentially a plankton feeder and does not show any selectivity in feeding with its closely-set-sieve-like gill rackers (Hora, 1938; Jones and Sujansinghani, 1951). Generally, the food items which are preponderant are crustaceans (particularly copepods), diatoms, green and blue algae; organic detritus, mud and sand have also been recorded (Hora 1938 and 1940; Hora and Nair 1940a, Chacko and Ganapati, 1949; Pillay and Rao, 1962; Holder, 1968 & 1971; Quereshi, 1968; Shafi, Quddus and Hossain 1977 a). Qureshi is of the opinion that in Bangladesh waters, the fish appears to feed only in the sea and stops feeding while ascending the rivers and that the fish is probably sustained by the fat accumulated during the feeding phase in the sea which gets gradually reduced during the upstream journey. He has also noticed the presence of sand-grains and mud indicating bottom feeding. Shafi Quddus and Hossain recorded that the juveniles were voracious eaters and bottom feeders and that the food and feeding havits change with increase in size of the fish and with changes in the season. Hora recorded that the young hilsha between 20 mm and 40 mm in length feed mostly on diatoms and sparingly on crustaceans and that slightly larger specimens up to 100 mm were found to feed on smaller crustaceans and also on insects and polysoa.

Behaviour: The fish is known to be a fast swimmer (Southwell and Prasad, 1981). Tagging experiments have shown that a fish may cover as much as 70.8 km in one day (Pillay et. al. 1963). According to Mojumdar (1939 b), hilsha move in the sea on the surface whereas in the river they move at a depth of 14 to 18 meters, though on a cool or drizzly day they may rise to within 2 meters from the surface. During migration upstream, the fish do congregate, but they have never been observed to form very dense shoals as observed in the case of many pelagic fishes.

Migration: It appears that the Bangladesh stock of hilsa are truly anadromous, feeding and growing to maturity in the sea and ascending to fresh water to breed. The young fish then return from breeding areas to feeding grounds at sea (Dunn 1982). Three times a year mature hilsha of both sexes and four to five years old enter the river and estuary system. These migration consists of a minor movement peaking in February and major migration peaking in June and September of each year. The winter migration of smaller fish (although many are matured) is apparently not a migration for breeding purposes and probably extends only as far as the estuarine and extreme downstream of the river. The major migrations in the monsoon season are the important periods of reproduction. Breeding, egg-laying and the subsequent development of the young take place in the open waters of the rivers, giving rise to a population of small hilsha (Jatka) which are exploited downstream four to five months later (Dunn, 1982).

Spawning ground: Exact locations of breeding grounds for this species have not yet been determined in Bangladesh rivers but it is thought that they usually breed at the bends of the large rivers when the rivers are full, and that they spawn against the current. It is likely that breeding is successful only at locations sufficiently far upstream to avoid the planktonic larval stages being swept out to sea (Dunn-1982). In Bangladesh, very recently, the locations such as Meghna estuary, Hatiya, Sandwip and Manpura, Nilkamal and Nijhundwip have been identified as the breeding places of hilsha. But it needs further concrete study for confirmation.

Age at maturity: In Bangladesh water areas, the adult hilsha are recruited into the fishery at age about 4 to 5 years (35-45 cm. total length; 0.5-1.5 kg total weight) and because there is no extensive capture of adult fish below the size, it is probable that this is the age of first spawning (Dunn-1982). Mating is polygamous and fertilization external.

Fecundity: The diameter of the eggs of hilsha range from 430.0-729.2 microns (Doha and Hye). Fecundating of hilsha fish varied between 348,312 (fork length of the fish: 273 mm) to 14,65,969 (fork length of fish 420 mm). (Doha and Hye, 1970). The average egg numbers may be 2,50,000-16,00,000. It is reported that 2.1 kg. wt. of fish contain 18, 64,000 eggs (cited in Shafi and Quddus 1982). According to Dunn (1982) two millions of pelagic eggs are produced per female spawner.

Life cycle: Sexually, the species is heterosexual, though one instance of hermaphrodites has been noted (Chako and Krishnamurthy, 1949). The females due to faster growth rate, attain larger sizes than the males (Pillay, 1958, Fertilization is external. The diameter of a fully matured egg varies from 0.70-0.75m. After fertilization the diameter ranges between 2.1-2.3 mm. In this stage it drifts and flows with the water. The egg membrane is elastic and viteline layer is very wide. Yolk is segmented and presents various sizes of oil globules. The eggs generally hatch in the temperature range 28º-28º 5C within 18-26 hours. After hatching, the larval are 2.3-3.1mm. in length. The yolk is totally absorbed after eight days of larval development. After 30 days of larval development the lateral bands become quite clear, the dorsal and anal fins extend up to 8th and 30th segment respectively.

Recent trend in catch statistics: The hilsha fishery is essentially confined to the artisinal sector -- traditional non-mechanised and small mechanised boats, both in inland and inshore waters. Hilsha considered the largest single species fishery in Bangladesh in almost all the river systems, estuaries, and marine environment, contributed approximately 30 per cent of the total fish production in the past (Raja, 1985; Hossain et, al, 1987, Mazid and Islam 1991). This production seems to be in a decreasing trend, compared to the earliest estimates (Mia and Shafi, 1996). This decrease in production or landing rate has been described to be the consequences of several natural and manmade barriers and over exploitation of the resource. However, concern over the anadromous stock is most frightful, as the broodfish are exploited mercilessly during their upstream migration throughout the southern rivers and possibly the progeny of the lucky ones are again caught without any consideration during their downstream migration at Meghna river system.

From the past catch statistics (before 1986-1987) of hilsha shad it is found that once upon a time, the maximum harvest of hilsha would be obtained from Meghna near Chandpur. The hilsha shad also would be harvested abundantly in the past from the rivers Tetulia and Para near Barisal, Padma near Gualando, and Shibsha near Khulna. Out of the total national hilsha catch, almost 95 per cent would be harvested from the fresh water river system (Padma, Meghna and others) and the rest 5 per cent from the sea. But at present the trend has been changed. It appears that more than 60 per cent of the total hilsha catch is harvested from Bay and its neighbouring coastal area and less than 40 per cent is harvested from the rivers. Fisheries scientists are quite concerned about the decreasing fish production trend as well as the shifting of their habitat. Many factors both natural and manmade are responsible for the significant decline of hilsha fishery in the river systems of Bangladesh.

The main significant reasons are described below:

1. *Siltation*: The inland river system is gradually affected by siltation due to many reasons.

2. *Accretion*: Accretion is also one of the factors for gradual decline of hilsha fishery in the country's river system. A lot of islands have accreted in the estuaries thus reducing the hilsha fishery habitat.

3. *Pollution* : Due to environmental degradation the spawning ground of hilsha has been distorted. This has also caused a significant negative impact on hilsha's travelling routes and grazing fields.

4. *Irrigation projects:* The construction of embankments and sluice gates under different irrigation projects in Bangladesh has also exerted negative impacts on the normal course of the river and thus affected hilsa fishery.

5. *Over-fishing* (over exploitation of the stock): Over-fishing is also one of the major causes. Due to introduction of highly developed fishing technology and other mechanisation of this sector, catching of hilsha has been considerably increased. The hilsha migration from sea to rivers for spawning purpose has been decreased to a greater extent. Recent statistics show that at present there are about 4000 mechanised boats, 20 thousand sail boats and 20 lac strong manpower engaged in exploitation of the resource.

6. *Jatka fishing:* The considerable amount of Jatka (baby hilsha fish) is being harvested every year from the estuary and fresh water river system of Bangladesh. Millions and millions of 'jatka' are being harvested by the fishermen in the month of February-May in the rivers with the help of 'jagat ber jaal' and 'current net'. It has been estimated from the survey (FRI, Mymensingh, 1990) that the total catch of 'jatka' is about 3456 metric ton and 442.37 million in number. If all these 'jatka' get the opportunity to grow and if each piece of 'jatka' attains on average 0.6kg weight in a year considering only 20-22 per cent survivality of them, the probable additional production of hilsha would be more than 45000 mt/yr. So jatka fishing is also one of the major factor for significant decline of hilsha production in the river system of Bangladesh.

7. *Catching of brood female hilsha*: The fishermen also harvesting mercilessly a considerable amount of berried female hilsha. This practice is also responsible for declination of hilsha fishery.

So what is happening to the fate of hilsha fishery in our country? As per newspaper reports for the last two consecutive years (1999-2000, 2000-2001) the hilsha catch in our river system has drastically fallen. And as a result thousands of commercial fishermen who are already engaged in hilsha fishery are becoming frustrated and looking for other profession. Due to its less catch, the price of hilsha fish has gone beyond the capacity of buyers.

Now it is high time to take appropriate measures for protection of this valuable resource for greater interest of the nation. So under the present context the writer likes to suggest the following recommendations for the protection of hilsha fisheries:

1. It is highly essential to know the present hilsha stock in our water territory. This will help to decide the harvesting quantity.

2. Banning the catch of jatka and brood female hilsha.

3. For conserving the hilsha stock the use of 'current jaal' having mesh size below 8cm be totally banned in the area from Shatnol of Meghna river up to Nilkamol-Hajimara (Chandpur) in March-April.

4. The harvesting of hilsha should be totally forbidden during their breeding period i.e. from 15th September to 15th October in the area from Sandwip-Hatiya upto upstream Meghna near Chandpur.

5. The setting of net with the help of bamboo poles/fencing traversely in the river branches (Meghna) extending from Mehadiganj, Hijla and Muladi thana under Barisal district and Maoa, Bhaggeskal and Aricha of the Padma in Nov-June to catch fish and obstruct the hilsha migration should be totally stopped.

6. Hilsha Fishery Investigation and Management Unit stationed at Chandpur should take all those issues of hilsha fishery in consideration and find possible solution.

7. Fisheries rules and regulations should be in force in the coastal area to protect hilsha fisheries.

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