



## **Environmental Education and Environmental Management in Bangladesh and their Sustainability**

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**Abstract.** Environmental education is in its early development in Bangladesh. Some traditions of environmental wisdom are quite ancient, but most of these are not recognised by the scientific community. The high level of illiteracy and school dropout create barriers to mass environmental education. Some universities offer courses in environment studies, but these are limited and the universities are under-resourced. Within the community Non Government and mass organisations have begun to change policy and perceptions relating to the environment. One successful example being a ban on public use of polythene bags. The paper describes some of these programs and makes recommendations for strengthening environmental education in Bangladesh. It highlights the need to deploy environmental expertise in public and private sector management systems as the focus of government policy in Bangladesh matures from a short-term focus on self sufficiency to the pressing issues of sustainability within the environmental opportunities and constraints offered by the environment.

**Keywords:** Environmental education, Environmental management, Environmental movement, Sustainability, Bangladesh.

### **1. Introduction**

Sustainability is now one of the most widely used words in scientific communities and its associated education systems, particularly in the field of Environmental Science (Filho, 2000). Knowledge, either traditional or institutionalised from formal education, is an essential prerequisite to attainment of sustainability in human society and endeavour. The concern with sustainability itself is partly a product of the integration of ecology into the basic science curriculum of schools in industrialised countries for the last 30 years. The existing information, education and mobilisation processes have also an important role in the evolution of environmental management around the world (Romero, 1995). Universities and other equivalent institutions play a leading role in promoting of environmental ethics and the principles sustainable development (Delakowitz and Hoffmann, 2000). According to Filho, “...universities must give future generations education and training that will teach them, and through them, others to respect the great harmonies of their natural environment and of life itself (Filho et al., 1996)”. At a practical level, environmental education (EE) can play a key role in creating awareness and motivation that change people’s skills, values and behaviour in society.

In Bangladesh, environmental education is a recent phenomenon particularly in the formal higher education sector where few universities teach environmental studies. Recently popular environmental movements have heightened awareness of environmental issues, as well as the need for education and skilled environmental management in Bangladesh. Popular environmental movements have sprung up involving many sectors of society including academics, various professional groups, the general public, many foreign Bangladeshis, government departments and various non-government organisations (for example, *Bangladesh Poribesh Andolon (BAPA)* or Bangladesh Environment Campaign). Since 1995 they have provided a common platform of pro-environmental forces in

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Bangladesh. To date, this force has been very successful in drawing national attention to a range of environmental issues.

This paper discusses current environmental education and environmental management issues of Bangladesh. It also discusses need for environmental education, practices and future possibilities for employment for environmental graduates from Bangladesh. Finally the paper recommends a policy framework for sustainable environmental education and its deployment in sustainable environmental management in Bangladesh.

## 2. The State of the Bangladesh Environment

For a long time, Bangladesh had a primarily traditional, pre-industrial economy. Despite their low productivity, an important virtue of traditional methods of production is that they are less polluting and more environmentally sustainable. To achieve higher productivity and growth, Bangladesh has for two decades striven toward industrialisation. However existing industries tends to be environmentally damaging. The early industrialising countries (EIC), now in their post-industrial phase, are trying to repair the damage done to their environments and turning to environmental sustainability. Even newly industrialising countries (NIC) experience the polluting potential of industrialisation. Hence, as Bangladesh proceeds towards industrialisation, she needs to beware of the environmental impacts of industrial growth. There are several reasons why Bangladesh in particular needs to exercise particular care with industrialisation and why her citizens need greater knowledge of environment.

**(a) Fragile ecology of Bangladesh:** Bangladesh is primarily a delta. The entire country is inter-connected through river systems and underground aquifers. For a considerable part of the year the land remains wet. This aqueous environment makes it very easy for pollutants to disperse in Bangladesh. The flora and fauna of the country are delicate. It is very easy to damage and destroy Bangladesh's ecological balance.

**(b) Extreme Population Density:** Of all countries of the world, Bangladesh has the highest density of population, some small city-states excepted. Bangladesh's population density is already fifty times higher than that of the US and six times higher than that of China. With such extremely high density, any contagion arising in Bangladesh is sure to very rapidly affect millions of people. High population density also leaves very little open space and uninhabited terrain to cushion against environmental stress or shocks. Human induced pollution loads are already close to or exceed that assimilative capacity of the environment. The high and increasing population density is itself a direct cause of environmental degradation (Khalequzzaman, 1999).

**(c) Importance of Foreign Capital:** In its industrialisation efforts, Bangladesh relies heavily on foreign capital. Foreign companies, generally in footloose industries like garment and footwear manufacture, do not usually have a long-term stake in Bangladesh's well being. They are more likely to be guided by short term profit goals. This increases the possibility of them making environmentally risky or damaging decisions. In 1997 an accident in a Magurchara<sup>1</sup> gas exploration test well operated by an international oil company caused widespread damage when wildfire spread into surrounding forest (Feeroz and Islam, 2000). As Bangladesh prepares to set up export processing zones all around the country and to issue mining leases for further inland and offshore exploration by foreign oil and gas companies, potential risk to Bangladesh's environment is likely to increase. For example, recently earth tremors have increased in the Chittagong-Rangamati region. It is alleged that large-scale mining exploration activities are contributing to geological instability in the area<sup>2</sup>.

**(d) Mass Poverty and Illiteracy:** Widespread poverty and illiteracy among the majority of people in Bangladesh increases the country's susceptibility to environmental damage. The general populace of Bangladesh is overwhelmingly preoccupied with meeting their basic material needs. Therefore they have little time or energy for concern about environmental amenities. High levels of illiteracy aggravate this problem, because illiteracy reduces the communication of complex information and acts as a barrier for them accumulate knowledge to understand the

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<sup>1</sup> Magurchara is a natural reserve forest, overlying large reserves of natural gas. In 1996 the US-based Occidental Gas Company began a gas exploitation test by drilling in the Sylhet district Reserve Forest. The Company spent a year clearing the site and establishing a temporary station in the area. In 1998 the whole gas field exploded and gas began to burn. The whole rig and associated establishment were submerged in the hole caused by explosion, which was 200 m in diameter. A column of burning gas rose to a height of 175 m and was visible from Sylhet town, 80 km from the Reserve. The gas burned for the next fifteen days at this height and then stopped burning suddenly (Salequzzaman, 2001).

<sup>2</sup> Personal communication from Dr. Mehedi Ahmed Ansary, member secretary, Bangladesh Earthquake Society, and associate professor of BUET

damaging impact of the environmental degradation that is occurring right around them on their own health. In the absence of popular protest, parties who pollute or damage the environment virtually have an open field.

All these factors lead to these conclusions:

- Bangladesh is particularly vulnerable to environmental damage.
- The only way Bangladesh can avoid environmental disaster is by through a strong and united, broad-based environment movement. This can only arise through mass environmental education and the emergence of local Bangladeshi expertise in appropriate and sustainable development.

How to build such a movement? First, the people of Bangladesh need to agree to the priority of environmental concerns and commence tackling them with the resources available, while also developing an effective, long term education and public awareness strategy.

### **3. Setting our priorities straight**

If an opinion poll to identify the top priority issues for the 21<sup>st</sup> century were conducted among ordinary citizens of Bangladesh, it is unlikely that the environment would top the list (Khalequzzaman, 1999). This is to be expected, given the low level of environmental awareness and the minimal level of environmental education available to people through schools and other institutions. I argue however that improvement of the state of the Bangladesh environment through environmental education is a pre-requisite for prosperous economic development. See for example the lack of educational policy in the Bangladesh Profile for the Johannesburg Summit, 2002 (United Nations, 2002). Only a better balance between environmental stewardship and economic development can guarantee a sustainable future and the well being of the country in the 21<sup>st</sup> century. The challenges of environmental issues in Bangladesh and the urgent need for sustainable development options require the development of environmental expertise capable of research, implementation and community education. This is only possible through effective environmental education programs.

### **4. Importance of Environmental Education in Bangladesh**

Environmental education is necessary not only to develop expertise which can contribute to policy making, but also to create a civil society which demands environmental accountability of its government and works with government in implementation. Government can easily draft and revise national plans for environment and sustainable development, using local or imported expertise. The far greater challenge is to effectively integrate communication and education both for the short and longer term outcomes. The general aim of environmental education and communication is to encourage and empower the community to conserve the integrity and diversity of nature, and to ensure that natural resources are used in an equitable and ecologically sustainable manner. Education is commonly perceived as a one-way flow of information, usually in educational institutions, especially schools. However, environmental education can be two-way communication with full participation and learning by people of all ages. The educational process itself becomes sustainable when the participants take responsibility and lead the process themselves. Environmental education should not be confined to schools, but is an important tool for managers, civil servants, community groups and NGOs alike, enabling them to implement policies to protect the environment (Van Hemert *et al.*, 1995).

### **5. Existing Environmental Education Policies in Bangladesh**

The Bangladesh government has several policy statements advocating widespread environmental education, but there has never been a specific government policy for environmental education nor environmental professions in Bangladesh. The Fourth Five Year Plan for Bangladesh (1996) states that “Environmental Education would be imparted to the teachers and students at all levels of education and specific measures must be undertaken to ensure participation of women at every level of education.” Furthermore, the Environment Policy, 1992 contains the following specific statements on environmental education and public awareness:

- Eradicate illiteracy and create widespread mass awareness regarding protection of the environment and utilisation of all national resources in a sustainable and environmentally sound manner.
- Ensure inclusion and dissemination of environmental knowledge and information in the formal and non-formal systems of education and the media.
- Encourage spontaneous and active participation of people in all environmental activities.

- Incorporate environmental issues in all training programs for public and private sector officials and employees including industrial and commercial workers.
- Encourage necessary research and evolve technology so as to ensure long term, sustainable and environmentally sound utilisation of all resources.
- Ensure that environmental issues get due consideration in all research activities by research and development institutions.

What is lacking in current government policy are clear goals and strategies for environmental education.

## 6. Present Status of Environmental Education in Bangladesh

Education services in Bangladesh fail to adequately service demand, due both to a growing population and limited funding. Access to education has not increased relative to demand, even though levels of enrolment have increased at the primary (Years 1-5), secondary (Years 6-10), college (Years 11-12) and university levels (Table 1). The literacy rate in Bangladesh is 45.1% of the population (BBS, 1997). Literacy rates vary between urban centres (57.7%) to rural areas (39.1%) and marked differences in are found between the sexes (Male 48.2% and female 39.6%) (BBS, 1997). Low levels of literacy impede dissemination and understanding of information on environmental issues.

**Table 1** Enrolment and drop out rates for students at primary (6~10 years old), secondary/SSC Examination (total), college (higher secondary) and university levels from 1996-1997

Education	Enrolment				Drop Out (% of student enrolled students who fail to graduate)			
	Urban		Rural		Urban		Rural	
Level	Male	Female	Male	Female	Male	Female	Male	Female
Primary	96.0%	93.0%	82.5%	73.6%	-	-	-	-
Secondary	116,068		1,200,279		48.87%		88.44%	
College	166,711		354,257		73.23%		76.89%	
University	141,171 (approx. 14% female student)							

Calculation based on BBS, 1997.

Formal Education: Currently environmental education is offered in primary schools. Primary education is compulsory for five years. To encourage education of girls in rural areas they pay no tuition fees up to grade. An integrated subject called Environmental Studies was been introduced into the primary and junior secondary syllabus in 1978. The syllabus of Environmental Studies for grade 3, includes the causes and effects of degradation of the environment, the importance and methods of conservation, prevention of waste and pollution and conservation of water resources (Sharafuddin, 1990).

The main principles for framing the Environmental Studies syllabus for Primary School are:

- ◇ The pupils will able to observe and know their immediate environment and develop a scientific attitude in solving their everyday problems;
- ◇ Study of separate subjects like biology, physics, chemistry, geography, geology, social studies, etc does not help young pupils understand the wholeness of the environment, so an integrated subject is very important; and
- ◇ Knowledge about proper use of environmental resources and of their conservation is essential for the maintenance of human life and civilisation.

The topics included in the primary and a secondary curriculum indicate the coverage of environmental studies in the formal school system. Although the environment receives substantial coverage in primary education, the coverage at lower secondary school (grades 6-8) is rather sketchy. Worse still, activity-oriented methods of teaching are totally absent in the present school curriculum due to:

- ⇒ Insufficient adequately qualified teachers,
- ⇒ Lack of basic educational infrastructure such as suitable classrooms and work space,
- ⇒ Lack of educational equipment, audio-visual materials, etc, and
- ⇒ Teacher training which fails to provide knowledge of the environment and skills required for effective environmental education.

*Higher Education:* Prior to 1996, environmental education in the tertiary sector was rather disjointed and poorly developed. In 1996 Khulna University first offered a 4-year undergraduate degree in Environmental Science. It was the first public university to offer environmental education in Bangladesh. Sylhet University (another public university) has offered a 4-year undergraduate degree Civil and Environmental Engineering since 1995. Some non-government universities have opened environmental education programs, such as Environmental Studies at North-South University (1995), and Environmental Science and Management at the Independent University (1996). Recently Dhaka University and Jahangir Nagar University (both public universities) opened undergraduate courses. In the environment courses described here, student enrolment is very competitive and places available are limited (only 25-40 students in each course). Prospective students need to pay expensive enrolment fees in the non-government universities, so only richer guardians can afford this education. However, facilities for research and fieldwork are inadequate in all of these universities.

In addition to these specialised courses all public universities in Bangladesh offer Ecology units in their B.Sc. and honours degrees with Botany or Zoology majors. At post-graduate level, there is a compulsory paper on Ecology in post-graduate Botany and Zoology programs. M.Sc courses in Environmental Management and Earth Science have been offered in Departments of Geography or Geology in some universities. Relatively better environment related units are offered in M.Sc. programs (some times undergraduate level also) in Bangladesh Agricultural University (BAU), Khulna University's School of Life Sciences and the Civil Engineering Department of the Bangladesh University of Engineering and Technology (BUET).

Environmental Engineering courses at both postgraduate and undergraduate levels are offered at BUET. The Bangladesh Institutes of Technology (BITs) also offer environmental engineering units within their undergraduate civil engineering courses. Polytechnic Institutes offer sanitary engineering units in the final year of three year civil engineering diploma courses. In addition, various institutes like the Public Health Training Institute, National Institute of Preventive and Social Medicine, Social Welfare Institute and Health Education Bureau also offer short-term sanitary engineering units for practising engineers, doctors, sanitary officers and social workers.

## **7. Environmental Science at Khulna University: a Case Study**

In 1996, Khulna University became the first public university in Bangladesh to offer courses in Environmental Science. Khulna University now offers a 4-year undergraduate B.Sc. Honours Course and 2-year M.Sc. The program aims to provide teaching of highest possible standard and a challenging environment in which students can develop their full academic potential. The syllabus for Environmental Science includes Ecology, Ecosystem Management, Global and Local Environmental Issues, Technologies and Sustainability, Social Science, Economics and Environmental Ethics, Water Resources and Land Use Management, Environmental Management, Environmental Engineering; Energy Technologies for Environmental Sustainability, Environmental Impact Assessment, Environmental Legislation and Planning and Environmental Auditing.

The curricula offer solid grounding in the principles of environmentally sustainable development with emphasis on the relevant physical, chemical, biological, processes and social, economic and ethical systems. Students in the Environmental Science Discipline (ESD) are equipped to make knowledgeable and informed decisions which result in environmentally sustainable business and lifestyle practices. Students enrolling in Environmental Science at Khulna University come from South-Asian countries like Nepal and India. Unfortunately the university is severely constrained with shortages of equipment for practical work, teaching staff and sufficient access to the Internet. However, as the pioneer of Higher Environmental Education in Bangladesh, the course has rapidly become popular, not only in Bangladesh, but for other developing countries also.

### *Non-formal and Informal Education:*

The formal school system still has inadequate delivery of environmental education in Bangladesh, but it does not bear sole responsibility for environmental education. Formal, non-formal, and informal educational sectors should work cooperatively towards local sustainability goals. Presently only 70% of the eligible children enrol in Government accredited Primary Schools, and enrolments fall to about 25% of all eligible children in Secondary Schools. Only 5% of the eligible age group enter tertiary education (Sharafuddin, 1990). More than 400 NGOs are now involved in non-formal education programs in Bangladesh. In 1994, more than 2.6 million people were enrolled in about 73,000 centres where NGOs operated. Of those enrolments, at least 1.4 million were primary-age children (63% of them girls), over 0.4 million were adolescents (65% girls), and about 0.8 million were adults (80% women) (Sharafuddin, 2001). In this context, non-formal and informal education (NFE) are crucial to educating the community in environmental issues. Some Environmental Education programs are regularly put to air on radio and television. Newspapers have of late given wide coverage to environmental issues. These relate to natural calamities such as floods and cyclones, land and river erosion, water pollution, deforestation, industrial effluent, destruction of wildlife, encroachment of river and lakes. Non-Government Organisations (NGO) in Bangladesh are encouraged to

undertake a wide range of environmental action programs. In addition to these NGOs, community service organisations such as Rotary, Lions, Apex, etc are active both in environmental improvement projects and environmental awareness programs.

Through such feeder schools gross primary enrolment has increased from 76% in 1991 to 95% in 2000, where the completion rate has increased from 40% to 70% respectively. The adult literacy rate has also increased from 35% to 62% (Sharafuddin, 2001). Participants in NGO based environmental education are assigned to take the lead in installing a sanitary latrine, mobilising children to be vaccinated against six deadly childhood diseases, making provision for safe water, motivating villagers to make compost<sup>3</sup>, and providing nutrition advice to mothers. In addition, most of the participant have mobilised the community peoples for the improvement of energy-efficient and safe household activities such as use of improved traditional earthen cookers (Siddiqui, 2003).

Informal environmental awareness has a long tradition in Bangladesh, particularly through folk and religious traditions. Local methods of fishing, farming, health care and other technologies developed over long periods of experience in various areas of the country. This traditional wisdom and technologies were often based on environmentally sound practices, such as integrated organic agriculture (now popularised as 'permaculture' in Western countries). By tradition, rural people do not eat catfish during the Bengali month of Chaitra (mid-March to mid-April). This is the period when the water bodies are relatively dry, hence the level of pollution is high and the preservation of such fish for the next season require that their stock not be exhausted during the dry season. Versified wisdom, such as the *Khonar Bachan*<sup>4</sup> (Nawaz, 1989) have for centuries guided agricultural practices in Bangladesh. Other folk sayings relate to health care, protection of crops and conservation of resources. Local plants like Neem (*Azadirachta indica*) and Bishkatali (*Polygonum sp.*) are used for protecting foodgrains from pests during storage in many areas of Bangladesh. Many non-formal education programs seek to integrate traditional environmental wisdom with insights and skills available from the sciences.

#### *A Case Study of Effective Non-formal Environmental Education in Bangladesh:*

Among the numerous national NGOs engaged in non-formal environmental education in Bangladesh is the *Bangladesh Poribesh Unnayan Sangstha* (Bangladesh Environment Development Organisation or POUH). POUH launched a nature awareness program in its 50 non-formal primary schools (Saeed *et al*, 1998). The program produced books for students, resources and training for teachers and guidelines for nature walks, visits to zoos and botanical gardens. Primary school teachers advised on the curriculum design and in turn use the materials published by the POUH in primary schools run by the government.

Like many other NGOs POUH facilitated many tiny non-formal feeder schools which teach classes one to three, preparing and encouraging students to go on to class four in government primary schools. These tiny schools, each with thirty to forty students, were designed to reverse the drop-out from early primary schools particularly for families who found school schedules or location was incompatible with schedules they needed to keep to generate income. POUH gave 1,500 children of the schools of rural areas textbooks on birds and trees written in simple language and illustrated as best as possible. These texts are used as teaching aids by the teachers, who themselves are trained to identify the trees and birds. Since it was realised that teaching texts will not be enough, the students are taken out on nature walks once a month. These walks are usually within a kilometre radius of the school, and the students are asked to identify flowers, bushes, trees, animals and birds they encounter. The latent interest in many of the children is aroused by the competition to know more and shine before their peers. The speed with which many of them learn about nature is remarkable. No doubt, once the school arouses their interest, they learn more by asking their elders. The youngsters are now picking up the knowledge that might have been lost. A third component is visits to zoos and botanical gardens in Dhaka and Rajshahi to see exotic animals, which awakens their interest not only regarding nature, but also about the diversity of the world itself.

Another component is the preparation of audio-visual materials to aid teachers in many remote areas where the pupils cannot be brought to one of the big cities for POUH activities. For them a slide or video show can partly substitute for the actual experience of travelling to different places. This program has received enthusiastic support

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<sup>3</sup> In Bangladesh refuse from kitchen, cow dung and poultry manure is carelessly dumped near the household. This causes serious environmental problems. The girls persuade the housewives to dig a compost pit and put all waste inside it. Thus, the environment is kept clean and the compost is used as fertiliser in the vegetable garden.

<sup>4</sup> Khona, a mythological wise lady. According to some authorities, Khona is a historical person, the wife of the astronomer Mihira (court scholar to Vikramaditya, 380-413 AD), Khona was herself an accomplished mathematician and astronomer. Khona has been considered by other philosophers as to be an imaginary person, her sayings symbolising folk wisdom based on centuries of farming practices (Nawaz, 1989).

from primary school teachers and professionals at the county level. Initially, the project began with local contributions, but after a year some support was received from a Japanese NGO. If there are any lessons to be learned, they are, first, that NGOs should go ahead with their pilot projects without waiting for government assistance, and second, it is easier to work informally with local governments than with the Ministries, because the latter require cumbersome, time-consuming formalities. Of course, any such initiative must make sure that it does not adversely affect any on-going government program, such as by drawing students away from government schools.

### **8. Broad Based Environmental Movements: A positive sign of environmental education in Bangladesh**

Bangladesh is victim of one of the world's worst environmental catastrophes. Poor rural people are dying of arsenic contamination in Bangladesh's villages, and poor urban dwellers are exposed to heavily polluted air. Social justice demands protection of environment. Thus, for both economic growth and social justice, Bangladesh has to make environmental protection a high priority. However, it is clear from the continued environmental deterioration that these efforts are not proving adequate for the environmental challenge that Bangladesh faces. It is necessary to raise the efforts to an entirely different level. It is a mistake to think that the government will do all that is necessary to protect Bangladesh's environment. If that were the case, then environmental degradation would not have proceeded to this extent in the first place. Solution to environmental problems does not always require costly projects, which in Bangladesh tend to be donor-financed. Sometimes correct policies with proper implementation are what are needed. However, such policies will not always be adopted and properly implemented unless there is a social pressure to do so. It befalls upon Bangladesh's civil society (intelligentsia) to provide the leadership in generating such social awareness and pressure. The experience of the developed countries also indicates this conclusion. The improvements of environmental quality in the developed countries did not come about automatically. Numerous citizens' groups had to work hard to bring about these changes. It is because of their persistent work that a strong social pressure now exists in the developed countries for protection of environment. Both major political parties of the USA now take environmental issues seriously. In Germany pro-environment Green Party is now a coalition partner of the government. Environment is a high priority in other developed countries too.

A similar process has to unfold in Bangladesh. Environment has to enter the agenda of all sections of Bangladesh's civil society. The professional and trade organisations have to take up the environment issue. Literary and cultural organisations which represent the most sensitive sections of the society, have to get involved with environment. Educational institutions and students have to assume a leading role. Women and children's organisations have to play a special role. Journalists and other members of the media can be very effective in spreading awareness and mobilising citizen's action about environmental issues. Such a process will ultimately lead the Bangladeshi political parties also to become serious about environment. It is heartening to note that various sections of Bangladesh's civil society are indeed becoming more active about environment. The media, particularly the print media is giving more exposure to environmental problems. Many civic voluntary organisations are emerging with environmental protection as the goal. There are many on going movements focused on particular environmental goals, such as protection of Dhaka's greenery and lakes. There are environmental movements outside of Dhaka, in various districts. Some of these movements even proved successful. For example, responding to citizens' urging, the government has recently stopped the building construction in front of Parliament place. There are successes at district level too. These are encouraging signs.

Civil society of Bangladesh is no longer confined within the geographical boundaries of the country. A large and increasing number of Bangladeshis now live and work overseas. Revolutions in communications, particularly the advent of the Internet has made it possible for non-resident Bangladeshis (NRB) to participate actively in social and political life in Bangladesh, even to extending their cooperation to resident Bangladeshis (RB) in solving environmental problems. The Bangladesh Environment Network (BEN) was established with precisely this purpose. Through BEN environmentally conscious NRBs and local environmentalists work together in common cause against environmental degradation in Bangladesh.. This network has demonstrated basic principles of unity, self-reliance, volunteer spirit, and subordination of partisan interests to broader national interests. As these are precisely the qualities that Bangladeshi people want to see in their community organisations, this nascent environmental movement has a significance that goes beyond environmental concerns, and may in fact conducive of a process of social regeneration. Some of the notable environmental improvements that have been achieved since the inception BEN and suggestions for a National agenda for sustainable futures are shown below:

a) *Eradication of the most polluting vehicles from Dhaka:*

Air quality in Dhaka City has been somewhat improved by taking drastic measures. The air quality of Dhaka city steadily deteriorated up to December 2002, a major cause being three-wheeled auto rickshaws powered by two stroke engines. After widespread community pressure, the Bangladesh government ordered auto rickshaws be

withdrawn from Dhaka roads. Since then, the air quality in Dhaka city has improved by as much as 25% at least partly due to the eviction of the polluting vehicles from the city<sup>5</sup> (Islam, 2003). This is no small gain, but much more needs to be done before Dhaka can finally lose the distinction of being one of the most polluted cities of the world (Salequzzaman *et al*, 2000).

b) *Save the Buriganga movement:*

The Buriganga river flows through the heart of Dhaka, the capital city of Bangladesh. This river, historically considered the lifeline of the capital city, now faces the danger of a premature death owing to repeated failure to conserve and protect the river since the 1970s. Since time immemorial, the lower part of Dhaka city has flooded during the monsoon season. To protect Dhaka's rapidly growing population and increasingly valuable infrastructure, the Dhaka-Narayanganj-Demra (DND) Embankment was constructed in 1988, providing a greater level of protection for Dhaka City from floodwaters from the Buriganga River. Since construction of embankment, the Buriganga has become encroached upon, not only by landless squatters as before, but by investors who construct major buildings. Although encroachment process has occurred since 1950s, it has accelerated under the physical protection afforded by the embankment. In this way, the entire riparian section of the Buriganga River in Dhaka City has fallen under the control of well connected and wealthy people. As a consequence, a section of the Buriganga River is alarmingly narrower by the encroachment process. In addition to encroachment, the Buriganga River has received untreated solid waste, industrial and municipal untreated waste-water and other contaminants for generations, but this too has exceeded the assimilative capacity of the river system. In this situation, members of the community and non-resident Bangladeshis, including academics, journalists, scientists, teachers, and some NGOs are now organising a mass movement to save the Buriganga from these multiple threats. This community of concern made repeated pleas to the government to save the Buriganga, but the authority did not take effective action against encroachment and pollution until 2000. Eventually, the resident and non-resident Bangladeshis formed a committee under the name 'Save the Buriganga Movement'. Members of Save the Buriganga Movement have conducted mass-scale rallies and processions to call for removal of encroaching structures and to stop the pollution. Finally the government agreed to take the effective action against the encroachment and pollution in the beginning of 2000. Eviction actions are in progress at the time of writing (Alam, 2003).

c) *Actions to protect heritage parkland in Dhaka:*

Osmany Uddyan, the vast green park in front of the Bangladesh Government Secretariat was planned as a national 'Eco-Park' with open space for the recreation of city dwellers. In the last decade, it has been steadily encroached upon and used for commercial purposes. Not only hawkers, but also public transports such as minibuses handcart operators have occupied a section of the north-eastern side of the park. Similar encroachment has occurred in many other sites of significant natural and cultural/historical heritage in Bangladesh. As a result of increasing environmental literacy, and capacity of communities to organise, pressure of mass movements has resulted in the government taking steps including halting construction of a house for the Speaker of the National Assembly in open space in front of Bangladesh Parliament.

Upon a writ filed jointly by the Bangladesh Poribesh Andolon (Bangladesh Environmental Movement) group and the Institute of Architects, Bangladesh, The High Court issued an interim stay order was issued. The Plaintiffs allege the construction project not only violates the 1973 master plan of famous architect Louis Kahn but breaches the Building Construction Act 1952, the Town Improvement Act 1953, and the Lowland and Open Space Protection Act, 2000. The order asked the government to make sure no further unnecessary and thoughtless construction beyond the 1973 master plan takes place in the Parliament Building Complex. The order also added, the government should explain why appropriate legal measures should not be adopted to prevent encroachment on the complex. Finally, the bench asked question to the government, "Why the complex should not be declared a national heritage site and why it should not be directed to apply to the UNESCO to declare the complex a World Heritage Site".

d) *Ban on indiscriminate use of polythene bags:*

The use of plastic bags is relatively a new phenomenon in Bangladesh. They only began to appear in the mid 1980s. Within a few years, they became popular largely because they were cheap and very practical. Some people invested in polythene bag manufacturing units. The low-cost investment and the huge profits (such as almost six times the production cost) resulted in massive growth of the industry within a few years. The number of factories rose from 16 in 1984 to more than 300 in 1990<sup>6</sup>. It has been calculated that about 9.3 million bags were thrown away in Dhaka City each day during 1999-2000. As Bangladesh has a serious problem with waste collection and

<sup>5</sup> Editorial, The Independent – A Daily Newspaper of Bangladesh, 03 May 2003.

<sup>6</sup> For details, please see <http://www.guardian.co.uk/Archive/Article/0,4273,4382070,00.html> (accessed on 23 December 2002).

management, plastic waste tends to be disposed of in the streets due to lack of environmental awareness and education. According to Salequzzaman *et.al.* (2000), only 10-15% of the daily wastes are put in rubbish collection bins, the remainder ending up in drains, sewerage channels and open spaces. Polythene bags cause 80% of blocked drains in Dhaka<sup>7</sup>. In most Bangladesh municipalities and urban cities the majority of drains are essentially open sewers, so they are easily littered and blocked with the non-degradable waste like polythene bags. In a flood-prone country like Bangladesh, blocking of drains by polythene bags severely exacerbates many problems, such as sewer water being forced into drinking water supplies during floods. This in turn leads to outbreaks of diarrhoeal and other water-borne diseases. Recognising these problems, environmental groups of Bangladesh waged long-term environmental campaigns against the use of polythene bags since 1998. The Bangladesh government finally banned production and use of polythene bags on March 1<sup>st</sup> 2002.

These four examples of community mobilisation for public environmental benefit demonstrate the capacity of the community to recognise environmental issues and commit time and resources to work for change. They also suggest that from grassroots communities to political elites, environmental awareness has entered the national conscience, but there is need for a greater level of environmental knowledge and skills for ecologically sustainable development. In the early post-independence phase of Bangladesh history, there was a major push to develop teachers and agricultural professionals who could contribute to national development. In more recent years the priority has widened to include engineering and technology as the goals moved beyond food autarchy to industrial competitiveness. The community is now aware that economic development cannot come at the expense of environmental sustainability, but there is an urgent need for expertise and knowledge to wrestle with the complex environmental issues facing the nation

## 9. Professional Environmental Expertise in Bangladesh

In the previous sections we described how the environment of Bangladesh is under great stress, yet there, as in most of the world, the fate of the environment has come to the attention of the community, who have shown they are prepared to make a stand on behalf of the environment. We also discussed how environmental education is already taking place from non-formal for a through to postgraduate degrees, and how this needs to be strengthened. Individuals, businesses and government have become aware to some degree of the need to address habitat destruction, species extinction, soil, air and water pollution, and urban sprawl.

However, human life Bangladesh to become ecologically sustainable, the various sectors of the economy need to further integrate environmental considerations into their decision-making and activities. The tools of environmental sciences are assuming increasing importance in industry, Environmental Scientists are deployed in a wide range of activities: cost-benefit analysis, environmental impact assessment, risk management, eco-auditing, life-cycle analysis and trouble shooting new regulations, especially regulations relating to the use of new products or technology and the responsibility for minimising and managing waste. Professional Environmental Scientists are finding roles in business as managers, public relation specialists, ethical investment analysts, environmental assessors and others (Salequzzaman, 2002).

Environmental pollution control, environmental protection, environmental management and ecological balance are relatively new concepts in Bangladesh. The Government of Bangladesh adopted legislation for Environmental Policy, 1992, Environmental Conservation Act, 1995, Environmental Conservation Rules, 1997 and Environmental Court, 2000. This legislation give some clue to the importance and scope of Environmental Science in its implementing. Considerable resources, including expertise will be required to implement these Acts. The Department of Environment (DOE) is the national government agency responsible for environmental planning, management and monitoring. It also works as the technical arm of the Ministry of Environment and Forests. The current human resources of the Department of the Environment (DOE), the lead agency, are not only very limited, but also concentrated in its Dhaka Headquarters and four divisional offices only. With a short history of university courses in environmental science, not all DOE staff have adequate environmental education. There is a need for ongoing professional development.

However, implementation of economic policies is not the responsibility of the DOE alone. For national development to be environmentally sustainable, integration of policy into all government programs business strategies of the private sector is essential. This suggests a need for environmental expertise in various ministries, government departments, municipal and city corporations, NGOs, private business and other public and private

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<sup>7</sup> For details, please see URL: <http://www.ealingfoe.org.uk/grnspceitms/BagBanNotBin.htm> (accessed on 21 December 2002).

organisations. In addition, experience suggests that within few years the DOE will need expand to the District levels and it is hoped that within coming 10 years this expansion will reach to the Thana/Upazila levels of administration.

This raises two issues, the first being investment in environmental education. In order to supply the number and the calibre of candidates to meet projected need for professionals with skills in environmental management, the quality and capacity of existing education institutions needs to be improved. Secondly, to enable Government Departments to appoint staff with adequate training in environmental sciences, they need to be able to select recruits with adequate training and/or experience. Under the current system of recruitment by the Public Service Commission (PSC) in Bangladesh there seems to be a *prima facie* case for the PSC to recognise Environmental Officers as a Technical Cadre in the PSC. Like other technical Cadres in PSC, graduates with relevant degrees such as Environmental Science, Environmental Studies, Environmental Management, or Environmental Engineering could be included in the proposed Environmental Cadre. These recruits should be deployed not only in the Department of the Environment, but also in other government institutions where environmental sustainability issues need to be addressed

Bangladesh has a number of state-sponsored research organisations such as the Bangladesh Council for Scientific and Industrial Research (BCSIR), Bangladesh Agricultural Research Council. In addition, other sectoral research organisations deal with specific issues like rice, cotton, jute, tobacco, forest resources, river morphology etc. These institutions need to address the environmental issues arising in their field of operation, developing sustainable development strategies, rather than leaving these matters to the DOE as a kind of environmental police force. The Government of Bangladesh has already mandated and adapted the requirements for Environmental Impact Assessment (EIA) for each industry or new project approved. Recruitment of qualified cadres for these positions and ongoing education and training programs for redeployed staff will ensure that these requirements are not simply window-dressing, but contribute to the sustainability of research and development. In this section, we have emphasised the need to increase the level of environmental expertise in business and industry, government and civil society, and at the same time to strategically build expertise through strengthening those institutions providing environmental education.

## 10. Recommendations

Although Bangladesh is still wrestling with problems of illiteracy and numeracy for masses of its population, it cannot afford to neglect the need for environmental education and development of skilled environmental management. Although general education, even functional literacy may increase environmental awareness, specific policies for Environmental Education, including a delivery program that touches the school curriculum at all levels, as well as mobilising resources in non-formal and informal education programs is overdue. As a major training resource, a leading sector in fostering in research to understand the environment, and a catalyst for new ways of thinking about sustainable development and the ecology of the modern State of Bangladesh universities have a key role to play. Although some universities offer specialised environmental education courses at undergraduate levels, many are lacking in resources (of equipment, teaching staff, library and Internet communications). Government environmental policy has addressed the environmental challenges facing the nation, but education and sectoral policies and plans do not give sufficient weight to problems of ecological sustainability. The following recommendations seek to address this gap:

- i. The Government of Bangladesh should develop a strategic approach to Environmental Education and establish a policy framework to support requirements for sustainable development.
- ii. Effective policies will enable delivery of environmental education that is tailored to the educational level and the life context (eg.urban/rural)of participants, local issues and integrates traditional wisdom. It will enable participants to 'learn by doing' in their own environment.
- iii. Existing environmental education curricula for primary and secondary schools needs to be upgraded to clearly indicate the priority issues.
- iv. In addition to integration of environmental education into the compulsory school curriculum, lifelong environmental education needs to be encouraged to enable government institutions and the private sector to constantly update knowledge and skills.
- v. All sectoral policies, programs and projects should include environmental education as an integral component.
- vi. Integrate environmental concerns into existing government training programs.
- vii. To facilitate partnership with NGOs, the government needs to simplify and minimise rules and regulations and establish transparent procedures.
- viii. Environmental Education programs should be designed to facilitate the participation of competent local NGOs and CBOs (community-based organisations) and not just be biased towards major players.

- ix. Existing environmental education programs in universities, such as Environmental Science of Khulna University need better resourcing, especially with practical equipment, teaching staff and Internet facilities.
- x. Personnel with expertise in environment should be deployed in monitoring and evaluation processes of government agencies (eg., Ministries of Planning, Environment, Education, Industries, etc.) to ensure transparency and accountability with respect to environmental performance.
- xi. The government should establish a new Environmental Cadre in the Public Service Commission (PSC) in Bangladesh. Like other technical Cadres, it would recruit appropriately qualified graduates directly into the PSC, where they should be deployed across agencies.
- xii. DOE needs to extend its services to all existing Districts and within the next 10 years to the Thana/Upazila level to ensure the environmental justice of the local community.

## 11. Conclusion

Bangladesh presents unique challenges to the search for ecologically sustainable development with a very high population density, a still high population growth rate and limited natural resources. Issues of development and conservation take an added significance for this country. A significant program of environmental education and development of local expertise is needed for massive changes in behaviour with respect to the environment.

The formal education system provides a ready framework for reaching a large part of the existing population and can help make future generations conscious of the importance of environmental conservation. Children are receptive and curious, making them appealing to motivate. Practical approaches that involve the students in solving local environmental problems have more influence, develop skills and give reinforcement to the idea that people can make a difference.

Most Asian countries have made efforts to introduce environmental education into primary, secondary and tertiary education with varying success due to lack of appropriate Environmental Education policies, inadequate equipment facilities and low under staff teaching systems. Pedagogical approaches have included making separate environmental studies and management courses, incorporating environmental education into existing curricula at primary and secondary levels and using a combination of both approaches.

Primary school education is the main focus of attention because of the inherent flexibility in curricula enabling infusion of environment into existing subjects and the higher level of enrolments in primary schools compared to secondary school. In Bangladesh, NGOs and universities with environmental education departments (Environmental Science, Environmental Studies, Environmental Management and Environmental Engineering) play a significant role in teacher training and providing materials for formal and non-formal education. Prerequisites for the successful introduction of Environmental Education in schools are: clear and well-communicated policy for environmental education; the will and resources to implement it; curricula revision; proper preparation of teachers and provision of in-service training; provision of relevant materials in local languages; networks for implementing Environmental Education strategies in Formal Education; teacher expertise exchange; and assessment and incentives for teachers.

It is clear that graduates from the environmental disciplines should have a significant role the environmentally sustainable development of Bangladesh. Therefore the Government of Bangladesh, national and international NGOs and other organisations should take the initiative to involve environmental studies graduates in the challenges of sustainable national development as well as global sustainability.

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