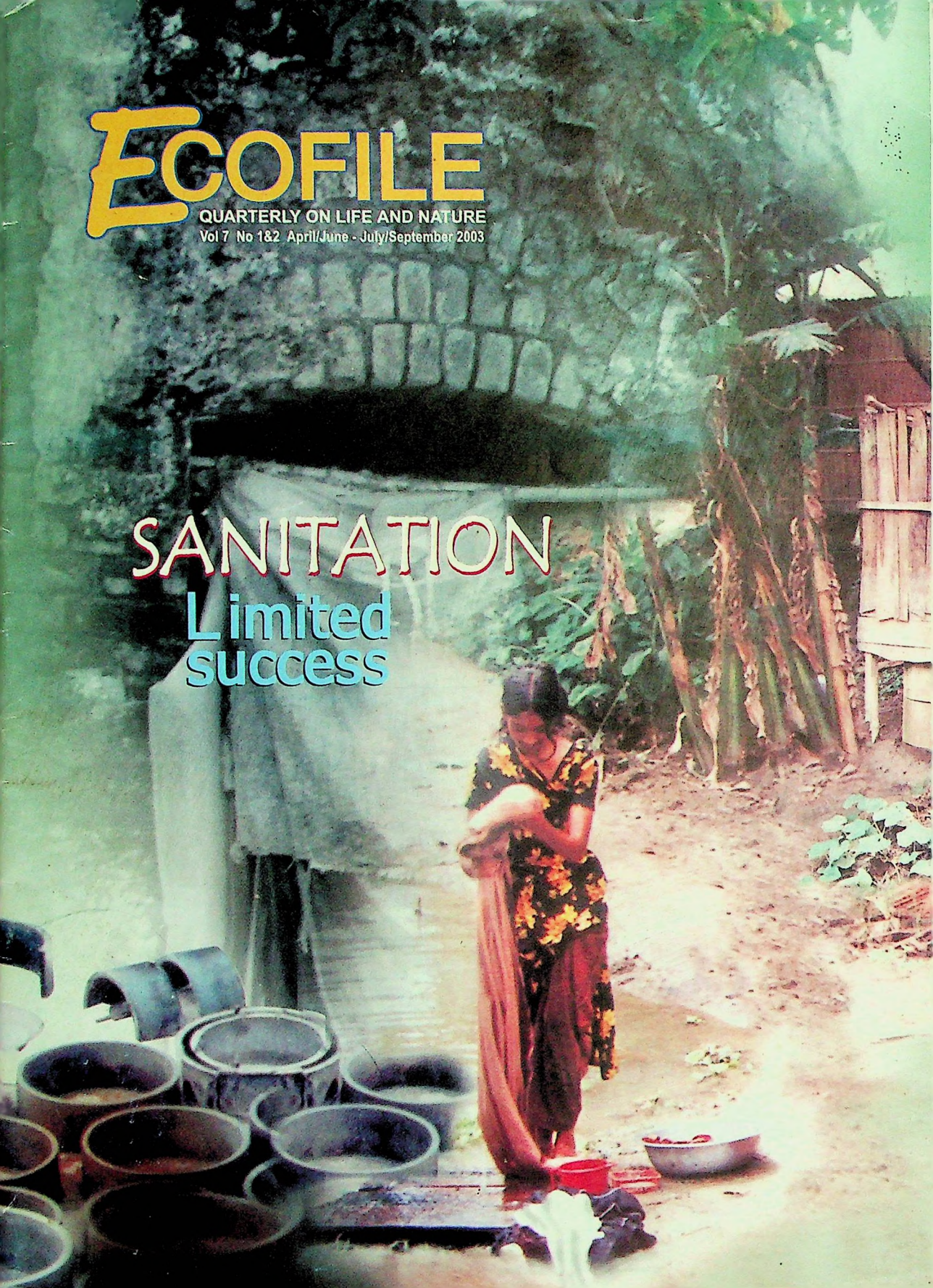
ECOFILE
QUARTERLY ON LIFE AND NATURE
Vol 7 No 1&2 April/June - July/September 2003



SANITATION
Limited success

The other war

Natural disasters wreaking widespread havoc

▶ In 2001, of all disasters, 54.6 per cent were natural and the rest were technological. Transport accidents accounted for 30.7 per cent of the disasters

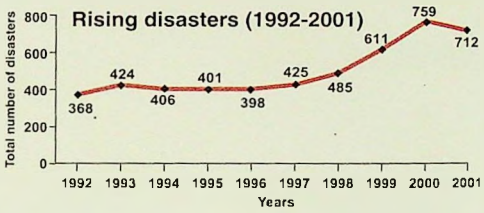
▶ The number of people killed or affected by natural disasters is on the rise. Disaster management is still not included in the mainstream development plans. But better preparedness in Bangladesh has reduced the number of cyclone-affected people since the 1970s

▶ Poor suffer the most as they live in disaster-prone areas

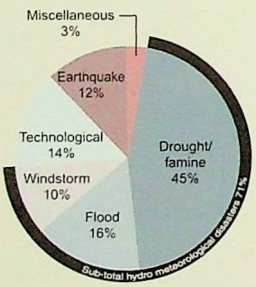
▶ Worldwide, 22.8 million people were internally displaced in 2001 because of conflicts and disasters. 43.7 per cent of them were in Africa.

▶ Geopolitical conflicts take away the importance of sustained planning in risk reduction from disasters

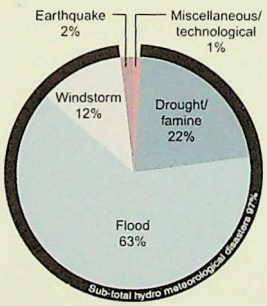
▶ Hydrogeological disasters take maximum toll and cause maximum financial damage. Though the number of episodes went down between 2000 and 2001, deaths from them doubled. The casualty list became much longer due to the Gujarat earthquake



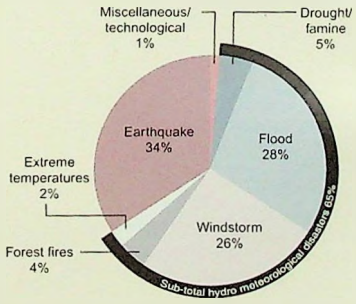
Death from disasters (1992-2001)



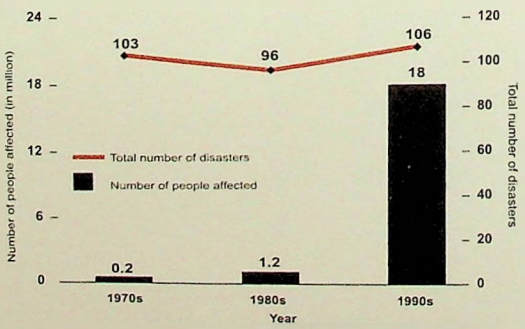
People affected by disasters (1992-2001)



Estimated damage by disasters (1992-2001)



Disasters and people affected in Oceania



Source: World Disasters Report, 2002, International Federation of Red Cross and Red Crescent Societies

▶ A marginal rise in episodes between 1970s and 1990s has increased the number of people affected exponentially. This, in spite of more advanced technology in hand to predict climatic changes. The trend is attributed to erratic climatic behaviour and people's non-preparedness

▶ It is clear that all future development plans must include risk reduction factors. Disasters in coastal areas only indicate a bleak future

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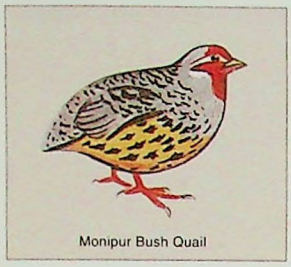
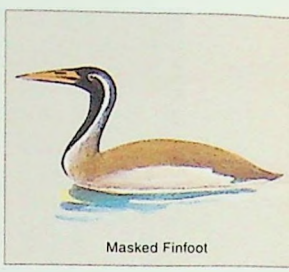

Monipur Bush Quail


Swamp Partridge


Black Partridge


Masked Finfoot

Let's save the birds

There are many species of birds which are gradually becoming extinct. The very common birds like Dove, Cotton–Teal, Kingfisher and Crow–Pheasant cannot be seen easily. If it goes like this, our next generation will not see or able to recognize many birds. A question to every conscious person of the society– can't we help the birds? Let us come together and save these birds.

K. M. Rahinoor Rahman
Member, Sundarban Watch Group
Shyamnagar, Satkhira

Unscrupulous practices around Kaptai Lake

Rangamati, one of the districts in Bangladesh is a land of beauty. It is surrounded by many hills. It looks like a kingdom of heaven. The Kaptai Lake of Rangamati is more beautiful. Many people of Rangamati are dependent on this lake for their livelihood. But now the lake is under a threatening condition. The water of the lake is getting polluted with the garbage thrown by people. One side of the lake is being filled up for making truck terminals. The surrounding places of the lake are getting forcibly-occupied for construction of hotels, houses and even for big shopping plazas. Some selfseekers are responsible for these conditions. The Kaptai Lake would not exist any more if we let it go like this. Can't we stand against such unscrupulous acts ? Each and every individual in Rangamati should come forward and protest to save this picturesque lake.

Saikat Ranjan Chowdhuri
Global Village, Rangamati

The tale of Sundarban

Sundarban is much precious for Bangladesh. The valuable trees are constantly getting cut down in the dark of the nights. Since the huge trees are being fell down, many species of birds and animals cannot be seen any more.

Bidyut Baran Mandol
Mongla, Bagerhat

Keep Ramna Park clean

Many people come to Ramna Park in Dhaka, riding their cycles and motor-cycles. People throw away empty food packets and other garbage. It pollutes the environment of the park. We all have to get cautious and careful to keep the park clean and beautiful.

Kashfia Safi
Dhaka

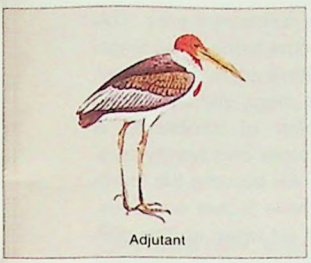
Why link rivers at all?

[We have picked up this letter for our readers from ***Down to Earth****, a science and environment fortnightly published from New Delhi, India. The letter highlights the loopholes in the river linking scheme and argues that it will eventually pollute the rivers.]*

Interlinking of river basins, the brainchild of prime minister Atal Behari Vajpayee will be detrimental for the national integration of our country. The process of linking rivers will delink people of the states covered in the scheme. If sharing the waters of one river–the Cauvery–can raise such a huge conflict, imagine the consequences that will arise while linking several river basins. Riots will become the order of the day.

People habitually misuse water and electricity publicly. As soon as water starts flowing in the link canals, people will begin drawing from it illegally. They will hook the power lines to run pumps, puncture the canal and put pipes below or breach the canals recklessly. Equitable distribution will be hampered and the regions will not be in position to get their allotted quota.

Linking of river basins is not an easy proposition. It is a large complex programme of water management. It involves technological, environmental and legal issues. River water sharing, therefore, has to be monitored by the Union government with the help of the army. But the vastness of the canals will make it practically impossible to monitor


Adjutant


Great Blue Kingfisher


Grey Nightjar


Purple wood Pigeon

the passage of water.

The economics of river linking also is enormous. It would involve roughly around US $104 million to US $125 million. We do not have resources to this extent. Banks will hesitate to advance financial help as recovery of loans from the beneficiaries will be difficult.

The routing of the canals will also eventually run into rough weather, as there will be no consensus about the course of the canals among the states and people. The other contention is pollution of the rivers. Ganga is one of the most polluted rivers in the world. Interlinking all the rivers will transport polluted water from the Ganga to other moderately clean rivers.


Alok

In the present context, considering all the loopholes in the river linking scheme, it is impossible to come to a settlement on sharing of water. The project will unnecessarily be delayed. Instead if we opt for watershed development projects, we can effectively harvest rain water. India receives moderate to good rains (about 800 to 1000 millimetre every year). If we undertake watershed development instead of linking rivers, we can comfortably survive with a minimum of one crop and adequate drinking water in the lean periods also.

Watershed development has the following advantages:

- For watershed works, the cost per hectare (ha) of irrigated land is around Rs. 10,000 as against Rs. 75,000 per ha in the river linking scheme.
- While watershed schemes can be completed in five years, linking of rivers will take up to 15-20 years to complete.
- Millions of labourers in India will get employment in watershed projects for the next five to six years. But as canal work involves heavy machinery or equipment, it is not a labour intensive job.

We have to, therefore, give up the false notion of linking rivers and save money and time by adopting the simple, and most effective, method of watershed development.

Mallikarjun Shetty
Karnataka, India

Please let us breath fresh air !

Dhaka is the capital of Bangladesh, where people from other countries visit for many reasons all the year round. And here, we the people of Bangladesh, stay as rightful citizens. Moreover, million others keep visting this metropolitan city from various parts of the country. But, the state of the environment of this city is drastically going down. Along with other pollutions, air pollution is still there. The lawmakers found only the two wheelers and the old vehicles as the major cause in creating pollution and hence banned them. No doubt, it was a great effort and definitely it had brought down the pollution, but is it enough? What about the other sources which cause air pollution? As a matter of fact the Dhaka Municipal Corporation do not pay any heed to citizens' repeated appeal. Everyone face these problems everyday and that causes various diseases. Just to mention one of them is the noxious condition of the ponds located in the city. The one situated just behind the Hotel Pan Pacific Sonargaon. While crossing that area the stinking smell comes out from stagnant water. On one edge, there are a cluster of poor people staying in a make shift arrangement on stilt houses. They relieve themselves on the pond water. The wastes gradually get piled up and decompose there. What is more alarming is that the dwellers take their bath, clean utensils, etc. in that water. The water has turned into jet black and is polluting the entire atmosphere. There are a lot more examples of this kind in and around the Dhaka city. Well, isn't it the administration who will look into these affairs? It's about time they wake up and save Dhaka from becoming uninhabitable.

Saiful Islam
Lalbagh, Dhaka

It has become very difficult to move around Dhaka comfortably. Transportation system is under a great threat. Traffic jams are a common feature. Intoxicating smoke from the year old vehicles make the air polluted. The air pollution has come down a bit after withdrawing the two stroke baby taxis from the Dhaka roads. But the traffic situation has again deteriorated due to the unplanned import of taxis and the old buses. The digging of roads and thorough fares is a continuous practice. Due to the faulty traffic management system, the traffic jams are increasing. The endangered environment of Dhaka is due to these causes. It is very difficult for our children to survive in such a condition.

Every year 15,000 people die in Dhaka due to air pollution. The majority of them are children. Thousaunds of children are the victims of various respiratory oriented diseases. It is just impossible to accept this situation.

It is learnt from a recent research work that along with the old vehicles, the commercial vehicles which are being imported, are mostly polluting Dhaka's environment. The intoxicating fume from the taxi cabs and human haulers are making the atmosphere unlivable. It has been found that the percentage of carbon monoxide contain in most of these new cars is more then 8 per cent, while the level of acceptance is 4-5 per cent. The level of hydro-carbon in the atmosphere is 800 PPM, whereas it is supposed to be at the level of 180 PPM. The research, undertaken by the air quality management, Department of Environment, may be a matter of great concern to the citizens. It is advisable not to issue license to the organizations that import old model vehicles and endanger the life of the city dwellers. The same study reveals that out of 31 diesel vehicles tested; only five had their pollution level lower than that of the level permitted by the government, (75 Hz smoke unit). The levels of pollution of the other vehicles were alarmingly high. The rule, which goes globally, is to fix a built-in-converter balancing the engine. There is also a ruling in this regard passed by the High Court. Practically, no one abides by the rule and in the process air pollution is increasing. To control the situation, a well thought out import policy has to be adopted. A committee should be formed with the representatives from the transport ministry, environment ministry, the importers of old and new vehicles and the environmentalists. This committee will formulate a common agreeable guideline to be followed. According to this guideline a law has to be passed. This law will stop importing vehicles that may pollute the environment.

There must be some sort of restriction for those importing vehicles for private and personal use. The traffic congestion will be a common and regular feature for such a huge number of cars plying in the limited number of roads in Dhaka city. It is noticed that a single family owns 3-4 private cars. To restrain the tendency from purchasing more than one car, it is suggested to increase the duty and road taxes.

Three small cars occupy an area equal to a bus. Whereas the number of passengers a bus can carry is ten times more than that of three small cars. There should be more buses plying on the road. If there are comfortable and luxurious buses, then people will try for those instead of their own cars. Extra levy should be charged to the vehicles entering a busy commerial area. This may help keep some traffic away. Single layer transportation system is, however, of no worth in a mega city like Dhaka where the number of inhabitants is more than one crore and twenty lacs. By 2015, Dhaka will become the fourth largest city. We have to ask ourselves, why have we not yet taken up any plan to introduce underground or overhead mono railway system, or do not have any design to construct umpteen numbers of flyovers? Cities like Kolkata and Delhi already have underground railway system. People enjoy a more or less hassle free city life and scores of flyovers are coming up fast in these cities. There are many other examples to look at.

Concurrently, we must ensure that more and more vehicles run on compressed natural gas. For this we need adequate budgetary sanction and infrastructure. We also have to utilize LPG and Ithanol. We have to import the technology using solar energy to drive vehicles. In brief, our planners have to take the initiative of adopting modern technical know-how and well-catered mass transportation system to ease us from the escalating problem. This ought to be done immediately. There is no time to question any more since we are running out of time.

Sometime back, in a seminar entitled 'Safe Water and Sanitation', the minister for local government, co-operative and rural development Mr Abdul Mannan Bhuiyan had said, "so far nothing significant has been achieved regarding sewerage and sanitation, Though we claim that 53% of our population has been brought under the fold and they enjoy the facilities, but like most of you, I also doubt how many of them actually use proper hygienic sanitation system. More gruesome is the scenario existing in the rural areas".

Those who are conversant with the sanitation and sewerage system of the country will definitely agree with the comment made by the minister. In Bangladesh the usage of water sealed latrine, both in urban and rural households, are 43% and 10% respectively. If we include the ordinary pit latrine the percentage will increase to 61 in the urban areas and 41 in the rural areas. Altogether the average is 43%. Another worrying part is that only 14% of the households in the slum areas of the metropolitan cities use sanitary latrine.

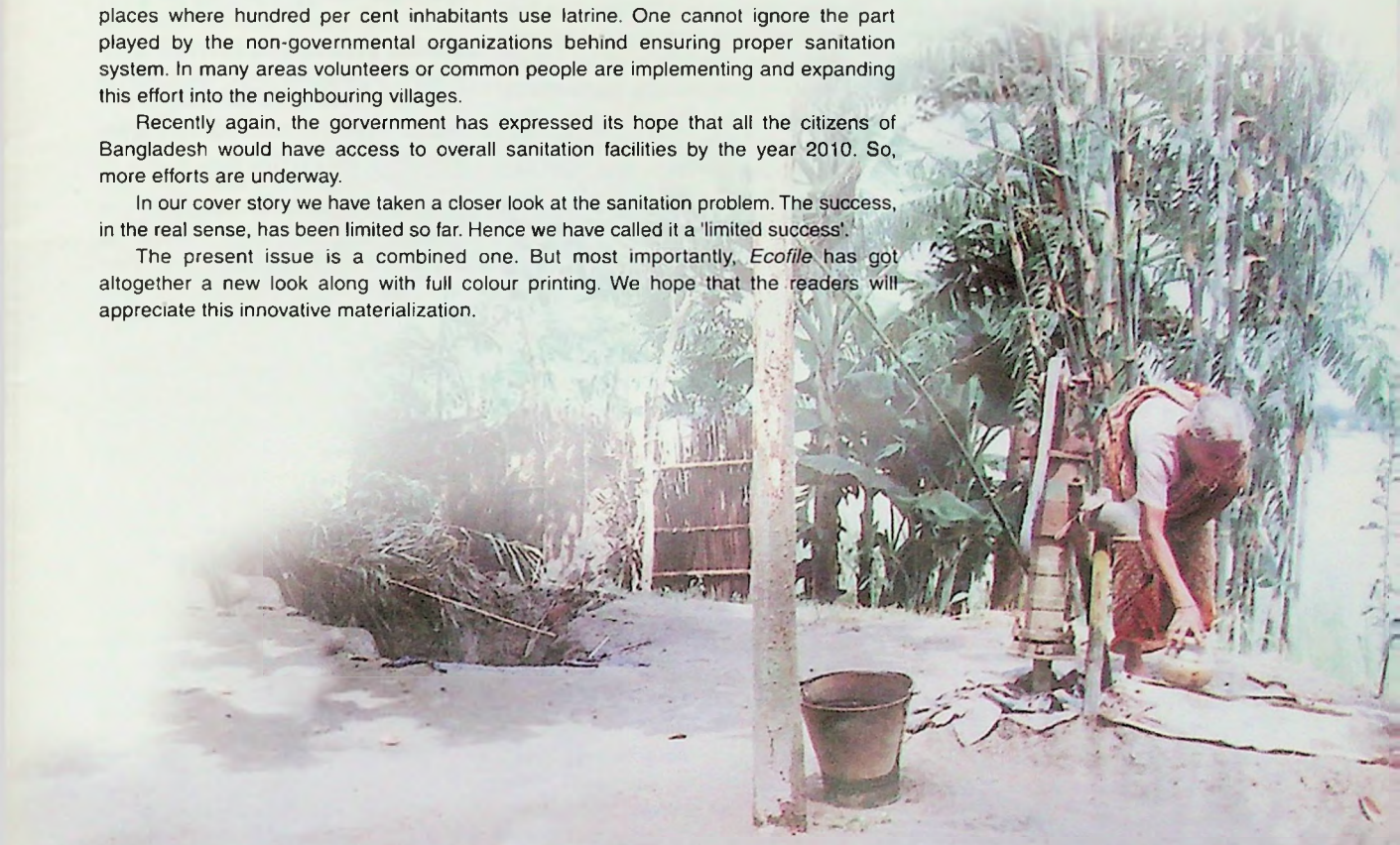
The sanitation problem has an affect on the expenditure in the health sector. Due to improper sanitation, various diseases are caused. Hence a lot of money has to be spent. A research article shows that the expenditure against medicine, doctors' fee and the transportation expenses sums up to taka five hundred crores per annum. Only hygienic sanitation and other related hygienic habits can reduce this cost.

There are also positive sides. Out of the above covered areas, there are several places where hundred per cent inhabitants use latrine. One cannot ignore the part played by the non-governmental organizations behind ensuring proper sanitation system. In many areas volunteers or common people are implementing and expanding this effort into the neighbouring villages.

Recently again, the gorvernment has expressed its hope that all the citizens of Bangladesh would have access to overall sanitation facilities by the year 2010. So, more efforts are underway.

In our cover story we have taken a closer look at the sanitation problem. The success, in the real sense, has been limited so far. Hence we have called it a 'limited success'.

The present issue is a combined one. But most importantly, *Ecofile* has got altogether a new look along with full colour printing. We hope that the readers will appreciate this innovative materialization.



Dew-drops – how better wash away world's dust

The Rivers in textbook

As we know, the rivers and Bangladesh are very much interlinked with each other. We cannot imagine Bangladesh without rivers. It's not only that they are beautiful, they are also part of our existence. We have to know about them and understand their overall nature. Therefore, we need to include a substantial chapter on our river system in the school textbooks, rather than only having lectures and workshops.

We get to know a bit about rivers from the books of standard 3 to 6. The composition titled "The Land of Six Seasons" from My Book Part 3, describes the characteristics of the seasons and various conditions of rivers and streams during summer and monsoon. All the rivers and streams get dry during the summer and are filled with water again in monsoon. The chapter "Beautiful Bangladesh" in My Book Part 4 gives a beautiful description of the rivers of Bangladesh— "Alongside the villages outlined with the shadows of thick green foliage runs a small rivulet. The water level of the rivulet falls during summer time. The white sand glisters through the clear water. Little boys and girls use parts of their loin-cloths to trap the fishes. The villagers take bath in the water and the women carry pitchers to fetch water from the riverside." The chapter titled "My Homeland" in My Book Part 5 depicts the harmonious images of Bangladesh" "So many rivers flow through Bangladesh. The people and the rivers have a great kinship between them. The Padma, the Meghna, the Jamuna and the Brahmaputra are the main rivers of this country. The streams like the Tista, the Karatoa, the Ichhamati, the Gadai, the Mahananda, the Dhaleshwari, the Shitalaksha, the Surma, the Karnaphuli, the Sangu and the Matamuhuri are also there. Various sorts of boats sail in these rivers and streams. The songs like Bhatiali and Sari remind us of the lasting bond that is shared by our rivers and culture."

The chapter named "Our Country" in the third part of the book "Introduction to Social Environment" describes Bangladesh as the mother of rivers. It says— "Bangladesh is the land of rivers and streams. There are many large rivers as well as small ones. The large rivers are the Padma, the Meghna, the Jamuna and the Brahmaputra. Many of the small rivers join the larger ones. Usually the rivers originate from the mountains. The movements of the rivers are marked on the map and a brief description is given. It also describes how a river erodes and builds up its courses once again. It says– "River flows in a zigzag manner, and the sharp turns cause the impact of the forces of water to create erosion. Also during monsoon the force and the velocity of the current increases and the heavy pressure of water creates erosion. Sometimes it affects the villages situated on the river banks and many villages get flooded and ruined by the rivers. While erosion takes place on one side of the river, it creates land on the other side."

We get a brief description of the country's main rivers, branches and tributaries in the essay titled "The Geographical Condition of Bangladesh". As the main rivers like the Padma, Meghna, Jamuna and Brahmaputra flow towards the delta, they play a major role in forming the land. The fertile plainlands are created from the silts deposited by the water of these rivers. The geographical conditions and the characteristics of the rivers are also described emphatically.

The chapter six on "The National Wealth" states the importance of the water. The piece on "Private and the National Resource" in Introduction to Environment (Standard 5) describes how are we benefited from the water of the rivers, and streams. Therefore, we must be cautious about not polluting these water sources.

The composition "The National Resources of Bangladesh" discusses about the water resources as well as the agriculture and forestry. It says– "Water is one of the major resources of Bangladesh. There are a large number of rivers, streams, lakes and waterbodies in Bangladesh. The Bay of Bengal, situated in the south of Bangladesh, is also an important resource.

The Bangla textbook for the student of sixth standard is "Charupath". The prose piece "My favourite Bangladesh" in the beginning of the book gives a brief introduction to Bangladesh. As a river based country the rivers of Bangladesh have been described – "Bangladesh is a country of rivers. Many rivers flow through this land. The Padma, the Meghna, the Jamuna and the Brahmaputra are the main rivers. Then there are streams and brooklets. They have got beautiful and poetic names like Karnaphuli, Rupsa, Surama, Mahananda, Dhansiri, Chitra and so forth.

The beauty of the rivers has influenced our culture and heritage and often gets mentioned in the poems. One such poem is "I will come again" by poet Jibanananda Das –

"I will come again
With languishing passion for the brooks,
greenswards and meadows of Bengal
On virescent wetlands
washed by broken water of *Jalangi*"

We also get the rivers mentioned in the poems "Kapatakhsha Nad" by Michael Madhusudan Datta and "Titas" by Al Mahmood.

In the social science book of standard seven, it is written— "All the ancient civilizations grew up centreing the river basins. Since Bangladesh is a riverine country, we notice a great influence of the rivers on it."

The geography book for the secondary education describes the sources of the main rivers of Bangladesh, their course and their branches and tributaries. It also discusses the river transportation system.

In the science book of standard eight, the water is mentioned as the natural resource. It describes briefly the main sources of water and the critical situation arising from its scarcity.

We can see that there is no individual composition on rivers excepting mention of their names with very little descriptions. We cannot imagine the existence of Bangladesh without rivers. So it is of utmost importance that all the students should know about the rivers as elaborately as possible from their textbooks. Can, we not design our curriculum in that manner ?

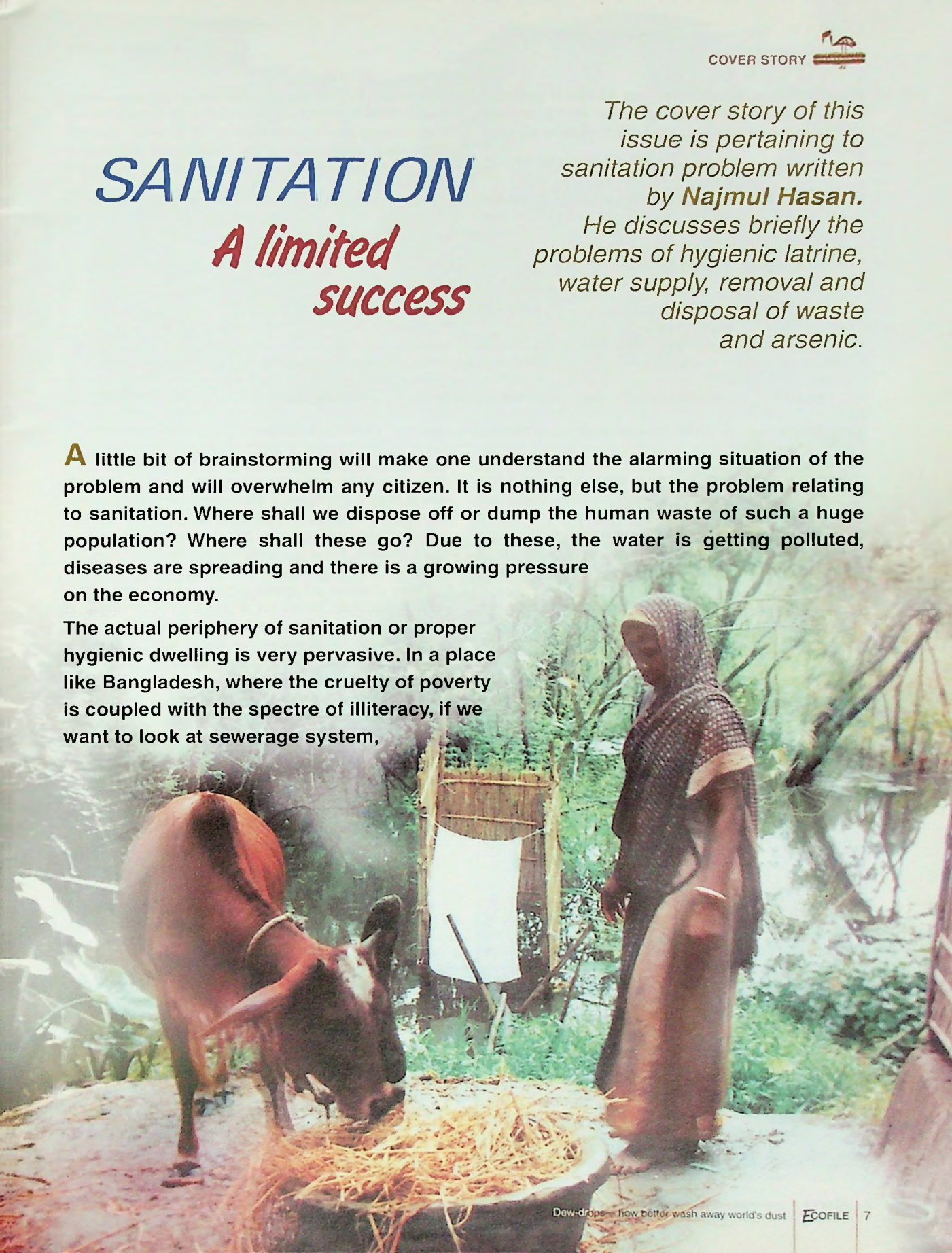
Liton Kumar Sarkar
Water Resources Department
BUET, Dhaka

SANITATION
A limited success

The cover story of this issue is pertaining to sanitation problem written by ***Najmul Hasan.*** *He discusses briefly the problems of hygienic latrine, water supply, removal and disposal of waste and arsenic.*

A little bit of brainstorming will make one understand the alarming situation of the problem and will overwhelm any citizen. It is nothing else, but the problem relating to sanitation. Where shall we dispose off or dump the human waste of such a huge population? Where shall these go? Due to these, the water is getting polluted, diseases are spreading and there is a growing pressure on the economy.

The actual periphery of sanitation or proper hygienic dwelling is very pervasive. In a place like Bangladesh, where the cruelty of poverty is coupled with the spectre of illiteracy, if we want to look at sewerage system,



Dew-drops – how better wash away world's dust

availability of pure drinking water and disposal of garbage in the cities along with proper sanitation, then what is the image we get? It is quite alarming, especially in terms of sanitation system.

Even in today's modern world, nearly 44% of the population in Bangladesh do not use latrine at all, and if they do, they use stilt latrines. The sides of coppices, canals and open drains are the places used to relieve oneself. Under no circumstances, we can say that the stilt latrines fall under the category of latrines. These stilt toilets are made by the side of the canals, ponds or drains encircled with gunny or bamboo walls.

In our country, as it is, pure or safe supply of drinking water is limited, barring the hilly region, the presence of arsenic in the tubewells, have made it even scarce. Along with it, the grave picture we get regarding the sanitation system makes the situation utterly vulnerable. Cleaning or removable of garbage in the capital city of Dhaka itself is one of the major issues.

The population of Bangladesh is somewhere around thirteen crores. This means that on an average fifteen hundred people live per square kilometer. Bangladesh is one of the most densely populated country of the world. Here, the daily average waste matter of this 'thirteen crore' population is around thirty to thirty-five tons. This insufficiency in hygienic ways of sanitation and sewerage system is due to the acute level of poverty and illiteracy, which eventually leads to lack of consciousness. Hence, the total environment of the country is getting polluted making it more difficult to control water and air borne diseases. Some examples of water borne diseases are: diarrhoea, cholera. dysentery, typhoid, jaundice and so forth.

These diseases get spread very easily, due to the use of open space and canals as a place for defecation. In Bangladesh, hardly 53% of the population use water–sealed latrine; 39% of the population use digged holes as latrine or self made latrines. In water–sealed sanitation system, the water is stored on the base of the latrines. Hence the bacteria do not get mixed with the air and pollute it. In Bangladesh, almost everywhere, one can get to purchase a water sealed latrine fitted in a slab with 4-5 rings— both from the government and private sources. The home made latrines are

INSTITUTIONAL RESPONSIBILITY OF WATER SUPPLY & SANITATION IN VARIOUS CITIES AND MUNICIPALITY AREAS

	Water	Sanitation	Drainage (Sewerage System)	Solid Waste
Different /Municipality	DPHE/Municipality	DPHE/Municipality	DPHE/Municipality	DPHE/Municipality
Dhaka	Dhaka WASA	Dhaka WASA (Sewerage Drainage) City Corporation (on-site)	Dhaka WASA (Subsurface) City Corporation (Surface)	City Corporation
Chittagong	Chittagong WASA	DPHE/City Corporation	DPHE/City Corporation	City Corporation
Rajshahi	DPHE/City Corporation	DPHE/City Corporation	DPHE/City Corporation	City Corporation
Khulna	DPHE/City Corporation	DPHE/City Corporation	DPHE/City Corporation	City Corporation

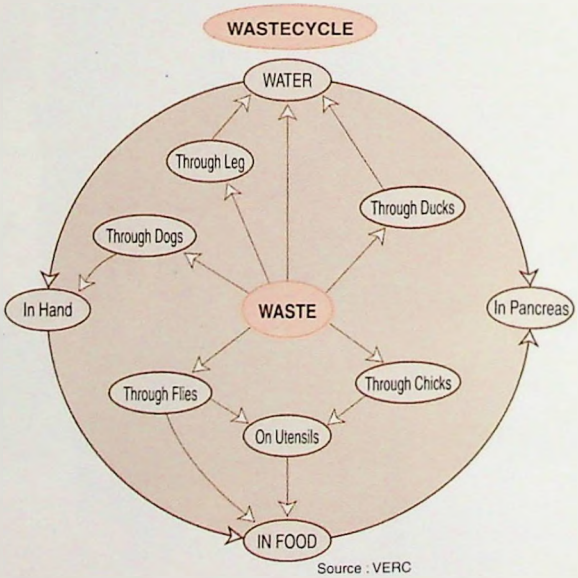
[Source: LGRDC, UNDP, UNICEF, WORLD BANK, 1994]

Slum–Dweller's Latrine

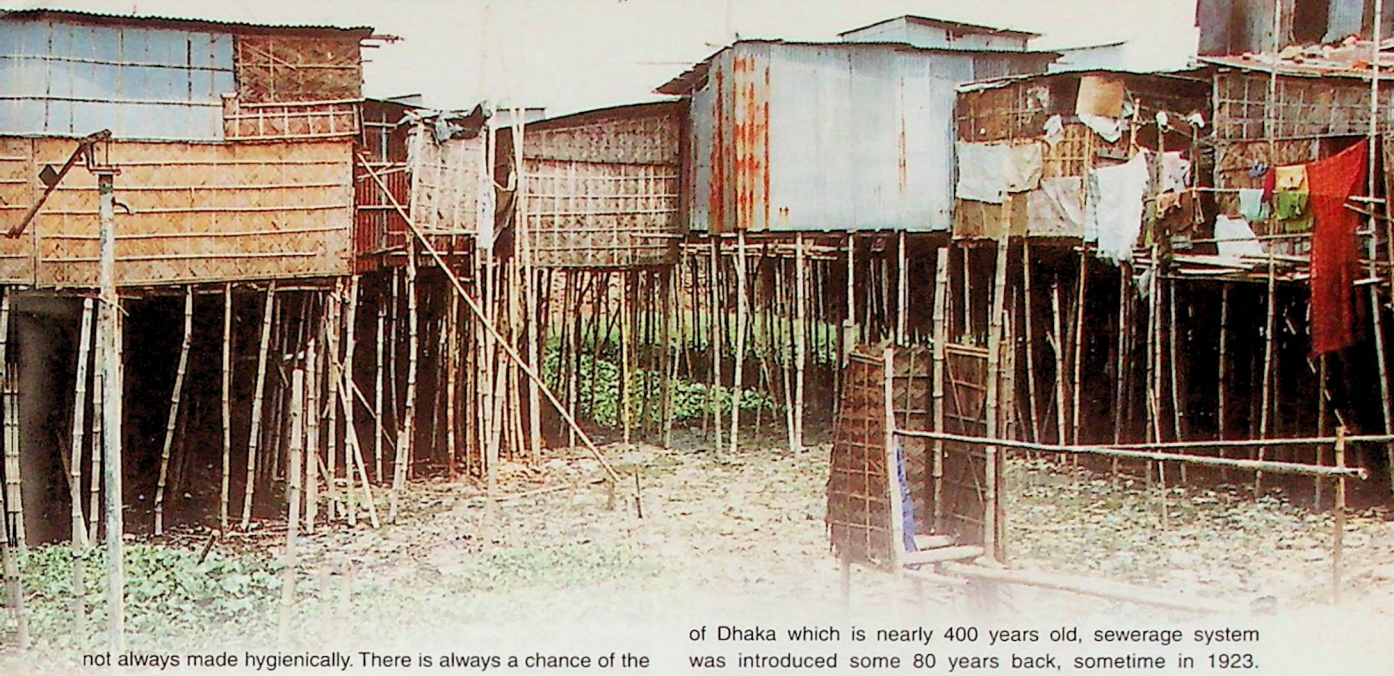
On the rear side of Hotel Sonargaon and on the opposite side of Film Development Corporation (FDC), is the Begunbari slum. There are nearly 140 families who live here. These families stay on bamboo framed scaffolds made on the canal. They do not have any hygienic and healthy sewerage system. They use stilt latrines (scaffolds made out of bamboo and surrounded with gunny). The human wastes get dumped in the water of the open canal. Two or three latrines are installed by the side of the road. There are a couple of latrines in the middle of the canal. Since the canal water is stagnant, the waste get piled up in the canal itself, and a swarm of flies are seen around the living areas.

Roksana (25), a housewife from this slum, works as a maid in community centres. Her husband Nuruzzaman (40) is sick and they are altogether four. She says that leading this kind of a life is very painful, but there is no way. Mosquitoes, flies and stinking smell are all part of their daily life. In this slum, there is one latrine for every six families. The average number of dwellers per family is five. Another slum-dweller uttered 'these are all temporary settlements. The slum can be evicted at any point of time; hence no permanent latrines have been installed. The dwellers also do not have the ability to bear the cost of a better latrine system'.

- ZINAT ARA



Source : VERC



not always made hygienically. There is always a chance of the diseases getting spread. The home made latrines do not have the system of holding water. Again, some people use stilt latrines. These stilt latrines do not fall under any kind of sanitation system, as they can never be hygienic. Through this system the human wastes get deposited in the open space, drains or canals. So these stilt latrines are nothing else but disease generating blocks. The waste gets piled up and rots, which eventually spread, diseases. The existence of these thousands of stilt latrines in the slums around the fast growing capital of Dhaka is nothing else but a mockery. The 44% people who do not use latrine relieve themselves not only in stilt latrines, but also in bushes and open spaces. This data, has been derived from Public Health Engineering Department.

Sanitation does not only mean usage of latrine. It includes proper way of using it, cleaning of hands hygienically, proper disposal of waste, positive attitude and appropriate measures. A latrine must be hygienic and odour free. There are various projects and programmes implemented both by public and private sectors in different places of the country to ensure this.

CAPITAL'S SEWERAGE SYSTEM

The sewerage system of Dhaka is not up to the expectation. This is not a recent problem. The city of Dhaka which is nearly 400 years old, sewerage system was introduced some 80 years back, sometime in 1923. During these 80 years, Dhaka has gradually transformed into a metropolis and now is the capital city of independent Bangladesh; but the pace of expansion and modernization of the sewerage system is very very slow. Till date, only 30% of area covered by Dhaka WASA is under the sewerage system. The people of the remaining 70% of the area do not enjoy such a system.

Contribution of SEMP in building up public awareness on sanitation

Under the supervision and guidance of Common Water Supply and Sanitation Project (CWSSP), 1,820 organizations and watsan committees were formed at union and ward levels. The total number of members of these committees is 16,309. Supported by the Ministry of Environment and Forest and UNDP, this project started rolling from August 1999. The project was implemented through Public Health Engineering. The project work is continuing in 5 unions under the 5 upazilas of Dakop, Tajumoddin, Bhaluka, Madhobpur and Gangchar. These fall under the five districts of Khulna, Bhola, Mymensingh, Habiganj and Rangpur. Training/ workshops were conducted and were imparted to project officers, officers and general employees of Department of Public Health, NGO workers, private manufacturers of latrines, WATSAN committee members (UP chairmen, members, school teachers) and to the local leaders. Through the training and awareness campaign, 22 non-governmental sanitation slab manufacturing units have been set up. In order to expand the use of hygienic latrine system, 2,200 hygiene latrines have been distributed free to the comparatively poorer section of the inhabitants. The main focus of the project is to supply safe drinking water and implementation of durable sewerage system.

The main objectives of the programme are to supply of safe drinking water and invent sustainable sanitation system. Its immediate priorities are: ensuring need-based safe water supply and developing mode of implementation for the project, ensuring that the water supply and sanitation services are well maintained involving the local bodies in the system, reorganizing the plan of action for the water and sanitation project based on experience and campaigning at the national level.

The project basically focuses on public awareness and infrastructural aspect. So far 42 workshops were held to train the upazila public health officers and general employees, members of union and ward level watsan committes, members of the Ansar / VDP, local leaders, school teachers, health and family planning workers and the NGO workers.

The total participants were more than 1,500 in these workshops. With a view to increase awareness, group discussions, campaigns, motivation at work at the household level etc. were organized. The total number of participants taking part in these activities was more than one lac.

Barring the comparatively poorer section, this project has arranged supply of latrines to all other sections at a manufacturing cost. The beneficiaries have to pay 50% in advance along with the application. The balance amount has to be paid by 12 monthly installments. Through this system, taka 3 lacs has been raised in the project implementing areas as a fund. Due to the awareness campaign, lots of families have started using hygienic latrines instead of going through the installment system.

In this remaining 70% area, people use septic tank, pit latrine, open latrine, etc. The areas like Mirpur, part of Mohammedpur, Shyamoli, Kalyanpur, Mohakhali, Gulshan, Baridhara, Uttara and nearly the whole of the northern part of Dhaka city are not under the sewerage system. After 1923, during the mid seventies, keeping in mind the then 12 lacs inhabitants of Dhaka, the expansion of sewerage system was made. In the last 3 decades the 12 lacs inhabitants have become 1 crore, but nothing significant has been done in expansion of the sewerage system. During this period, Dhaka spread mainly towards the north, but this northern spread is not covered under the sewerage system. The sewerage, designed for 12 lac inhabitants obviously can not shoulder the present pressure of a large number of inhabitants. This results into overflowing of man-holes in the roads and it has become very common in the city. Specially in the areas of old Dhaka, like Narinda, Bangsal, Sutrapur, Islampur, Armanitola, Lalbagh, Siddique Bazar, the much old sewerage system has broken down. The growing number of skyscrappers are making the situation even worse. According to experts' the insufficient sewerage system may totally break down any time not being able to clear the waste matter of an inflated population. As it is, a little rain causes water logging in many areas of the capital. This stays for days together and enters the sewerage lines, making the environment of these areas unbearable.

Scenario : Noakhali

The report received from the office of the Civil Surgeon says that 18% inhabitants use sanitary latrines, 95% of the children are attacked by worms. The awareness level amongst the people regarding sanitation is 20%. 80% of the diseases are caused due to inadequate sanitation system.

The Water and Sewerage Authority in Dhaka has given sewerage connection to 44,841 houses. The waste matter is disposed into Pagla Sewerage Refinery Plant through a 631 km long pipeline and 23 sewerage lift stations. The sewage goes through a refinery, and gets settled down in the lagoons. It is then pumped and thrown into the Buriganga river. The Pagla Refinery has a capacity of sanitating 1,20,000 cubic metre of waste matter per day; but regular amount of disposed and pumped off sewage aggregates to 10,00,000 cubic metre from the Dhaka city. It is not that this whole volume ultimately get disposed at Pagla Refinery Plant. The sewerage pipelines do not have the capacity to manage such a volume and that is why a part of the waste gets overflowed through the man-holes in different places. There is a brickbuilt pipeline to Pagla from Narinda and Sayedabad. These pipelines have developed lots of cracks through which the waste also leaks out.

WASTE REMOVAL

The present infrastructure for removal of waste under the city corporations and municipalities in the country is undoubtably very inadequate. In the capital city, Dhaka City Corporation faces great difficulty in removing 3,000 tons of refuse every day. Piled up garbage almost everywhere and the stinking smell from it is very common. In summer during the time of mango and jack fruit, the daily waste goes up to 4.5 tons. Along with this, there is the waste from the hospitals and clinics. These hospital and clinic wastes are dumped

Activities of DPHE

The Department of Public Health Engineering working to eradicate the problems of sanitation. The work is continuing in the rural, urban and slum areas throughout the country. It is being implemented through the city corporations, municipalities, various non-governmental organizations (NGO) and other developing partners. The activities include construction of sanitary latrines, encouraging the use of sanitary latrines instead of stilt latrines, imparting technological know how in constructing sanitary latrines and so forth. A project under DPHE named 'Rural Sanitation' implemented which end in June this year. Another project, worth taka 236 crore is implemented starting from July. A total number of 28 projects are on-going nationally, with a specific focus on building up mass awareness on sanitation, water supply and health.

Recently, the government with the help of UNICEF and other funding agencies has undertaken a few environmental projects along with sanitation. One of them is called 'Municipal–Slum-Suburbs'. The sanitation programme has been brought under this project. The primary work of the project is in progress. It will cover the five city corporation areas and ten municipal corporation areas. This includes ten slums of the Dhaka metropolitan city. Md. Sadek Hossain, the Executive Engineer of the project informed that the project will be implemented through an NGO in each area with the help of the city corporations and municipalities. The project will introduce proper sanitation system in these areas and will construct community latrines of 2, 3, 4 or 6 units.

untreated in the wayside dustbins or containers. The total number of sweepers of Dhaka City Corporation is around seven thousands. They are appointed with various responsibilities. The number of ward cleaners is 5010, 119 are storm sewer cleaners, 909 truck cleaners, 283 are drain cleaners, 444 are market cleaners and 90 container cleaners. In the city's 90 wards, each ward has 50 to 100 cleaners. It is alleged, that these cleaners do not turn up to their duties almost for half of the month. Out of 252 refuse carrying vehicles of the Dhaka City Corporation, on an average half of them remain broken down. Recently, Dhaka City Corporation in an experimental run has given out the responsibility of removing the waste to a non-governmental organization. The city waste gets disposed in two separate dumping stations at Matuail and Mirpur. These two stations do not have any more capacity to hold the waste. No new dumping station is yet located.

CAPITAL'S WATER SUPPLY SYSTEM

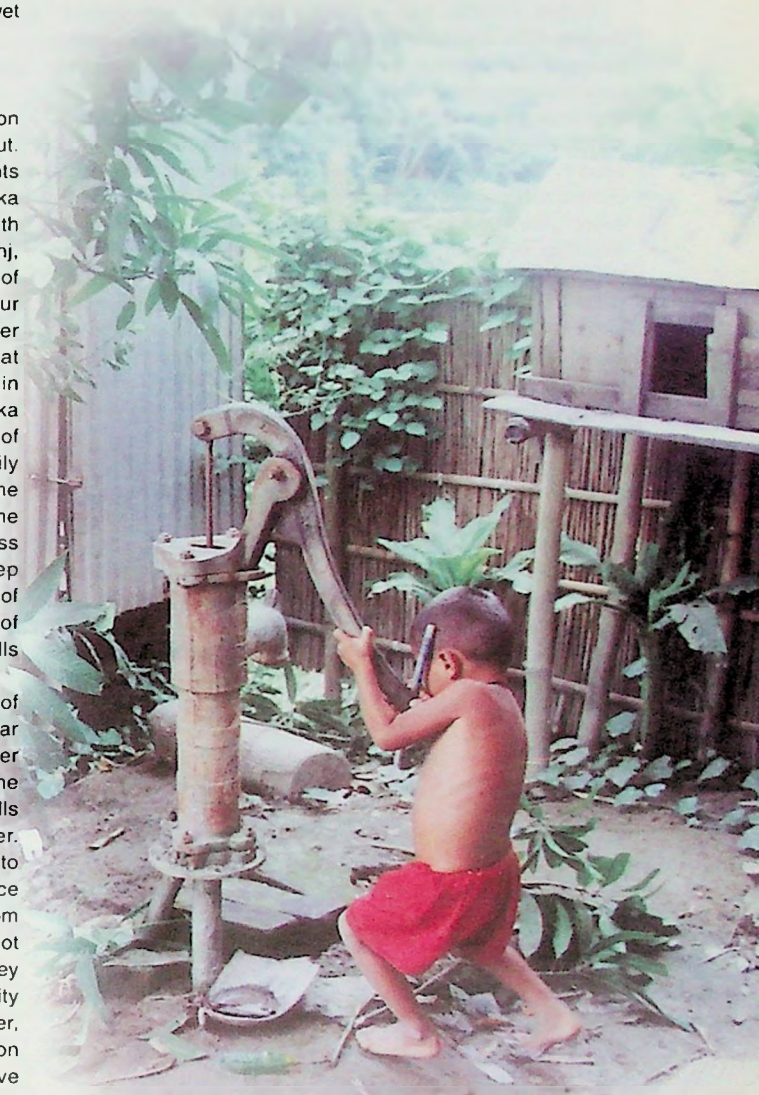
Sanitation and water are very closely related. Sanitation without safe water is something we cannot think about. Ensuring supply of safe water to the one crore inhabitants of Dhaka and Narayanganj is the responsibility of Dhaka WASA; but how far WASA is successful in keeping up with this enormous task? In both Dhaka and Narayanganj, during the summer season there is a great scarcity of water. Dhaka WASA has 400 deep tubewells and four water treatment plants in order to supply water. The water treatment plants are situated at Sayedabad and at Chandnighat in Dhaka and Sonakanda and Godnail in Narayanganj. According to the estimate given by Dhaka WASA, it is only possible to supply 140–145 crore litres of water everyday to Dhaka and Narayanganj. The daily requirement of water is 160 crore litres. On paper, the supply of water nearly meets the demand, but in reality the supply of water in Dhaka and Narayanganj are much less than the requirment. Pumping of water from the deep tubewells get disrupted due to low voltage and scarcity of electricity. As informed by WASA, due to shortage of electricity, the pumping of water from the deep tubewells remain suspended for 150 hours everyday.

On the other hand one of the most alarming aspects of water supply in Dhaka is that due to non-stop and regular pumping of water from the underground sources, the water level is going down by a metre every year. As a result, the amount of water being pumped from the deep tubewells are becoming less, resulting in acute scarcity of water. Referring to geologists, Dhaka WASA informed that, due to the special ground condition of the city, there is no chance of landslides, though, off taking or pumping of water from underground is done regularly. The slums in the city do not have any water supply connection and if they do have, they are illegally done. Hence, safe drinking water for the city slumdwellers is very scarce. Scarcity of safe drinking water, usage of house made latrines or total lack of sanitation facilities make the environment unhealthy. Effective measures for supply of safe drinking water for the capital's slum-dwellers are yet to be taken. The slum-dwellers grow up and continue to live in the slums for the rest of their lives, as they have no other alternative. Malnutrition, diseases and untimely deaths almost becomes inevitable.

CHITTAGONG'S WATER SUPPLY SYSTEM

Chittagong– the second largest city of the country, also experiences acute scarcity of water supply. The magnitude of this problem is not at all less than that of the Dhaka city. During the summer, this problem turns more critical. But chittagong's Mohora Water Treatment Plant is the largest one of the country.

Chittagong WASA is given the responsibility of supplying drinking water to the city; but it is only capable of meeting 34% of the total demand. The 36 lac population of Chittagong



requires 50 crore litres of water every day; but Chittagong WASA has the capacity of supplying only 17 crore litres of water daily. The water supply to the city of Chittagong is also dependant on deep tubewells. Every year during the dry season the level of groundwater goes down resulting to a severe crisis.

SOURCE OF SAFE WATER ENDANGERED

To lead a hygienic and healthy life, safe drinking water is one of the essential ingredients. In Bangladesh, safe drinking water is difficult to obtain. When supply of safe drinking water should have been ensured the people of Bangladesh, we see the sources of water to be in great threat. After detecting of arsenic in the deep tubewell water, it has become very difficult to find safe sources for getting water.

Before the 70s, safe water sources were very limited. Barring Dhaka a few other cities, the safe drinking water supply system was not there. For the greater mass water from canals, ponds, rivers and a limited number of wells were the only sources. It is unsafe to drink water from rivers, canals or ponds, but for a long time the general mass of our country used to think that the flowing river water was pure. As a result cholera and diarrhoea used to sweep over the villages almost every year. During this time, in the early 70s, shallow tubewells were set up on a mass scale with support from UNICEF. For the people in the rural areas, it became very easy to get safe drinking water, but this privilege proved to be temporary. The water from these shallows turned to be a curse. Though we do not know precisely since when arsenic was also getting pumped with water from these shallows at a harmful proportion, it was first detected in 1993. After sinking shallow tubewells in the villages one after another the government had declared that 97% of the population are getting supply of safe drinking water. Once the arsenic was detected, the government reduced this figure to 29% and claimed that 68% of the population is within the reach of safe drinking water. We can say that 32% of the population is deprived from the reach of safe drinking water, while 3.5 crores of people are under the threat of arsenic infection and they are still drinking arsenic infected water. The water supplied to the metropolitan city of Dhaka from 400 deep tubewells and 2 treatment plants do not carry arsenic. The geologists believe that the water supplied in the capital do not have any chance getting contaminated by arsenic, but the water supply system is insufficient for the city. Immediately after raising the water through deep tubewells it goes through chlorination. It is then sent to the water treatment plant to get purified. Up to this part, the water remains safe; but by the time it reaches the consumers, its safety is questionable. Due to cracks and holes in the water supply pipelines, water from the drainage and even from the sewerage lines get mixed with the drinking water supply. Hence, no conscious citizen of this city thinks the supplied water to be safe. Most of the people drink water after boiling it at home. Outside the house, they drink bottled mineral water. Due do scarcity of safe drinking water in the cities, bottled mineral water is precious– Tk. 20 for every litre. Along with the above problem, every year during the summer there is a big scarcity of water in various localities of the city. When WASA cannot pump-up water due to load shedding and disruption of electricity, the water supply gets suspended in these areas.

In the hilly regions too, scarcity of safe drinking water is wide spread. In these areas, sinking of tubewells is very

Average human waste accumulation in a village

Approximate number of households in a village	145
Households having hygienic sanitation	15
Households using open latrines or open space to relieve	130
Number of people using open latrines or ophe space	485
If daily faeces of a person weighs 800 gm, then daily human waste measures 485 persons X 800 gm	388 kgs
Weekly it is 7 days x 388 kgs.	2,716 kgs
Monthly it will be 30 days x 388 kgs	11,640 kgs
Yearly it stands 365 days x 388 kgs	1,41,620 kgs
1,41,620 kgs = 3,631 maunds or 26 truck full	
The village will accumulate 26 truck full of human waste in a year	

Source: VERC, February 2002

Ahsaniah Mission working on sanitation problem in the coastal region and in the slums

Dhaka Ahsaniah Mission is working for the poor and unoriented people by providing sanitation facilities and creating awareness in the country's eight coastal districts. The organization informed that, in the last 10–12 years, it has succeeded in building up awareness regarding sanitation amongst a few hundred thousands of people. The Mission is working on village cleanness drive safe drinking water, usage of sanitary latrines, arsenic and so forth in the frontier villages of 28 upazilas under 8 districts of greater Barisal and Noakhali. For operational purposes, branches and sub-offices are developed in the village areas, where training is imparted to the representatives of these branches, so that they get a clear idea regarding sanitation. These representatives trained by the Ahsaniah Mission work along with the people. Community centres are also built in the villages.

The activities of the Ahsaniah Mission include: propagating the necessity of usage of sanitary latrines, encouraging people to use and install latrines, for which, support is provided. The families, who are interested in installing latrines are provided with loans, along with help for installing family–wise and locality–wise latrines. From 1990 to 2000, 32,850 latrines were installed through loans. Every family was given a sum of Tk 1000 as loan for six months. A 7% service charge was levied on the loan amount. The loan recipients repaid their loans through weekly installments. The families who had no mony at all, the Ahsaniah Mission helped them in installing the latrines free of cost. Moreover those who did not have any idea of the usage of sanitary latrines, were all made aware.

Recently, the Ahsanish Mission has taken up sanitation programme in the slums of Dhaka. It started from June this year. The Mission started working in the slums under ward 3, Avenue 5 of Mirpur 11. The programme of installing one thousand latrines in these localities has been planned. Gradually this programme will be extended to other slum areas of Dhaka.

–Shamim Rahman

difficult due to hard surface. As there is an acute crisis of safe drinking water all the year round, terrible prevalence of water borne diseases as a regular feature.

There was also a report published regarding this problem in the last issue of *Ecofile*.

ARSENIC SCENARIO

For Bangladesh, the specified level of arsenic in safe drinking water is 0.5 mg per litre. Barring the hilly region of the country, the level detected in the other parts is more than the specified level. On the other hand, the Project Director of the Department of Public Heath Engineering informs that the World Health Organization has relaxed the specified level of arsenic for Bangladesh, being a developing nation. The safe level of arsenic is supposed to be 0.1 mg.

In 1978, arsenic was detected in the state of West Bengal in our neighbouring country India. Long after this, in the year 1993, arsenic was found in the shallow tubewells of Baroghoria, a border area under the Chapainababganj district. With the initiative of the Department of Public Health Engineering, sample water from these shallow tubewells were brought for testing to the Bangladesh Atomic Energy Comission laboratories. But even after four years there was no effort to detect the shallow tubewells nor there was any measure taken to build awareness about the harmful aspect of arsenic contaminate water. In the process, till 1997, there was no clear picture of the level of arsenic contamination or about the areas affected by arsenic. The Department of Public Health Engineering informed that no work could be implemented regarding arsenic during that time, due to lack of proper arsenic testing instruments.

From 1997 to 2000, with the assistance of UNICEF and British Department for International Development (BDID), the Department of Public Health Engineering conducted two surveys. The reports of the surveys are very alarming. Water from a total number of 53,500 tubewells was tested under these surveys. It was found that in 61 out of 64 districts, the water of 268 upazilas carried more arsenic than the specified level. Arsenic was detected at various layers of the underground water. Interestingly when arsenic was detected in one tubewell, the very next one beside it did not bear any mark of arsenic. Hence detecting of arsenic was a tough job. However there is no other way than to test the water of each and every tubewell.

With a view to ensure Arsenic free safe drinking water supply, other than treatment and purifying process, there are four other technologies to be used. Under the circumstances, the sanitation problem has to be given much priority. Effective initiatives have to be taken. We have to learn from our previous experiences. It is not only the government or the NGOs, every citizen, irrespective of their age should come forward.

Adieu Pinjira

Pinjira (26) the mother of three used to live in Mirpur village. This village is in the Charghat upazila of Rajshahi district. Her husband Masud (29) was a worker in the rice–mill. She was unable to run the family with the small earnings of her husband. So, Pinjira started working in a rich farmer's house, where she used to boil and dry up the paddy. Other than that, she used to work as a maid in that house. With the amount she earned from there, she used to feed her three children, often without having food herself.

Pinjira first spotted some marks in her body in 1996. She had seen these marks in others too in the village. One of the neighbours told her that this is on kind of a skin disease and there is nothing to worry about. Pinjira believed in her neighbour's words. But during the next monsoon more marks appeared on her body. Cracks were noticed between the fingers of the hands and feet. While picking up anything heavy the knee used to pain. The neighbours also got scared seeing her. Her mother–in–law said, "you have leprosy; you will destroy my son". Then onwards pinjira had to face a lot of adversities. Her husband Masud believed his mother and started avoiding her, to the extent, he disagreed to take food and water from her hand. Masud got married for the second time in June 1998. When the second wife left him, he got married for the third time. Pinjira while persuading her husband from not getting married for the third time was severely beaten up by her husband. Pinjira fell seriously ill.

On the other hand, the family where she used to work did not allow her to enter their house. Since there was no work, starvation and family problems became regular features. The villagers also did not allow her to take water from the tubewells. She was prohibited from taking bath in the same pond the others used. Two houselords drove her away from the marriage ceremonies in their houses. During this period Nargis (22) a bold volunteer from the village came and met her one nights. Prolonged starvation, negligence and maltreatment had turned pinjira as thin and dry as a piece of wood. Nargis offered help to take her to the hospital the next day. At the hospital the doctors after checking her for a long time said that she was infected with a deadly skin disease, and also with leprosy. The doctors advised her to take some vitamins and nutritious food. But where would she get it from?

The water Pinjira used to drink from the tubewell for the last 16 years was found to be arsenic contaminated. The level found was more than the bearable level. In the same year two doctors from Nipsom visited that village and advised Pinjira to get admitted at then Dhaka Leprosy Hospital.

A couple of villagers and Nargis took her to the hospital. The examinations revealed that her liver had become inactive by arsenic. At this fag end, there were many who came forward to help her, but it was too late. Three days before her death, her inhuman husband physically tortured her. A good Samaritan bought her some nutritious food and gave her Tk 1000 for treatment. Her husband gambled and drank with that money. Pinjira wanted to have a piece of meat just a fortnight before her death. Just before her death, she wanted to know from Nargis crying that what would happen to her children when she is not there. Even today Nargis remembers those words. She hardly could do anything for Pinjira's children.

[M. Mohiuddin, Source–People's Report on Bangladesh Environment 2001]

GLIMPSES

SCENARIO 1

On the south-western side of Dhaka is 'KAMRANGIR CHAR' (sandy land rising out of the river). Madrasa para of Asrafabad is situated here. In this locality, 25 daily labourers stay in a mess, which has a stilt latrine situated over a virtually dried up ditch.

Opposite to the ditch, there are two stilt latrines, between a distance of 10 feet. The fences of these latrines are nearly broken. These stilt latrines are used by members of 8 families and 20 daily labourers. Between these two stilt latrines, there is a tubewell. These people collect their regular drinking water from this tubewell.

A little far away, there is a slum. In this slum there are 30 families, who too are daily labourers. There are three stilt latrines meant for these 30 families of daily labourers. Covered with corrogated tin sheets on the sides, these stilt latrines are built on concrete pillars which work as the base. The wastes from these stilt latrines are getting piled up on the bottom, which is an open space. Close to this area is the flood control dam.

SCENARIO 2

Munshihati is another locality of 'KAMRANGIR CHAR'. The houses in this part are built with concrete or with bamboo pillars. Some of the houses are of concrete, some with corrogated tin sheets and some made up of hedges. In one of the houses like this, two latrines have been made with 24 rings. The waste from one ring-well goes to the other. Each of the ring-wells has 4 rings above the surface and 8 rings under. There are two sizes of rings small and big. The big rings cost Tk 70 each and the small rings are Tk 50 each.

Stilt latrines for the inhabitants.

The houseowner bought these rings from a place called 'Kholamura' on the other side of the river. One can get these rings from Munshihati as well at a price Tk 100 each. The cost of this particular latrine is Tk 300, which consists plastic pan fitted to a slab. The latrine and the 2 ring-wells are connected by few feet of plastic pipe. The pipe had to be purchased at the rate of Tk 11 per foot.

The tubewell in this house is situated nearly 20 feet away from the latrine. The pipe of the tubewell had been bored deep down to two hundred and twenty five feet. The owner of the house informed that the tubewell water is being pumped up from very deep. The depth of the ring-wells of the latrine is less. Hence there is no possibility of the deep tubewell water getting contaminated by the human waste.

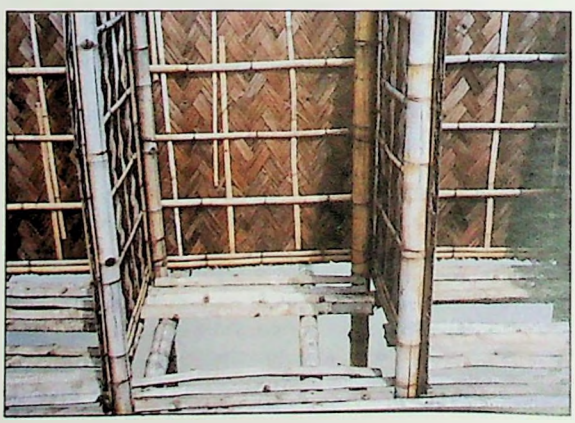
SCENARIO 3

Kalunagar in Hazaribagh is little to the north. The lines of houses are similar to that of a barrack. Every file consists of seventeen small family units. The houses are on scaffolds made out of bamboos over the ditches. The monthly rent of each of these houses is Tk 400. Electricity charges are included with the rent. Each house has four ovens. The cooking is done serially. There is a single deep tubewell for the whole lot of families. The deep tubewell has been drilled deep inside the ground in the ditch itself. The inhabitants do not know, how much deep the tubewell is. Within a distance of twenty feet from the tubewell, nine stilt latrines are situated in a row. These are on the top of the ditch. Each stilt latrine is walled on three sides with bamboo strips thatched with leaves. The human waste from these stilt latrines, fall onto the ditch below. On the other side of the ditch, the houses are located.

NO SOAP AROUND FOR HAND WASHING

Around the stilt latrines, nothing like soap or ash was found, with which people can wash and clean their hands after relieving themselves. While discussing this, it was noticed that these inhabitants are least bothered about the issue of washing and cleaning their hands after relieving. Some of these inhabitants are not at all aware of this. Others do not have the capacity to purchase an extra soap for washing and cleaning their hands after using the latrine.

The coexistence of stilt latrine and tubewell.



SOME VILLAGES / HUMAN HABITATION AREAS OF BAGMARA-MANDA USE LATRINE

There are quite a few initiatives in the country with the aim of ensuring cent percent use of latrine. This Ecofile report focuses on one of these activities. The report has been written after visiting the villages of BAGMARA in Rajshahi and MANDA in Naogaon.

It took only Tk 17 and a day's labour to build a latrine. There is no stinky odour coming out of it. Again, there are latrines, where the expenses to build them were Tk 50 and some Tk 175. At the beginning it was something not at all believable. Later, after physically visiting BAGMARA in the district of Rajshahi and MANDA under the district of Naogaon, we found it to be true. This was made possible with the help of 'Village Education Resource Centre', which is more commonly known as VERC. The initial effort was actually taken by the local inhabitants of the villages. Gayatri, wife of Kartick Chandra, a resident of a locality called Dighipara in the village of Sayedpur under Bagmara police station told us that her homestead measures 4 decimals. The house is made up of mud. The boundary wall is also made of mud. They had built an attached toilet in November 2001. To build this latrine, they had spent Tk 175 only. It was their money and not any kind of subsidy. The latrine has a plastic pan and the pan is connected to the pit with a plastic pipe. There is soap on a soap case at the corner of the latrine. There is a pipe situated over the pit, which works as the outlet of the accumulated gas in the pit.

Table

Percentage of population with access to sanitary latrines (water seal and pit latrines)

Populations in	1990	2000
Rural areas	27	44
Urban areas	78	82
Total	37	53

Source: DPHE, Bangladesh.

In the same village, Amulya Charan Gayen has eight bighas of agricultural land. He has a pond. The area of this pond is one acre and twenty-seven decimals. The area of his housing is six and a half decimals and an orchard measuring one bigha. Amulya Gayen had built a latrine two years back. The cost incurred was Tk 225 plus physical labour. The latrine was found to be clean and tidy. To wash the hands, soap is kept at a corner. No organization had funded him nor given him any credit.

Rehana, from the same village, had built a latrine in 2001 incurring a cost of Tk 190. She is a member of the Village Health Development Committee. Rehana and her husband Dumon Mandol have two children. They have an agricultural land of six kathas and homestead area of 3 decimals.

More or less this is the picture of every household in the Dighipara locality in Sayedpur under Shubhodanga Union. The number of households there is seventy-four. When the sanitation programme was first implemented, seventeen households had their latrines. In the month of August 2000 VERC along with the villagers made a general assessment. This voluntary participatory programme made the villagers realize the importance of building latrines. They understood the necessity of latrines and what would be the problems if they did not have the any; hence they felt motivated to build latrines. Every household of Dighipara now has latrines. Twelve latrines are used by seventeen households. Due to the shortage of space and other problems in building latrines, several household members use a single latrine. The remaining households have their own latrines.

Dighipara, with a one square kilometre area, has one non-governmental primary school. There are projects by NGO's like BRAC and ASHA in Dighipara. The metalled road is situated five hundred metres to the north of the settlement area. A little more towards the north, nearly a kilometre away is the market and nearly five kilometres away, there is a small river. There is also a pond some one and half kilometre away from Dighipara. The female population of Dighipara is one hundred and fifty-four and male population is one hundred and forty-eight. The number of television sets in the village is two. No one buys a daily newspaper. Here the number of self designed and self made latrines is eighteen. Other than this, the number of semi-permanent latrines is thirteen, water sealed latrines nineteen and pit latrines nine. Some of the latrines are made up of plastic pans and plastic pipes, and they cost Tk 175. Some had made the pan out of tin sheet and the pipe costs only Tk 15. Some had used bamboo as the pipe.

Walking through the surrounding bushes, backyards and the edges of the field, no smell or sign of human waste was found. The young boys and girls affirmed, that no one from their village goes out in the open to relieve. People from other villages who come to visit them, out of grown habit go to the open, but they are mostly not allowed. Once, a road-way labourer was caught by the young boys while he was relieving in the open. The do's and don'ts regarding sanitation practices was read out to him, which was written on a tin plate in the village. He was penalized for the misdoing and then later pardoned.

A simple but proper latrine in santal village, by the side is the gas pipe made out of bamboo.

Through this process, men, women, children and youths became aware regarding the usage of latrine. After a period of time, it was declared that cent percent of the inhabitants of Dighipara use latrines.

Now, initiatives are being taken to ensure growth of other habits. Amongst these are— washing hands after using the latrine and before and after taking food, keeping food and drinking water covered, keeping the body clean, wearing sandals while going to the toilet and keeping it hygienic, cleaning of the courtyard and road, disposal of garbage in a specific place, storing cow-dung in a pit without causing any health hazard, using safe water in household work, not to spit in any place and so forth. A villager monitoring committee has been formed to supervise and oversee the above exercises. The male and female members of the committee keep a regular watch on who is not following the norms and try to correct them.

In Dighipara it was noticed that there were around twelve to thirteen kinds of technologies being used for making latrines. Majority of the techniques are invented by the local villagers. They are shown enough respect, considered to be knowledgeable and are often caringly called as village engineers. VERC term them as village inventors. Here one learns from another's experience and goes on inventing new techniques. Some of them work as consultants and demonstrate the simple techniques to the people of other villages. They have demonstrated in places like Kishorganj, Jaldhaka and Khansama. A number of national and international NGOs hired some of them on a consultancy basis to inspire the villagers in far off areas by practically showing the techniques in installing the latrines and the system of using them.

In Dighipara, not a single latrine was found to be dirty, broken, unused, stagnant with water or stinky. Not a single ring slab was found lying on the open or being used as a bowl for feeding the cows. The villagers see to it that the latrines are made in such a way that the wastes are not exposed, the odour does not stink the area, the flies cannot enter the pits and the environment stays clean.

This way, at the initiative of VERC, eighty-seven settlement areas of Sitakund in Chittagong, Teknaf of Cox's Bazaar, Bagmari and Mohanpur of Rajshahi, Lalmohan in Bhola, Nachol and Bholahat of Chanpainababganj and Manda use hundred percent hygienic latrines. In these areas there are 5,556 households and the number of latrines are 4,552. Out of these, there are places where several households use a single latrine.

While visiting the localities of Dakshinpara and Bagpukurpara of village Kirtoly under Kusumba Union of Mandar, we met Abul Kalam Azad of village Kirtoly. He had spent Tk 400 to build a latrine towards end of 2001. He has a three member family, with five bighas of cultivating land, pond measuring 70 decimals, 32 decimals for housing and 10 decimals for orchard.

Mukti Begum of the same locality also has a family consisting of three members. Her family's land extends to

one bigha for agriculture and the area of housing is 16 decimals. It took Tk 2000 to make the latrine in her house a couple of years back.

In this village, latrines were found which cost Tk 50 or Tk 75. To make these hygienic and odour free latrines cheap, tin casks, meant for tin shed houses, are used. Each cask costs Tk 30. Out of one, two pans can be made. Along with these, the cost of plastic pipe and other miscellaneous expenditures are there. There were nine such latrines. One of the villagers informed that it took only Tk 17 for him to make a latrine. There were eleven latrines costing Tk 75 each and 35 latrines, costing between Tk 100 and Tk 450. Ten latrines were there which cost Tk 400 each.

The river Shiv is a kilometre away from Dakshinpara of Kirtoly. Some call it a dead river. During the scorching heat of May and June, the river is fully dry and is used for paddy cultivation. From Dakshinpara, the Kaligram swamp is two kilometres away. A little far off from Dakshinpara, Delubari is a place where the poor santals live. They work in the neighbouring farmlands. While we were there, it was found that the male members of the village had gone out for harvesting. A few old men and women came forward. A couple of middle aged men and women also came. We spoke to Bishnu Sarkar (70), Bharati (35) and Pia Lal (36).

They informed that the total number of houses in the area is thirty-one. Discussions were held on the necessity and advantages of latrines. They said that after realizing its importance, fourteen latrines were made in a single day. Maximum of them were made out of tin and plastic pipes. A plastic pipe was connected to the pan made of tin and was led to the pit. Plastic pipe or bamboo were used as exhaust pipes for gas and were fitted with the pits. Since majority of the working men became busy in harvesting, they could not get time to enclose these latrines. Once the pressure of harvesting work reduces, the latrines will be enclosed with bamboo strips or Palmyra leaves. Till that time the latrines would remain fenced with Palmyra leaves. The tin made pans and the

WORKING METHOD OF VERC

VERC has its own way of working. After discussing with the villagers, awareness and interest are developed among the villagers about water and sewerage and sanitary practices. Then a committee is formed called WATSAN (Water and Sanitation). The number of committee member is nineteen. Seven are women and rest twelve is men. The villagers select the committee members. The WATSAN committee makes a work plan, and forms a group of poor women. Gradually each and every villager is inspired to install a latrine. The villagers make the latrines according to their financial capacity. For this, there are various designs for latrines. To keep the process on-going, more committees and groups are formed. They are Union Steering Committee, Rural Sanitation Engineering Group comprising of local villagers, Water- Point Management Committee, Village Engineering Group and also cultural groups. Before starting the work, techniques are used for village assessment on a participatory basis.

latrines are kept clean and tidy.

After the tribal village, we moved on to Masterpara of Baropai village under Kushumba Union. The story here was more or less the same. A locality of fifty-three houses, every house has a latrine in Masterpara. The target was achieved October 2002. In this locality 12 latrines are made out of tin casks. Other than this, there are water sealed latrines, offset pit latrines and pit latrines. Every latrine has either soap or ash for washing hands. Once, there was a time, when only 55 persons used to brush their teeth regularly. Today the number is 180. Once, there were only 80 persons who used to cut their nails regularly. Now this figure stands to two hundred and five. There are twenty deep tubewells and two wells. There is a mosque, a school and a club. The number of females and males are 111 and 113 respectively.

The entire work is going on with the assistance of VERC. The Regional Coordinator, Tapan Kumar Saha informed that at the start of the work, the workers of VERC were not so well accepted by many villagers. The female folks of the village were not easily accessible, but gradually the attitude of these people started to change. It would not have been possible without the cooperation of the female folks. The children and the teenagers also came forward. They helped in creating awareness through singing songs and dancing. A few of the elderly local leaders objected in the beginning. Now they are active partners. Some of them are campaigning in the neighbouring villages or in the far away villages where their relatives live with their own initiative. They do not take any money in return.

According to Tapan, the biggest success achieved is the transformation of the perceptions of the local people in the areas where they are working. He also said that people could realize their own problems and understood what is to be done.

He said : "VERC does not have any kind of micro-credit programme in the areas where we work. We do not extend any financial help or subsidies, nor do we provide any material support for making latrines. We do not relate micro-credit with latrine construction or go for any agreement. People realizing the necessity build their latrines themselves. We just help them by building awareness."

Regarding failure, Tapan Saha admitted, "We still could not arrange to provide safe drinking water to every household. Secondly, we cannot firmly say that any of the union enjoys cent percent household latrine system; but we are optimistic to reach the point within a very short span and are working towards that."

The Assistant Project Engineer of VERC working in Rajshahi said that they bring-in and show various technologies for making latrines to the villagers. Then the villagers according to their capacity adopt one of them. The villagers start inventing new methods themselves. The effort goes on depending on their needs, availability of materials, financial conditions and other practical considerations. The invention and development process of these techniques are amazing, specially when you listen about them from the villagers. They elaborate how they made the pan with tin sheet, how they got it welded by a blacksmith, how a piece of rexin was used to prevent stink and if it did not work, a foot of plastic pipe was used for shallows, and was fixed. Listening to these innovative ways, one can make out the potentiality and the mark of creativity of our countrymen. There were a number of discussions held with the villagers of Madhyapara in Kirtoly. One of the discussion sessions was held during the afternoon, sitting in a courtyard. The participants were Abul Kalam Azad, Amjad Hossain Paik, Mukti Begum, Halim Bibi (1), Halim Bibi (2), Rozina Khatun, Sahida Khatun, Shefali Bibi, Rabiya Bibi, Sohel Rana, Golam Rabbani, Humayun Kabir, Afsar Ali and Rabiul Islam. They wrote on a piece of paper and gave it to us describing the types of latrines that are in use in their locality and how much did they cost.

The participants informed that when they did not have the latrines, they faced hundreds of problems. But after installing and using the latrines, those problems were solved. For instance, during the last couple of years no one of the village had been attacked by diarrhoea.

The same thing reflected in the information given by the women and men of Sayedpur Dighipara village in Bagmara. They mentioned about nine advantages.

A survey was conducted to collect facts for this report in the settlement areas where 'hundred percent target' of latrines were achieved. During this survey, the local villagers rather emphasized the advantages like non-existence of diarrhoea, other such diseases and hence saving of expenses. It was noticed that the villagers have grown up the habit of throwing garbage in their own pits or a few households throw the garbage in a common pit.

Now the question may arise, that after two or three years, when the pits of the latrines get filled up with waste matter, will the villagers again dig those pits? We have to wait to get the answer. But the workers of VERC are optimistic. They reported that, unlike other NGOs, they did not distribute ring-slabs at random nor they had given any financial help. Only thing they did was, to stimulate the ardent zeal amongst the villagers. If this exercise could bring forth so much of a change, then it is more likely that the villagers after having understood the advantages of sanitary latrines and getting used to hygienice ways, will not return to a life without latrines any more.

The villagers seemed to echo the feeling. They also cannot think of a house without a latrine.

Meanwhile, there are NGOs who are following the foot-steps of VERC. Many teams and experts from countries of Europe and Asia visited and saw the method of work, adopted by VERC. To demonstrate this method, two VERC workers had gone to Cambodia. A New Delhi based daily newspaper 'INDIAN EXPRESS' commented on the programme of VERC by saying– "LEARN IT FROM BANGLADESH KEEP INDIA CLEAN."

(Data collection work in Rajshahi and Naogaon was assisted by Shahiduzzaman.)

Scenario

Pathakpara of Kurigram

The inhabitants of Pathakpara have already done their calculation. They understand which will be profitable. According to Manjuara (40)– an inhabitant of Pathakpara in Kurigram, situated 3 km away from Rajarhat Upazila headquarters– "A serious attack of diarrhoe will cost you up to Tk 500 buying medicines." The expense for treatment will have to be met by selling some household things or by taking loan. But it is possible to prevent diarrhoea by buying a sanitary latrine which costs Tk 170. Everyone from children to elderly people of Pathakpara knows about the benefit of using hygienic latrine. They know how to protect the health. Mina Begum (25) said, if the sandals are not worn, while going to the latrine, the worms crawl up and destroy the digestive system. All of them are clear about the hygienic rules like washing hands with soap or soil properly before having food or after relieving. Eshahak (55), said that the human wastes are not found on the roads any more. Everybody got used to sanitary latrines and has given up the bad habit of defecating in the bushes or jungles. The villagers informed that out of 300 families in the village, there are only 28-30 families who do not have the latrines. But many of them deposited money in advance for ring-slabs Uddyam Shangstha, an NGO in the village. The ring-slabs are manufactured in the courtyard of the organization's office. A set of ring–slabs costs Tk 170. The Director of NGO Abed Ali informed that the organization implemented a project in 2001 with the help of "NGO Forum for Drinking Water Supply and Sanitation". In January 2001, when the baseline survey was done, the population of the village was 3,170 consisting of 300 families. Among them, only 42 families had ring-slab latrines. But now there are approximately 90% families having hygienic latrines. He said that they have a target where by 100% of the families will use latrines within 2003. With a views to achieve this target, a village improvement committee has been set up. Consisting of 15 members, the president of this committee is, Shahidur Rahman, the Imam of the local mosque. Every month a meeting is held where the committee discusses about their progress. Apart from this, the committee informs the women about the various ways of safe health. The upazila nirbahi officer (UNO) wants to fulfil the target in the whole upazila within June 2003. Keeping that in mind a project has already been started based in Rajarhat upajila with the support of UNICEF. It was started in July 2002. A vast campaign was done by the chowkidars on sanitation and a notice was served to every household with respect to installing hygienic latrine and its usage. The UNO made sudden visits to inspect from house to house. There are 53 cases filed against the pollution of environment. The UNO Sheikh Rafiqul Islam said, "In the beginning legal threat was given, but now we lay more emphasis on motivation. Everyone knows about the hygienic latrine in the upazila. An orientation course is being run for various leaders from every field, like– teachers, imams, the chairmen–members of union parishads, NGO and political leaders etc. More than 500 student brigades have been formed in schools, colleges and madrasas. VGD card-holders and students awarded with scholarships are buying ring–slabs for latrines from their monthly savings.

A budget of Tk 2.5 lacs has been allocated from ADB, which is being distributed amongst various unions to buy ring–slabs for poor families. He informed that by implementing mobile latrine manufacturing unit, they are selling one ring and slab at Tk 171. To ensure good quality of ring–slabs, the private manufacturers were given training. The information collected from upazila parishad is that before the project had started 30% family used hygienic latrines out of a total number of 3188 families. Now it has gone up to 90%. Rest of the families will install latrines within June 2003.

–Abdul Khaleq Faruque

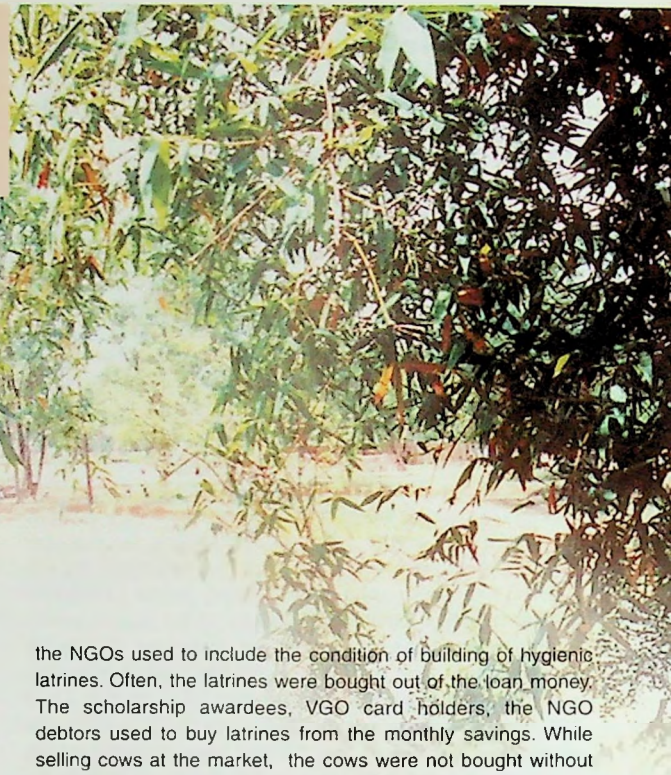
Activities of NGO Forum

NGO Forum is implementing its project Water Supply and Sanitation (WATSAN) with an objective to ensure proper sanitation among poor and uneducated people in the rural areas. It has so far installed 25 lacs of latrines. It is working along with the NGOs, CBOs and private entrepreneurs as a chief coordiniator and support agency to implement safe sanitation in the urban as well as rural areas, which are deprived from one of the most primary facilities like sanitation. The NGO Forum informed that, they are working as a development associate to the government, the funding agencies, as well as the national and international organizations and stakeholders in this sector. The WATSAN Programme is divided into two components–hardware and software. Since most of the people in the country are poor, it gives the advantage of constructing low-cost latrines under the hardware programme. Under this programme, the home made–hygienic latrines, water–sealed latrine, san plant latrines, offset latrines, mould sets and implements for the rural sanitation centre– all are supplied. It provides training to develop health awareness through software. This includes mobile film shows, choir songs, rally, miknig courtyard meetings and folk events. For smooth functioning of the programme, the whole country has been divided into 12 working areas. The areas are: Barishal, Bogra, Chittagong, Comilla, Dhaka, Faridpur, Jessore, Khulna, Mymensingh, Rajshahi, Rangpur and Sylhet. Each of these areas is provided with a local office, well equipped with good administration and management. There are 705 sanitation centres at present, run by various partner organizations of NGO Forum. There are 600 partner organisations. 25 lacs of latrines have been supplied to them. So far about 1 crore and 20 lac people have been benefited through NGO Forum. Apart from this, 7,433 workers of various partner organizations and 46,210 villagers have been trained regarding WATSAN. But the most pathetic condition of the sanitation system is found in the slums of the country. Specially the scenario of Dhaka city is most threatening. The inhabitants of the slums use latrine less than the people of the other parts of the country. Only 13.5% of the slum–dwellers use latrines. Though the NGO Forum has implemented sanitation programme in various towns and slums, the staff of the NGO Forum said that they do not have any programme in Dhaka City.

- Shamim Rahman

PATGRAM

100% Latrine
A Success Presently Marred



An initiative was taken to motivate people in using latrine and to get rid of diarrhoea and other diseases in Patgram village of Lalmonirhat. What is the present situation there? Abdul Khalek from Faruque investigates and reports

An initiative can change the scenario of a place, if it lasts long. If the favourable conditions get fulfilled, it can change the habits of human beings they were accustomed with for a long time and can show a new horizon. The initiatiative is called "Patgram, a project for installation and usage of hygienic lateines among 100% families. The possibility of a big chang in sanitation system was and with the implement of this project initiated by the upazila parishad along with the local people. the project started from April 1999 and ended in March 2002. It was able to draw attention of the national and international researchers and of the development workers as an example.

THE WAY IT STARTED

25 people died of diarrhoea in the flooded Patgram upazila in 1998. This upazila is 90 km away from the district town of Lalmonirhat and the inhabitants of this place became apprehensive of diarrhoeal disease. The Upazila Nirbahi Officer, Shariful Alam, detected that the usage of unhygienic latrines was the cause of diarrhoea. After that, he took the initiative to provide hygienic latrines among 100% of the families in Patgram and made it mandatory for them to use it. A survey was held at that time and it was recorded that the total population of Patgram upazila was 1, 84,295. The number of hygienic latrines used was only by 3,552 families out of 30,938 families. The average percentage was 11.48. Thus, germs were spreading and polluting the total environment and the surroundings. To salvage the situation, the patgram project was approved by the Upazila Parishad and by the District Development and Coordination Committee. Finally, with the support from UNICEF, a social morement began.

THE WAY IT WAS IMPLEMENTED

People from every group irrespective of their opinions were inchuded in this project. Goverment employees, imam of the mosques, students– teachers, chairmen–members of union parishad ansars and the members of VDP and people from every walk of the society got themselves associated in this project spontaneously. While giving the loans, the banks and the NGOs used to include the condition of building of hygienic latrines. Often, the latrines were bought out of the loan money. The scholarship awardees, VGO card holders, the NGO debtors used to buy latrines from the monthly savings. While selling cows at the market, the cows were not bought without the certificate of the UP Chairman certifying that the cow seller has a latrine at his home. While registering a deed of a land or a kabinnama for marrige, the UP chairman or kazi would verify whether the people concerned have latrines at their homes. Student brigades were formed with all the students of schools, colleges and madrasahs for campaigning and motivating people to build latrines in each and very home in the area.

A monitoring team of 5 members was formed consisting the following people–Assistant Commissioner (land), – Upazila Welfare Officer, Fisheries Officer, Youth Development Officer and the Assistant Deputy Engineer of Department of Public Health. With the help of the chairmen and the UP members, the team indentified the families without latrines and made them sign immediately the letter of agreement for building latrines. Finally, the team supervises the entire work.

Before the project started, there were only two centres for constructing latrines at the Department of Public Health Engineering. Later 15 temporary constructing units were built with the help of union parishad to meet the demand. The upazila parishad helped the UP chairmen by giving loans. The workers got trained by the Department of Public Health Engineering in constructing good quality latrines. UNICEF arranged for the tin sheds, rooms and all other things required for guarding these units. A set of 2 rings, one slab and one bamboo cage for a latrine cost Tk 270, produced by these units. A major campaigning was done through miking, singing Jari songs, bill boards, posters and distributing leaflets. To motivate people, various orientation courses, courtyard sittings, friday congregation sessions and class room discussions were held. Only after the students brigade made sure each house had a

latrine installed, it was declared that there was 100% coverage. One of the characteristics of the project was intense motivational work by which the families were induced to buy a hygienic latrine with their own money. Sometimes presesure tactics were also applied. Unicef helped the project by providing support in areas like motivational campaign, setting up temporary latrine constructing centres, monitoring and so forth.

THE PRESENT SCENARIO

The success of this project no longer holds good due to lack of follow-up, monitoring, supervision and funding problem. There is no active initiative now, regarding this matter. After surveying various villages and localities like Baura of Babra Union, Rasulganj of Nabinagar Municipality, Dhabalsuti and Rahamanpur of Patgram Upazila, this was the scenario we found. 85% of the inhabitants of these areas are using hygienic latrines at their homes. Others have gone back to their old habits. This was because of poverty and mental capacity. Those who are well-to-do like the moderate farmers and service holders, shifted their latrines to other places when the existing pits got filled. The others did not fix the latrines when the fences broke or did not bother to make it useable again once the pits were filled up. There were one or two families who bought the rings and the slabs, but were yet to use them. The discussions revealed that they did know about the various hygienic habits like washing hands properly before having food or after defecating, going to latrines wearing sandals, keeping the courtyard and the surrounding areas of the houses clean. But many of them fail to or cannot follow the rules due to constant economic pressure or regressed mentality. Most of the courtyards were seen piled with garbage. The bottom of the tubewells was filthy. The cow dung were scattered here and there. Many poor families did not have the sandals and own tubewells which are necessary.

Fahima (25) is the inhabitant of Nabinagar whose husband is an ordinary vegetable seller. The family bought the ring-slabs two years back. They could not afford the fencing. So the latrine was not built and the ring-slabs were left unused at the back of their house.

Sakina (30) does not have anything except the house. Her husband is a daylabourer. They were compelled to buy the ring-slabs while buying the house. Those ring-slabs have been implanted underground in the bamboo-clump beside the road. Since it does not have any fence, they cannot use it during the day time.

Mamtaj-uddin (65), of the same village has got a latrine, but during the last monsoon it got filled up with the soil. After that, it is not being used. The 10 members of his family now relieve themselves in the adjoining bamboo-clump. Sabina Yasmin (40) bought the ring-slabs with the vulnerable card savings of her poor mother. But they are lying near the tubewell. According to her, the ring-slabs were not used and the latrine was not made because of want of money to build the fences. Anjuara, a student of Baura High School, bought the ring-slabs with her scholarship money but could not install the ring-slabs due to financial crisis. According to her, the money she gets, is spent buying her books, copies and dresses. The money her father earns is not sufficient enough to avail food regularly. Although there is a latrine in Shamser Ali's (57) house, it has been kept unused after the pit was filled. Johura (45) of Dhabalbasati village in municipality area said that they had a ring-slab latrine for 5 families with 25 members. But it was deserted after the fences got broken. The Programme Assistant of BRAC in Baura, Mosammat Rasheda Begum informed that the debtors got the ring-slabs with the loans. They were also asked for maintaining the latrines. Now, the female health workers are looking after these. Member of ward 5 in Baura Union, Mozammel Haque expressed that such a huge task was successful by the united effort of everyone. A. R. M. Faizul Islam, the Certificate Assistant of Patgram Upazila Parishad said, "There is no monitoring in the project due to fund crisis. There are many people who do not have the tubewell and as a result no flushing is done and the pipe gets unfit for use.

The headmaster of T. M. High School of Patgram, A. B. M. Mahbubur Rahman exclaimed that the success they had already gained is being eroded due to the lack of maintenance and follow up. He also added that the project was implemented 50% by administrative pressure and 50% by motivating people. So it will not last if there is no system of following it up. The Chairman of Patgram Municipality, Shamser Ali said that, they had to buy latrines for many poor families with the money collected from various sources. The way the project is going on, half of the people may go back to their old habits within 4-5 years. Ahmed Hossain, Assistant Engineer, Department of Public Health Engineering said, "It is getting difficult to hold on to the success due to lack of monitoring and supervision as there is fund crisis. The project coordinator of UNICEF in Rangpur, Nurul Islam opined that Patgram could be a 'model' for other localities, the way mass awareness was created among the people in favour of hygienic sanitation. "It is also the responsibility of the local people to carry on with the success and not let such a great effort go in vain," he added.

Fahima could not afford fencing due to financial crisis. So the ring-slabs are lying at the backyard.

Munshiganj Municipality

Highly ill-maintained sewerage system–a threat to the public health

— Shamim Rahman

The environment of Munshiganj municipality has taken a horrid shape due to sheer bad sewerage system. Most of the houses situated under this municipality have temporary latrines. There are a lot of houses where stilt latrines are built on outline of the ponds, small ducts or drains. Some of the ring latrines have connecting pipes, which fall into the rivers or ponds. Though the municipality provided some sanitary latrines for domestic purpose, it is very insufficient compared to the demand. There are only two public toilets in the town. The ill-condition of the sewerage system has become a threat for public health in Munshiganj municipality which has a population of 50 thousand.

The district town of Munshiganj is situated on the south–eastern bank of the river Buriganga. The municipality was formed after liberation in January 1972. Later, it grew into a district-town. Divided into 3 wards, the present area of Munshiganj municipality is 10.85 square km. A display notice board in the municipality office says that the numbers of temporary and brick–built houses are 8900 and the population 4461. But according to the local people the numbers, specially the population, may be more. At present, the Munshiganj municipality is facing many problems. One of the acute problems is the sewerage system. The condition of the sewerage system of Ward 2 and 3 are really pathetic. Char Kishorganj, Ramjanbeg, Islampur and Charshil Mandir of ward 3 and the West Deobhog of Ward 2 are going through this noxious situation for a long time. Besides, in most of the houses in Katakhali and Munshirhat, temporary latrines are being used. There are many stilt latrines made by the side of the nearby ponds, ditches and canals. Moreover, though there are many houses where the latrines are made of concrete rings, the pipes from latrines are connected directly with the rivers or ponds. Thus the water of those rivers and ponds are getting highly polluted. There are also many open latrines in these areas which pollute the air with stinking odour. The information was given by the local inhabitant of Katakhali, Shafiqul Hossain. The Sanitary Inspector of the municipality agreed to the comments made by him and said that such complains are often made by the people. At first a cautionary notice is given to the owners of these latrines. After that if they do not take any action, the latrines are demolished by the municipality.

No doubt, the condition of the sewerage system of the municipal town is very grim. The people of the town, specially the shop owners and businessmen in the market are suffering a lot because of such a condition. Ariful Islam, a grocery shopkeeper in the municipality area, informed that people relieve themselves at any place. Textile retailer, Motaleb Mia said, the environment of the market area is getting polluted by this. There is a public-toilet in Munshirhat under the municipality area and the other one is in the bus stand. These are used by thousands and thousands of people from dawn to dusk everyday. Two public toilets are insufficient for a municipal town like this.

There are many homeless people who live in the town, out– skirts of the town and in the suburbs. Many of them live in homes made in deserted places. They do not have any specific place to ease themselves. Jahid, a rickshaw-puller, who lives in Charkishorganj area said, "We do not have a place of our own, so where will we build the latrine?" In all, there are only 995 latrines distributed amongst the inhabitants of the municipality. Mohammad Mahboob Alam, Executive Engineer of the municipality, informed that these latrines consist of 5 and 10 rings with two-pits and have been distributed amongst the people at half price. The stipulated price of these latrines is Tk 5,828. The half of it is Tk 2,914. This specific project was funded by ADB through LGED. But it has finished its work last year. The demand of latrines in the municipality is much more. The chairman of the municipality, when inquired about the causes of such a poor sanitation system and whether there were any plans to overcome it exclaimed that the demand for sanitary latrines in the municipality is huge. The distributed latrines are far less in number than it is required. Most of the inhabitants in this municipal area are poor. They cannot afford the cost of building sanitary latrines. Those who have taken the facilities of getting the latrines at half–price could not pay the money back till now. We are giving them reminders. We cannot put pressure on these poor people. They want it free and it is not possible for the municipality to distribute the latrines free of cost. The total amount is unpaid. If we can collect all the unpaid amounts, we will apply again for latrines. On the other hand, the Department of Public Health Engineering is not paying and heed to the problem of sewerage system. When A.K.M. Faruq, Executive Engineer, DPHE was tried to be contacted, it was said that he was out for office–work. One of the staff informed that they were not doing any work on sewerage system in the municipality area at that point of time.

Do you eat guava? Boiled egg and even bread?

Wild animals also drink cow milk, boiled eggs, bread, guava, Sagar banana, Champak banana and Shabri banana. It seems very funny. But it is true. Some animals prefer beef. They also like edible herbs, cucumbers, various fruits, wheat and maize and even green grass, creepers, snakes, frogs, chameleons and other insects. There are many animals and birds in the Mirpur zoo in Dhaka. These animals come from different climatic and geographical conditions. Their food habits are different. A leopard eats 5 kg beef in a day. A Royal Bengal Tiger needs 12 kg beef everyday. The carnivorous animals generally eat beef. The Indian Lion eats 10 kg of beef. The wild cat eats 500 gm beef and 500 gm Shabri banana; generally the foods are served to the animals in the morning around 11–12 o'clock. The days in which the cages have to be cleaned it rolls down to 3-4 o'clock in the afternoon, for serving them food.

Bear eats 1 kg bread, 2 kg Champak banana, 2 kg edible herbs, cucumbers, other vegetables and half kg of milk.

The animals are served with seasonal vegetables and fruits. Hippopotamuses are herbivorous animals. To feed a hippopotamus everyday, 90 kg green grass, maize and guava are needed. It also eats 10 kg of wheat bran and 20 kg seasonal vegetables and herbs.

Peacocks eat vegetables, fruits, grains, insects, snakes and frogs. There are suppliers to supply these items.

Ria birds come from America. It is mainly herbivorous and eats grass and leaves. But as an omnivorous animal, it also eats small animal like insects, chameleon etc. Apart from these, it eats 400 gm of poultry feed, 500 gm of whole grains, 500 gm of breads, edible red herbs 20 gm and one boiled egg.

Kesoari birds live in Australia. Everyday this bird eats 2 kg of Sagar banana, 800 gm of bread and two boiled eggs.

Balubora bird eats a couple of lizards, mouse and small birds.

Langur eats everyday 2 breads weighing 800 gm, 2 boiled eggs and fruits. Deer each day eats 5 kg wheat bran, 500 gm of til seed–oil cakes, 8-9 kg of green grass, cucumber, guava and bananas. Some snakes eat 1 rabbit and 2 chicks. The snake is fed once in a week. The day is Sunday.

The beef are bought from Gabtoli Market for these animals. The food like meats, vegetables, fruits are supplied by the enlisted suppliers.

There are two big chicken poultries in the zoo. The chicks and the eggs are supplied from there for animals and birds. There are separate containers for drinking water in the cages for the animals and birds. These information were provided by the caretaker of the zoo, Shafiqur Rahman.

–Zeenat Ara

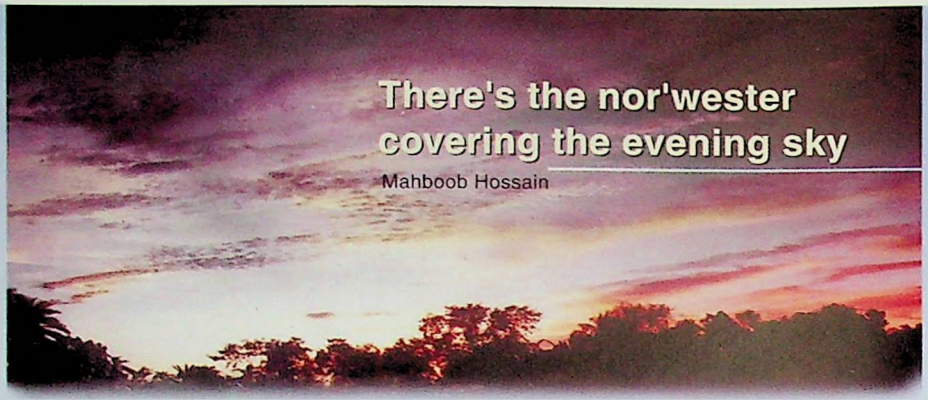
The environment of the human habitation in the north is changing

Re-dredging of the 21 km long Sarmongla Kharia Khal of Godagari upazila in Rajshahi district is going unhindered with support from Barendra Multi Purpose Development Authority and with the funding of UNDP under Sustainable Environment Management Programme (SEMP) of the Ministry of Environment and Forest.

Prime Minister Begum Khaleda Zia inaugurated the workshop on water circulation on 5 June 2003 on the occasion of International Environment Day. She planted a sapling of a fruit tree on the bank of the canal and released small fishes in the canal. The expenditure for water circulation will be collected from the beneficiaries in phases. Meanwhile, a vast amount of land has been included for irrigation and hence, there has been a marked transformation of the cultivated land in Godagari and Paba Upazila.

Cross dam is an infrastructure, placed vertically on the canal, which helps to hold the water in the canal up to a certain level. The excessive water passes over the cross dam and gathers in the next portion. The various crops, which need little water, are being harvested in the banks of the canal with the reserved water in cross dam. Since the Barendra region experiences shortage of rainfall, it has only one crop, Aman, depending upon rain water. Hence, the standard of living of the inhabitants of this area is very low. The water in the upper surface is being reserved by the cross dam and with the re-dredging of the canal three types of crops are being harvested. The farmers are being benefited specially where there is a shortage of water. Nowadays there is extra 5000 megaton of crops produced in 1500 hectre of lands by the side of the canal and the current market price of the produced crops is about taka 4 million. Due to plantation of various kinds of fruit and forest–grown trees the harshness of the weather has reduced a bit and the amount of rainfall has increased. This way a balance has been restored in a desert–like area in terms of overall environment, at the same time it has turned to be a good source of producing large quantity of fruits.

Since it has increased the capacity for reserving water due to re-dredging of canal and building of cross dam, it is considered to be as a big source of recharging the underground water. The usage of the underground water is gradually decreasing and due to increase in the upper level water, it is helping a lot to balance the environment of the area.



There's the nor'wester covering the evening sky

Mahboob Hossain

Ten years back Hamiduzzaman Chowdhury, Director, Weather Forecast Department had said– "We are noticing a dramatic change in the weather for some years, and there is a possibility of more variations in future. It is due to the reaction of Farakka and deforested area on the northern side where the changes of the weather are noticed comparatively more. The way it is changing, perhaps in future we have to change the harvesting time. There is much possibility of more natural calamities. If we cannot control the environmental pollution, the people of this country perhaps will encounter a new climatic condition in the far future. [Source: *Dainik Bangla*, July 1993]

Today, if we analyse the strain and nature of nor'wester that visits us during summer, the comment holds true. The rage of nor'wester has increased. During the summer it hits somewhere or the other everyday. Though it is not possible to know the numbers of nor'wester which had hit, the members of the weather office confirmed the numbers of nor'westers this year were more than last year. In the year 2000, from 23 March–4 May, the weather office recorded a total member of 58 nor'westers by the amino metre. Though many nor'westers could not be recorded by amino metre, the weather experts believed that nor'wester in an average struck everyday. The intensity of nor'wester was higher this year. The storm was very powerful in some places. Such powerful nor'westers did not occur earlier so frequently. A weather expert acknowledged that the character of nor'westers have also changed. In the past, nor'wester usually occurred during the day. But now it does not follow any time. Last year it mostly struck at night. According to the weather expert previously nor'wester used to occur more in the western region of the country and less at the centre. Since last year it is the opposite. Now nor'wester strikes more at the centre.

In the countryside, nor'wester occurs very frequently in the month of March and April. The storm blows from the north-west side and thus it is named nor'wester in English. This storm blows until the monsoon comes in the country during the beginning of March. The weather experts say that the warm–wet stream of air coming from south and the continental dry and cold air from west and north–west merge at a height of 2–3 kms in atmosphere. Then it creates two different waves in atmosphere. After meeting the warm and cold air in the atmosphere, the warm and wet air creates windy clouds upon the cold wave. The nor'wester storm with thunder and lightning is produced from this cloud.

The weather experts informed that the intensity of cyclone has increased recently. Now 3-4 major cyclones occur in a year. Previously, it was one on an average. It may happen due to the change in the weather. Or it may be that previously due to scarcity of technology, it could not be detected. The weather experts do not want to conclude anything without finding the real causes of change in weather pattern. They say, 'One needs to do a lot of research work to know about the causes.' But they believe it might be the influence of the weather changing globally.

It was clear from the research done in Met Office that the temperature in Bangladesh is increasing. This has reached a threatening point in the last 10 years. The Deputy Director of Met Office Samarendra Karmakar informed that the tendency of increasing temperature in the atmosphere in Bangladesh has been observed over the last 10 years during 1961–1990. After going through the documents of the previous 30 years, it was seen that every year the temperature increased by 0.0037 celsius on an average. At the same time, the average quantity of rainfall increased by 4.9323 mm. Observing the previous 30 years and last 10 years, it has been seen that every year the temperature in this country increased by 0.3072 celsius on an average which is almost double compared to the pervious 30 years. In 40 years, the average quantity of rainfall is 4.6909 mm. Therefore in the last 10 years, though the temperature has increased, the rainfall has decreased.

Samarendra Karmakar said that a fair amount of research has to be done to see whether the incident occurred due to the change of weather globally or not. The population is increasing. The forests are being cut down. The transport and industrial pollution is also increasing day by day. The weather ought to be affected by these. But to what extent and why is yet to be found.

The new technique of weather forecasting

An advantage for the farmers

It can be the end of a miserable situation millions of farmers used to face every year. It is the new technique which forecasts the weather in monsoon. The method was used for the first time last year to forecast the weather, about 3 weeks earlier in the gangetic basin in Bangladesh.

Through this new technique it is possible to forecast the the timing of the rainfall, more accurately. The research workers of Georgia Institute of Technology of U.S.A invented this method. The main inventor of this method Peter Webster claimed that this method would help the farmers to take various decisions specially the management of water resource. This process can be used in any place. The statistics are used in this method. At the same time the information, regarding the dynamics of the atmosphere is used elaborately.

Bibhutibhushan and nature

Mridula Bhattachariya

In Bangla literature, the name Bibhutibhushan and the nature are considered to be one and the same. The way he described the nature in his first novel, *"Pather Panchali"*, and the story, *"Upekshita"*, was a perfect description of eternal beauty and ambiance of Bengal. In fact, this is not only applicable for the novels, short stories and diaries of Bibhutibhushan, it is also reflected in his individual nature. The force of nature has not only made him romantic, but also has allured him to the mystic world. We sometimes notice that profound mysticism is mingled with effervescent romanticism in his writings and his extramundane personality was the source of these images.

He realized the essence of the nature and he wrote about it in his diary. "There is a spiritual nature in this world. As we are born within the plants, fruits and flowers, light and shade, sky and the ether, and we are so closely related to them, it's difficult for us to grasp the true image of nature." He was althrough engaged in giving this sun-baked reality a smooth and facile portraiture both in his literary work and practical life. This was possible because of the transcendental quality of his artistic self. His spiritual nature is deeply rooted in the spread out world of organism— trees, florets, fruits, sunbeam and penumbra, wind and sphere are all part of it. Bibhutibhusan's spiritual realm offers a rear consolation to the conscientious people of the twenty-first century and takes on an affirmative journey. He made himself enriched by the abundance of nature and showed his gratitude to the creator. He wrote in his diary—

"I was thinking while wandering on the road to the court in half-light, 'Oh lord! I don't want your paradise, land of the blest, or the abode of lord Vishnu— hold your eternal world of stars for the virtuous supermen. Bring me back to this earthen world. Let your unrevoked blessings be there to iron out my pathway of coming and going to this phenomenal world of fruits and flowers, indelible mournings and sufferings and awestruck childhood." It is not only the gratitude, Bibhutibhushan believed that the relation between nature and human being is similar to the mother and child. He has expressed that undetachable. warm and lively feeling by saying– "This realization opens up with touch of nature which is bare and free. The quiescent soul arises with the scent of idle Margosa flowers, the field, filled with moonlight, the forest of sun plant, the languid songs of the birds in twilight. the picture of sunset in the far end of the field and in the sweet earthen and dry incense of the falling leaves. Hence the nature is like an all

healing plant to me—there is no other medicine to rekindle a dead or fainted sensation."

So Bibhutibhushan satisfied his inner self enjoying the mystery of the world by imbibing everything or by extending himself into everything and then carrying his sensation beyond.

Man is not an animal—he can perceive—he made this statement a number of times. His love for nature was so inherent that he could not accept anyone who was incapable of perceiving nature. His only desire was that every human being should feel the nature strongly with his every sense. He wrote in his diary— "This open nature, the sloping banks of rivers covered with grasses, catkin, the forest of silk cotton plant, the chirping of birds—the blue mountain ranges, the unfathomed oceans, the unknown continents—the laughing faces of children, beautiful maiden, the affectionate wife, the noble friends, the helpless groups of poor—the amazing history of this great mankind, rise and fall, the evolution of politics and society, this enormous world of stars, planets, satellites, the nebula comet, the shooting stars, x-ray, the unknown power of the world, electricity, invisible rays, high penetrating radiation—that land of spirits, the mysterious eternal life after death, the endless and splendid mystery of life, the vastness and endurance of thoughts—those who are not engrossed by these mysteries and are satisfied with the cattle cake and feed meant for the cows and buffaloes, those who became ignorant, inert and indifferent about the profound mysteries—they are the eternal unfortunate beggars—who can salvage them from poverty?"

Here we see the uniqueness of Bibhutibhushan and his yearning to discover mysteries. For his material, Bibhutibhushan has profusely drawn upon trees, wild flowers, fruit and the soil and brewed them with his own imagination, which is vast, mysterious, splendid and beautiful. A wonted thing very easily becomes an unusual experience in Bibhutibhushan's work. All that meandering feeling he creates and evokes us to a sorcerous entity— "What a wonderful sight, the bank near Khabrapota—the brick-red scrap of cloud floating in the sky behind a silk cotton tree—greenery everywhere. What beauty, what peace, such softness, mind is full of happiness with wet, sweet and juicy fragrance of green sugarcanes. I am resting, looking at the sky and the trees far off." As a writer of *'Pather Panchali'*, Bibhutibhushan got enormous popularity and readership, which is a rare instance in the history of Bangla literature.

Rabindranath personally felicitated him and said, "The book is standing on its own truth." The main character in *"Pather Panchali"*, Apu's childhood, adolescence and youth, all were controlled by nature. When he was exhausted and totally shattered with the domestic troubles, it was only the nature which stood by him as a shelter. It is very normal for a human being to corelate his power with a bigger power, otherwise he feels very lonely. The crucial moment in Apu's life could have damaged his healthy development by repressing and confining his own desires, nature was his only support. It is the nature which possesses its place in domestic life through emotional upsurge and close contact with human being. In Apu's life this was fulfilled with streams, plants, sky and clouds.

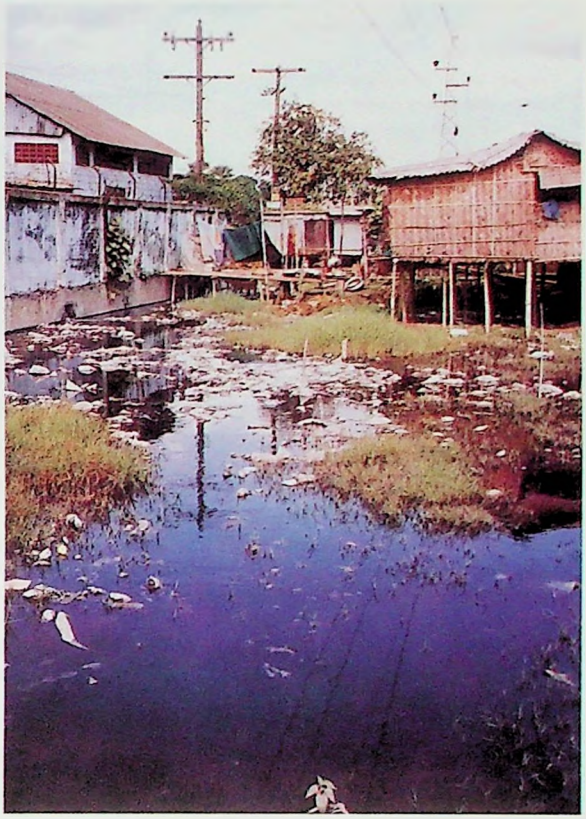
No doubt, Apu's love for nature, as he grew up, did not cramp, but became even more intense. His love for poetry and nature flew not only parallel, but were complementary to each other. He used to listen to his guru at primary school, "This is the spring in the mountain situated within human society. The breeze is always blowing at the peak. It is always adorned with deep blue sky along with dark clouds"– the verse, full of Sanskrit sonance made him aware about the beauty and man's interwined relationship with nature.

During the later years, when he learned to enjoy poetry, the poetic and the natural world became singular to him– "Looking at the cloudy sky above the bamboo-clump, he saw— someone extending his hands, praying for the immortal armoar and earrings taking advantage of generosity of a young hero". It is not difficult to understand the reason behind mingling of poetry and the natural world in Apu's mind. He got variant savour of domestic life from nature and at the same from poetry.

His extroverted mentality was supported by the nature as well as by poetic passion. Hence the picture of Apu's early life was filled with strokes of nature. The various streams of thoughts and imaginations and it's steps were revealed periodically by description of the nature. After *"Pather Panchali"* was published many people could not understand the inevitable part of nature described in the story and termed it as 'Botanical novel'.

In fact, the society was like nature to Apu, or its substitution. It was his merit that Bibhutibhushan was able to show the world of plants, animals and birds in a lively manner in his creation because of his acute observation and perpetual love for nature. He could not have been that successful, if he had not got the experience from his childhood. Since his experiences were confined within a specific place in Bangladesh, many people wanted to restrict his creation within a narrow boundary. Though from a particular milieu it never lacked profundity. Bibhutibhushan was very cautious about this and wrote— "When we say we love this world, we do not realize that this love is for a very narrow and favourite place. The plants, brooks, soil and the people of that place are very dear to me. Hence, in loving them we tend to believe we love the world very much. In fact, it is that particular village or city which is my world." A child is brought up in his or her mother's shelter. Then one day it comes out of the shelter and grows up in a natural way. Likewise the civilization has passed through the old mother nature. Bibhutibhushan realized this truth and we can observe it in Apu's character—the childish state of mind instead of elderly complicated mentality. While reading the book, a question arises—how much do the present readers value the philosophy of a great nature lover? The dominance of civilization upon the nature is evident today. We do want to reinstate nature along with a healthy agricultural and industrial growth. We have to be conscious about the degradation of nature. Ecosytem is equally important for our social environment. And Bibhutibhushan inspires us to that end and teaches us to love nature more deeply.

Public policies to ensure environmental sustainability**



Ensuring environmental sustainability–the seventh Millennium Development Goal–requires achieving sustainable development patterns and preserving the productive capacity of natural ecosystems for future generations. Both efforts in turn require a variety of policies that reverse environmental damage and improve ecosystem management. The challenge has two dimensions: addressing natural resource scarcity for the world's poor people and reversing environmental damage resulting from high consumption by rich people.

Many environmental problems arise from the production and consumption patterns of non-poor people, particularly in rich countries. Rich countries consume a lot of fossil fuels and deplete many of the world's fisheries, damaging the global environment. They also use a lot of tropical hardwoods and products from endangered species.

To ensure the sustainability of Earth and its resources, including the development prospects of poor countries, these harmful production and consumption patterns must change. Energy systems will have to generate much lower greenhouse gas emissions. Fisheries will have to be managed based on ecological limits rather than heavily subsidized free-for-alls. And international rules of the game will have to mitigate the over consumption that endangers ecosystems and certain plants and animals. But with smart policies and new technologies, the costs of these changes can be quite low.

At the same time, many environmental problems stem from poverty–often contributing to a downward spiral in which poverty exacerbates environmental degradation and environmental degradation exacerbates poverty. In poor rural areas, for example, there are close links among high infant mortality, high fertility, high population growth and extensive deforestation, as peasants fell tropical forests for fire-wood and new farmland.

Given this chain of causation, policies that reduce child mortality can help the environment by lowering population growth and reducing demographic pressures on fragile ecosystems. Other examples of poverty contributing to environmental degradation abound.

Thus reducing poverty can play a pivotal role in environmental protection. Worsening environmental conditions–including depletion of natural resources and degradation of ecosystems and their services–hit poor people the hardest. And when poor people degrade the environment, it is often because they have been denied their rights to natural resources by wealthy elites. In many cases, for example, poor people are forced onto marginal lands more prone to degradation.[1]

Around the world, 900 million people live in absolute poverty in rural areas,

Goal 7 : Ensure environmental sustainability

Target 9 : Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources

Target 10 : Halve, by 2015, the proportion of people without sustainable access to safe drinking water.

Target 11 : By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers

depending on the consumption and sale of natural products for much of their livelihoods. In Tanzania poor people derive as much as half of their cash incomes from the sale of forest products such as charcoal, honey, firewood and wild fruits.[2] The least developed countries are the most dependent on agriculture and natural resources. Yet relying on primary products-agricultural and forest products, minerals, fish-for export earnings makes developing countries highly vulnerable to resource depletion and worsening terms of trade.

The relationship between poverty and environmental resources also has a strong gender component. Poor women and girls are hurt disproportionately by environmental degradation, often because they are responsible for collecting fuel, fodder and water. In many countries deforestation forces rural women and girls to walk farther and spend more time and energy collecting fuel wood. In Africa they spend up to three hours a day just fetching water, expending more than a third of their daily food intake.[3]

Poor people tend to suffer the most from air and water pollution. They spend more of their household incomes on energy, yet the services they receive are often of low quality such as biomass fuels burned in inefficient, polluting stoves, or kerosene lamps that cost more per unit of illumination than lamps powered by an electricity grid.

Poor people are also the most vulnerable to environmental shocks and stresses, including floods, prolonged droughts and the emerging effects of global climate change (box 6.1). Moreover, they are the least capable of coping with such shocks and stresses. In dryland India biodiversity-related products (such as wild fruits or honey) usually account for about 20% of the incomes of poor rural people. But during droughts they account for more than 40% because cultivated crops fail.[4]

Ignoring environmental sustainability, even if doing so leads to short-run economic gains, can hurt poor people and undermine long-run poverty reduction.[5] The strong links between poverty and the environment call for a focus on the needs of people whose livelihoods depend on natural resources and environmental services. In policy and practice, environmental management should create income-generating opportunities, strengthening people's property and user rights and fostering their participation in political decision-making.

The links between poverty and the environment also run in the other direction. Poor people are often deprived of the means and rights to invest in the sustainable use of environmental resources through improved water treatment and sanitation, cleaner energy technologies and so on. Poor people also lack the money to invest in substitutes for environmental services.

Ever-expanding consumption hurts the environment through polluting emissions and waters. Growing depletion and degradation of renewable resources also undermine livelihoods. Over the past 50 years carbon dioxide emissions quadrupled, with much of the increase occurring in rich countries. In 1999 per capita carbon dioxide emissions in high-income OECD countries exceeded 12 metric tones- compared with 0.2 tones in the least developed countries.

Because of their larger contributions to global environmental degradation and their greater financial and technological resources, rich countries bear much of the responsibility for addressing environmental concerns. Rich countries also need to help poor ones pursue environmentally sustainable development. Achieving the Millennium Development Goals requires policies that stress the complementarity betwen sustainable development and environmental management and that minimize the trade-offs. Indeed, ensuring environmental sustainability is essential for achieving the other Goals (Table 6.1)

Box 6.1

How global climate change threatens developing countries

Global climate change is expected to increase the economic disparities between rich and poor countries, especially as temperatures increase. The estimated damage for poor countries partly reflects their weaker adaptive capacity. Hence climate change is a major development issue.

Climate change could lead to large-scale, possibly irreversible changes in Earth systems, with effects at the global and continental levels. Though the livelihood and scope of these effects are not well known, they will be significant and so must be reflected in policy-making. Potential effects include:

- Reduced crop yields in most tropical and subtropical regions and increased variability in agricultural productivity due to extreme weather conditions (droughts and floods).
- Increased variability of precipitation during Asian summer monsoons, which could reduce food production and increase hunger.
- Reduced water availability in many water-scarce regions, particularly subtropical regions. Increased water availability in some water-scarce regions-such as parts of South-East Asia.
- Increased destruction of coral reefs and coastal ecosystems and changes in ocean-supported weather patterns.
- Rising sea levels. With a 1 metre rise in sea level, partly due to global warming, Egypt could see 12% of its territory home to 7 million people disappear. Rising seas threaten to make several small inland nations-such as the Maldives and Tuvalu-uninhabitable, and to swamp vast areas of other countries.
- Increased exposure to vector-borne diseases (malaria, dengue fever) and water-borne diseases (cholera).

Source: IPCC 2001a, b; UNDP 1998.

ENVIRONMENTAL RESOURCES

Ecosystems and natural resources, fundamental to so many productive activities, contribute much to the global economy. In the late 1990s agriculture accounted for nearly a quarter of the GDP of low-income countries.[6] Industrial wood products contributed $400 billion to the global economy in the early 1990s, and fisheries accounted for $ 55 billion in exports in 2000.[7]

Scarce natural resources and ecosystem stresses often force unwanted trade-offs on poor communities. A community can get more food by converting a forest to farmland, but in doing so it may lose environmental services such as timber, biodiversity, clean water, flood regulation and drought control.

FOOD

Human well-being depends on natural resources and environmental services that help produce food. People rely on soils to grow corps, grasslands to raise livestock and freshwater and oceans to support fisheries. Underlying much of this productivity: genetic resources. Over centuries farmers have generated crucial stocks of knowledge and productivity by breeding livestock and selecting, storing and propagating plant

TABLE 6.1 **Why reaching the environmental Goal is so important for the other Goals**

Goal	Links to the environment
1. Eradicate extreme poverty and hunger	Poor people's livelihoods and food security often depend on ecosystem goods and services. Poor people tend to have insecure rights to environmental resources and inadequate access to markets, decision-making and environmental information- limiting their capability to protect the environment and improve their livelihoods and well-being. Lack of access to energy services also limits productive opportunities, especially in rural areas.
2. Achieve universal primary education	Time spent collecting water and fuel wood reduces time available for schooling. In addition, the lack of energy, water and sanitation services in rural areas discourages qualified teachers from working in poor villages.
3. Promote gender equality and empower women	Women and girls are especially burdened by water and fuel collection, reducing their time and opportunities for education, literacy and income-generating activities. Women often have unequal rights and insecure access to land and other natural resources, limiting their opportunities and ability to access other productive assets.
4. Reduce child mortality	Diseases (such as diarrhoea) tied to unclean water and inadequate sanitation and respiratory infections related to pollution are among the leading killers of children under five. Lack of fuel for boiling water also contributes to preventable waterborne diseases.
5. Improve maternal health	Inhaling polluted indoor air and carrying heavy loads of water and fuel wood hurt women's health and can make them less fit to bear children, with greater risks of complications during pregnancy. And lack of energy for illumination and refrigeration, as well as inadequate sanitation, undermine health care, especially in rural areas.
6. Combat major diseases	Up to 20% of the disease burden in developing countries may be due to environmental risk factors (as with malaria and parasitic infections). Preventive measures to reduce such hazards are as important as treatment- and often more cost-effective. New biodiversity-derived medicines hold promise for fighting major diseases.
7. Develop a global partnership for development	Many global environmental problems-climate change, loss of species diversity, depletion of global fisheries-can be solved only through partnerships between rich and poor countries. In addition, predatory investments in natural resources can greatly increase pressure to overexploit environmental assets in poor countries.

Source: Based on UNDP, DFID, World Bank

varieties. Diverse genetic resources enable farmers to adapt to environmental change by creating new livestock and plant varieties better suited to new conditions. In periods of scarcity, wild biodiversity is also a source of alternative food products.

BOX 6.2

Improving the lives of slum dwellers

An estimated one–third of the developing world's urban population lives in slums. They contend with overcrowding, substandard housing and poor access to safe water and sanitation–resulting in high rates of disease and infant mortality.

Rapid urban growth suggests that the problems of slum dwellers will worsen in cities already vulnerable. The United Nations projects that between 2000 and 2010, 85% of the growth in the world's population will occur in urban areas–almost entirely in Africa, Asia and Latin America. In 2001 more than 70% of the urban populations in the least developed countries and Sub-Saharan Africa lived in slums. Without substantial interventions, this figure will increase.

Millennium Development Goal 7 calls for significant improvements in the lives of at least 100 million slum dwellers by 2020. Traditionally, donors have been less focused on the needs of urban residents. But with growing pressure to manage rapid urban growth, that is beginning to change.

Though cities are often associated with environmental destruction, their high population densities offer opportunities to build crucial infrastructure–such as sanitation, transport and health care services–at lower costs per capita than in rural areas. Urban environments can also offer better prospects for making governments more responsive and accountable to people's needs. The success of slum dweller associations around the world–such as in Mumbai, India, and Nairobi, Kenya– suggests that higher population densities and closer proximity to decision-makers enable poor urban residents to make their voices heard.

Total, urban and slum populations worldwide, mid-2001

Region	Total population (billions of people)	Urban population (percent)	Urban slum population (percent)	Urban slum population (thousands of people)
World	6.1	47.7	31.6	923,986
Rich regions	1.2	75.5	6.0	54,068
Developing regions	4.9	40.9	43.0	869,918
North Africa	0.2	52.0	28.2	21,355
Sub–Saharan Africa	0.7	34.6	71.9	166,208
Latin America and the Caribbean	0.5	75.8	31.9	127,567
East Asia and Oceania	1.4	39.0	36.3	194,323
South–Central Asia	1.5	30.0	58.0	262,354
South–East Asia	0.5	38.3	28.0	56,781
West Asia	0.2	64.9	33.1	41,331
Central and Eastern Europe and CIS	0.4	62.9	9.6	24,831

Estimates from African Population and Health Research Centre, in collaboration with UN HABITAT.
Source: UN-HABITAT 2002, UN 2002i.

WATER

Natural resource mismanagement and degradation threaten vital water services–undermining economic growth, human well–being and environmental resilience. About 1.7 billion people, a third of the developing world's population, live in countries facing water stress (defined as countries that consume more than 20% of their renewable water supply each year). If current trends persist, this number could increase to 5.0 billion people by 2025.[8] Limited access to water is weakening the development prospects of many countries, and conflicts over water use and distribution are a common cause of international disputes.

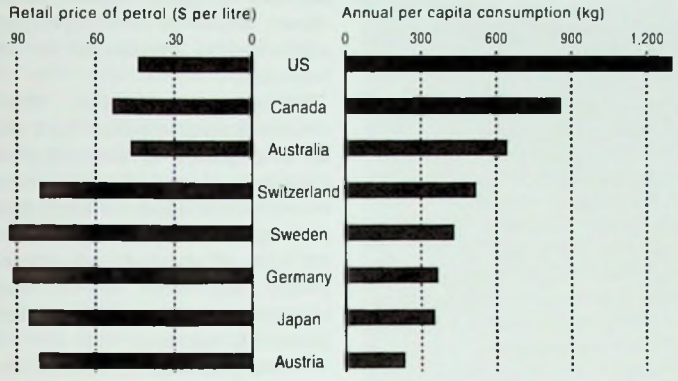
ENERGY

More than 2 billion people lack access to electricity and the services it provides, including lighting, refrigeration, telecommunications and mechanical power.[9] These services are essential to delivering education and health care and to creating productive employment opportunities.

In the poorest counties more than 80% of energy comes from traditional sources such as dung, crop residue and fuel wood.[10] Inefficient stoves and heating technologies often force local people to gather traditional fuels at a rate that exceeds the natural regeneration of these resources, degrading land. Cooking with such fuels can produce extremely high levels of health-damaging air pollutants, both indoors and out. Solutions to such problems involve in rich countries to the use of low-cost, low-emission technologies in developing countries.

Transportation, the most energy–intensive sector, is a key challenge for achieving sustainable energy use. Governments should provide incentives for consumers and producers to switch to more efficient vehicles and more sustainable resource use. The price of petrol, much of which is determined by taxes, can make a big difference. Among OECD countries Canada and the United States have some of the lowest petrol prices–and, not surprisingly, the highest per capita

Figure 6.1
Higher petrol consumption is associated with lower prices in OECD countries, 2001



Source: IEA and OECD 2003

Box 6.3

Involving local residents in conservation in Guanacaste, Costa Rica

Since its inception in 1985, Costa Rica's Area de Conservacion Guanacaste (ACG) has exemplified a new model of conservation–one featuring decentralized decision–making, a commitment to making wild land a productive asset and a focus on making conservation economically sustainable. Designated as a World Heritage site by the United Nations Educational, Scientific and Cultural Organization, the ACG encompasses 2% of Costa Rica's national territory and its home to more than 235,000 species–65% of the country's biodiversity.

Through a local council, civil society is involved in decision-making on the area, which is one of the region's largest employers and hires only native Costa Ricans. More than $45 million has been invested in the area's development, and its annual budget of $1.5 million is spent directly in the area and neighbouring towns. Local businesses benefit from the influx of visitors. In addition, the ACG serves as a springboard for applied research being conducted by the National Institute for Biodiversity: forest restoration will increase the habitat available to search for profitable natural chemicals. Other environmental services provided by the ACG include eco–tourism, water generation and carbon storage.

The main lesson of Guanacaste is that protected areas must be managed entirely at the local level, with resources suitable for their sustainability. The ACG manages and develops 2% of the country at almost no cost to Costa Rican taxpayers.

Source: Janzen 2000, pp. 122-32; UNDP 2001a

consumption. Austria and Japan have among the highest petrol prices–and per capita consumption one-quarter the US level and one-third the Canadian level (figure 6.1). In India petrol costs four times as much (at market exchange rates) as in the United States.

LIVELIHOODS

Natural resources and environmental services are a direct source of livelihood for many people–especially poor people in rural areas, who are the most severely affected when the environment is degraded or access to environmental assets is limited or denied. By maintaining the environment's health and productivity, natural resources and environmental services maintain livelihood options and potential for diversification. Variety is essential because poor people need to be able to diversify their use of natural resources and environmental services as conditions change.[11]

POLICY RESPONSES

Policy interventions to address natural resource scarcity for the world's poor people and– to reverse environmental damage from over consumption in rich countries must take into account the diversity of the natural environment, the many and varying causes of environmental degradation and the complex links between poverty and the environment. Interventions should also draw on past efforts to improve environmental management:

- Environmental management cannot be treated separately from other development concerns. To achieve significant, lasting results, it must be integrated with efforts to reduce poverty and achieve sustainable development. Improving environmental management in ways that benefit poor people requires policy and in-situational changes that cut across sectors and lie mostly outside the control of environmental institutions including changes in governance, domestic economic and social policies and international and rich country policies.[12]
- Successful environmental policies must see poor people not as part of the problem but as part of the solution (Boxes 6.2 and 6.3)
- Environmental problems must be actively managed as part of the growth process. Environmental improvements

Box 6.4

Promoting equity and the environment— a creative fiscal example from Brazil

In 1992 most Brazilian states adopted an ecological value added tax (Imposto sobre Circulacao de Mercadorias e Servicos, or ICMS–E). A levy on goods, services, energy and communications, the tax is the largest source of revenue in Brazil. One–quarter of the revenue goes to municipalities, with allocations to individual municipalities based on various indicators of environmental performance. The states of Parana and Minas Gerais, for example, distribute revenue based on the proportion of protected areas in each municipality, weighted by a conservation factor related to protection of each area.

The ICMS-E was intended to compensate municipalities with large conservation areas for the resulting loss of revenue. Revenue from the tax is often used to maintain parks and reserves, including tool purchases and employee salaries.

In some states the tax appears to have significantly increased the number and size of protected areas. In Parana conservation areas grew by more than 1 million hectares between 1991 and 2000–a 165% increase. During 1995-2000 Minas Gerais also added more than 1 million hectares–a 62% increase. *Source:* May and others 2002.

Global fisheries–getting sunk by subsidies

Around the world, fish stocks are being depleted because of unrestricted, highly advanced fish harvesting. Overfishing occurs in Asia, parts of Africa and Latin America and many small island countries–with overfishing by local residents often aggravated by fishing fleets from rich countries. According to the United Nations Food and Agriculture Organization, more than a quarter of the world's fisheries are over exploited or depleted.

Global subsidies for fishing are conservatively estimated at $ 10-15 billion a year–about a quarter of the annual $56 billion trade in fish. These loans, tax incentives and direct payments often support distant fleets that are too large given available fish stocks. The United States provides about $ 400,00 a boat to help its fishers catch tuna in the South Pacific. In 1996 the European Union spent $252 million–a third of its budget for fisheries–on access agreements for its fleets to fish in distant waters. The European Union also continues to spend more on harmful subsidies–such as to build new boats or modernize old ones (1.2 billion euros in 2000-06 from EU and national budgets)–than on efforts to reduce fishing (1.1 billion euros). According to the World Bank, only 5% of fishing subsidies have a positive environmental aim. Most reduce fish stocks and hurt marine ecosystems.

Source: Institute for European Environmental Policy 2002; WWF 1998; IFPRI 2001; Milazzo 1998.

cannot be deferred until rising incomes make more resources available for environmental protection.

Six policy principles should guide environmental policies:

- Strengthening institutions and governance.
- Making environmental sustainability part of all Sector policies.
- Improving markets and removing environmentally damaging subsidies.
- Bolstering international mechanisms for environmental management.
- Investing in science and technology for the environment.
- Increasing efforts to conserve critical ecosystems.

STRENGTHENING INSTITUTIONS AND GOVERNANCE

Many environmental problems are grounded in institutional failures and poor governance. Three institutional failures are especially important for environmental management: inadequate property and user rights, insufficient information and opportunities for local stake-holders to participate in decision-making and weak monitoring and enforcement of environmental standards (Box 6.4).

At the international level institutional and governance problems are evident in struggles to develop fair, effective systems to manage global resources such as oceans and the climate. At the national level weak property and user rights are a common cause of environmental problems such as deforestation, overgrazing and over-fishing. Managing open access to a common resource is difficult because the decisions of individuals and companies are based on private costs and benefits–and so can reduce environmental and community well-being.

To respond, local people must have the power to manage the environmental systems on which their livelihoods depend. How? Partly by clarifying overall property and user rights to common resources, which may require reforming policies and institutions that control access to land and natural resources. And partly by strengthening women's property rights, because women tend to be more dependent on environmental resources for their livelihoods.

Decentralization can improve environmental governance. But it should be accompanied by efforts that build community capacity to manage environmental resources and influence planning and policy-making. Respecting the rights of marginal and indigenous groups, who often rely on natural resources for much of their incomes, is particularly important.

In many developing countries natural resources are plundered by corruption, benefiting powerful elites at the expense of poor people who depend on such resources. Countering corruption requires strengthening governance, with better enforcement, stiffer penalties and increased community involvement. In several countries citizens are assessing how well governments provide access to environmental decision-making and regularly monitoring environmental governance. Both efforts will likely spur further progress.[13]

MAKING ENVIRONMENTAL SUSTAINABILITY PART OF ALL SECTOR POLICIES

Most sector policies affect the environment, but too often environmental considerations do not

inform policy-making. More scientific advice can ensure that understanding of the natural world feeds into the political process at all levels. Economic analysis, incorporating valuations of environmental assets, should also inform policy-making in all sectors.

Sector policies with significant effects on the environment should be subject to rigorous environmental impact assessments. In addition, Poverty Reduction Strategy Papers– as well as national development and sector strategies–should explicitly address environmental protection and management. National governments, multilateral organizations and bilateral aid agencies need to systematically incorporate environmental impact assessments into their policies and programmes.

Social policies related to the Millennium Development Goals also affect environmental quality. Investments in human development, particularly in education for women and girls, offer numerous environmental benefits, including reduced population pressure. So, environmental policies need to address the gender dimensions of the links between poverty and the environment, integrating them into the formulation, implementation and monitoring of Poverty Reduction Strategies and related policy reforms.

National frameworks, such as strategies for sustainable development, should guide policies for natural resource management in light of a country's specific resources and concerns. Many national environmental action plans fail to address their effects on other sectors and on the needs of poor people. To improve environmental policy-making, such plans should explicitly address these concerns–as well as their contributions towards reaching the Goals.

IMPROVING MARKETS AND REMOVING ENVIRONMENTALLY DAMAGING SUBSIDIES

The normal operations of markets drive apart private gains and social costs because productive activities often generate private benefits for economic agents but impose costs on society. Thus regulation or corrective taxation may be required to align private and public incentives with the need for environmental protection.

Especially harmful are government policies, such as direct or hidden subsidies, that send the wrong signals by pricing environmental resources inappropriately. Reducing environmentally damaging subsidies is often far more cost-effective than directly regulating economic activity. Reflecting environmental costs in market prices–through pollution charges and other market-based policies–also promotes environmentally sound practices and sustainable use of natural resources.

Prices for irrigation water are an important example. Even though water is becoming more scarce in many countries, it tends to be provided to users almost free of charge. That approach promotes waste, increases soil waterlogging and salinization and discourages farmers from investing in water conservation. Other environmentally damaging policies include subsidies that promote large-scale commercial fishing and forestry and excessive use of agricultural chemicals such as fertilizers and

Box 6.6 **Felling forests–with subsidies**

In 1998 the Group of Eight (Canada, France, Germany, Italy, Japan, the Russian Federation, the United Kingdom, the United States) committed to protecting the world's forests. But some G–8 members continue to subsidize forest industries–undermining forest protection and accelerating forest loss.

Among the most pervasive subsidies are low charges for logging companies cutting old-growth wood on public lands, tax write–offs for logging companies, government construction of logging roads at no cost to the companies that will use them and direct grants to logging companies for, say, planning costs. Canada, Japan and the United States are the leading G–8 subsidizers. Among European members, France stands out as the only government with direct investments in logging companies.

Canada's subsidies total $ 2.0–2.7 billion a year. Japan subsidizes sawmills that process logs imported from old-growth forests in Canada, Siberia and elsewhere, and its export promotion agencies support programmes that destroy old–growth forests and hurt traditional communities in Australia, Indonesia and elsewhere. In the United States timber sale programmes in national forests cost taxpayers more than $ 2 billion in 1992–97. France is building roads and making related logging investments in environmentally sensitive areas of Central Africa. Numerous studies have shown that such road building does serious harm to the region's primary tropical forests. The Russian Federation's forests are beset by massive illegal logging. Not collecting taxes and fees from such operations is a type of subsidy, offset somewhat by the high risks of doing business in the country.

Source: Sizer 2000, Myers and Kent 1998.

Box 6.7 **Policy responses to climate change**

Scientific evidence strongly supports immediate action to curb the greenhouse gas emissions that cause global warming. The 1997 Kyoto Protocol places most of this burden on rich countries–because while they contain only 16% of the world's population, they generate 51% of such emissions.

The protocol calls on rich countries to reduce carbon dioxide emissions by at least 5% of 1990 levels by 2008–12. Supporters of the protocol see this as an important step towards mitigating climate change. Opponents castigate it for unnecessarily high implementation costs–due to restrictions on emissions trading–and for a lack of emission limits for poor countries. Another criticism is that, even if fully implemented, the protocol would reduce the average global temperature by less than 0.15 degrees Celsius by 2100.

The United States, which produces 25% of global greenhouse gas emissions, has refused to ratify the protocol. Without US participation, no international agreement on climate change is likely to significantly reduce the threat of global warming. But international cooperation is required to provide incentives for the private sector, consumers and governments to reduce greenhouse gas emissions.

To increase acceptance of the protocol, more attention should be paid to minimizing the costs of combating climate change. It will also be important to build on the Clean Development Mechanism, which permits reductions in carbon emissions through innovative international trading systems.

In addition, there is scope for long-term reductions in greenhouse gas emissions in rich and poor countries beyond the terms of the Kyoto Protocol:

- Developing clean energy technologies solar or wind energy, fuel cells, hydropower, geothermal energy–that release little or no carbon dioxide. Making these technologies cost- competitive with fossil fuels will require increasing public investment in research and development and removing fossil fuel subsidies.
- Developing safe, economical carbon sequestration technologies that prevent the release of carbon dioxide into the atmosphere. Promising examples include natural carbon sinks such as forests, sequestration in deep seas and mines and chemical fixation of carbon dioxide as thermodynamically stable metal carbonates.
- Increasing energy efficiency through more efficient vehicles, appliances, lighting and industrial motors, and through reduced electricity transmission losses.

Source: UN 1997; Nordhaus and Boyer 1999, pp. 93-130; World Bank 2003i; Baumert and others 2002.

pesticides (Boxes 6.5 and 6.6).

Topping the list of damaging subsidies, however, are those for fossil fuel consumption. Worldwide, their value exceeds all foreign aid from all sources.[14] There is growing consensus that energy subsidies should focus on expanding access to technology, developing and disseminating cleaner fuels and increasing end use efficiency–not promoting consumption. As some European countries show, pricing fossil fuels appropriately can provide a powerful incentive for increasing the use of renewable energy. The lower unit costs of renewable energy technologies benefit both rich countries and developing countries considering their adoption.

Policy interventions should also account for the impact of economic activities on environmental assets. National income accounts (such as GDP) should differentiate between in–come from sustainable use of natural resources (sustainable agriculture and forestry) and from activities that reduce stocks of natural capital (extracting minerals or oil). These accounts should also include the effects of economic activities on environmental quality and productivity, such as soil and water degradation.

Such "green" accounts place environmental problems in a framework that economic ministries understand. They also encourage decision-makers in finance, planning and sector ministries to pay more attention to environmental degradation. When the costs of environmental degradation and natural resource depletion are accounted for, Sub-Saharan Africa's net savings rate goes from positive to negative in most years between 1976 and 2000.

BOLSTERING INTERNATIONAL MECHANISMS FOR ENVIRONMENTAL MANAGEMENT

Environmental degradation rarely stops at national borders, yet many environmental policies and institutions do. International watersheds, fisheries, pollution and climate change pose environmental policy challenges that must be addressed by countries working together–because the actions of one country affect the welfare of others. Compounding the problem are the unequally distributed benefits of environmental services and the costs of managing them within and between countries.

Several international environmental agreements have drawn attention to the need to manage the global environment. But implementation of these agreements could be improved. Greater emphasis should be placed on the needs of poor people, particularly in reaching the Goals. And more needs to be done to build developing countries' capacity to implement these agreements and integrate them with national policy–making.

New institutional arrangements may be needed to coordinate national policies in response to regional and global environmental challenges. Stronger cooperation is needed for regional environmental management. The countries along the Rhine river show how costs and benefits can be shared in managing an international watershed.

Intergovernmental processes tend to be difficult to organize and slow to execute, but they are the only realistic way to address cross–border pollution and ecosystem degradation. International agreements should share burdens equitably and ensure that the benefits of better environmental management accrue to the local people who bear the direct costs and lost opportunities of environmental resource protection. The Montreal Protocol–the international agreement to protect the ozone layer–has been a resounding success of global environmental policy. But its implementation was facilitated by cost-effective alternatives to ozone–depleting substances, limiting the need for extensive benefit– and cost–sharing between rich and poor countries.

Although rich countries produce most of the emissions that lead to global warming, the effects are felt all

over the world. Meanwhile, progress on curbing these emissions has been mixed (Box 6.7)

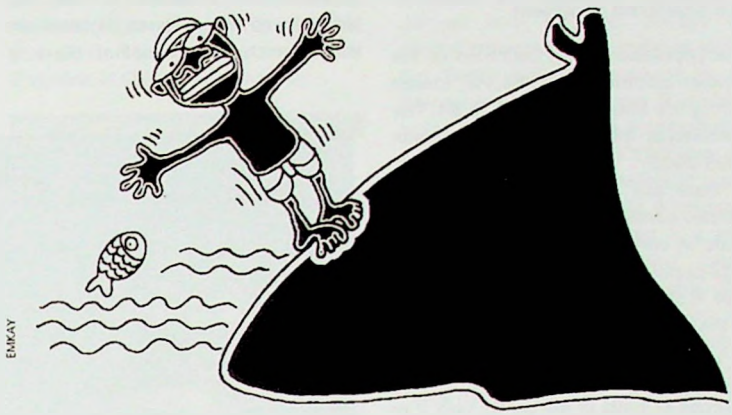
INVESTING IN SCIENCE AND TECHNOLOGY FOR THE ENVIRONMENT

Available technologies can go a long way towards addressing complex environmental challenges cost-effectively. Needed are ways to provide these technologies to people who need them most. In poor countries this will often require significantly strengthening institutional capacities for technological cooperation.

Improving technologies for environmental problems will require dramatically reorienting research and development policies. In rich countries public investment in energy research and development–including for renewable energy–has dropped precipitously over the past two decades.[15] Given the need to address climate change, increased investment is essential to expand markets for renewable energy technologies and lower unit costs, benefiting rich countries and enabling poor countries to adopt the same solutions.

Scientific understanding of the natural world is substantial, but a remarkable amount remains unknown. No mechanism exists to track major ecosystems and their continued ability to produce needed goods and services. A Life Observatory should be established to systematically monitor major ecosystems such as coastal habitats, major watersheds and wetlands. Such an observatory would complement current efforts, including the Global Terrestrial Observing System, the Global Climate Observing System and the Global Ocean Observing System.

The Life Observatory should build on the Millennium Ecosystem Assessment, a four-year effort involving 1,500 scientists compiling the best available knowledge on the world's ecosystems and the services they provide. The Life Observatory would ensure that these analyses are continuously updated to map the long-term effects of human activities on specific ecosystems.



To devise responses, policy-makers require reliable scientific forecasts of human-induced environment change. Environmental indicators that accurately track the environment should be developed and integrated with national policy making. Long-term planning should factor in projected changes in climate and changes to specific ecosystems to assess how these trends will affect development progress and needs.

INCREASING EFFORTS TO CONSERVE CRITICAL ECOSYSTEMS

Creating protected areas is often the best way to conserve species diversity and critical ecosystems. More than 60% of terrestrial species are found in 25 ecoregions on just over 1% of Earth's land surface. These biodiversity hotspots face extreme threats that have already caused a 70% loss of their original vegetation.[16]

The best hope for conserving biodiversity and critical ecosystems is for the world's governments, scientists and other key stake-holders to set priorities and cooperate on common goals. Conservation efforts are most effective when constructed by experts from a wide array of disciplines, in consultation with local residents.

Well-managed protected areas can generate significant revenues through tourism and innovative financial mechanisms, such as payments for ecosystem services. Local people, particularly poor people, should be seen as part of the solution–not part of the problem. People whose livelihoods depend on protected areas must benefit from them and have a stake in their continued success. Otherwise such efforts will not be sustainable.

Available technologies can go a long way towards addressing complex environmental challenges cost-effectively.

Notes

1. UNDP, DFID and World Bank 2002.
2. IMF 2000.
3. WEHAB Working Group 2002b.
4. UNDP 2002d; UNDP, DFID and World Bank 2002.
5. UNDP, DFID and World Bank 2002.
6. Khemani 2001.
7. Khemani 2001.
8. IPCC 2001a.
9. UNDP, WEC and UNDESA 2000.
10. UNDP, WEC and UNDESA 2000.
11. Koziell and McNeill 2002.
12. UNDP, DFID and World Bank 2002.
13. Perkova and others 2003.
14. UNDP, WEC and UNDESA 2000.
15. IEA 1999.
16. Myers and others 2000.

Africa

The only work is to exist in a shattered continent

The population in 38 countries of the African continent was 34.1%; lowest during the time between 1975-84. The percentage increased to 54 between 1995-2000.

* There are only 3 countries in the African continent existing on a higher scale in comparison of existence. The total population of these 3 countries is only 6.5% out of the total population of the continent.
* Out of the total percentage of carbon dioxide that oozes from industries and sources of fuels in the world, only 2 or 3 percent oozes from Africa. But Africa suffers most as the reactions occur due to the change in weather. The maximum draught, flood and cyclones occur in this continent.
* The forest areas in Africa will disappear within 50 to 100 years. The forest life in this continent will no longer exist because of the changes in weather.

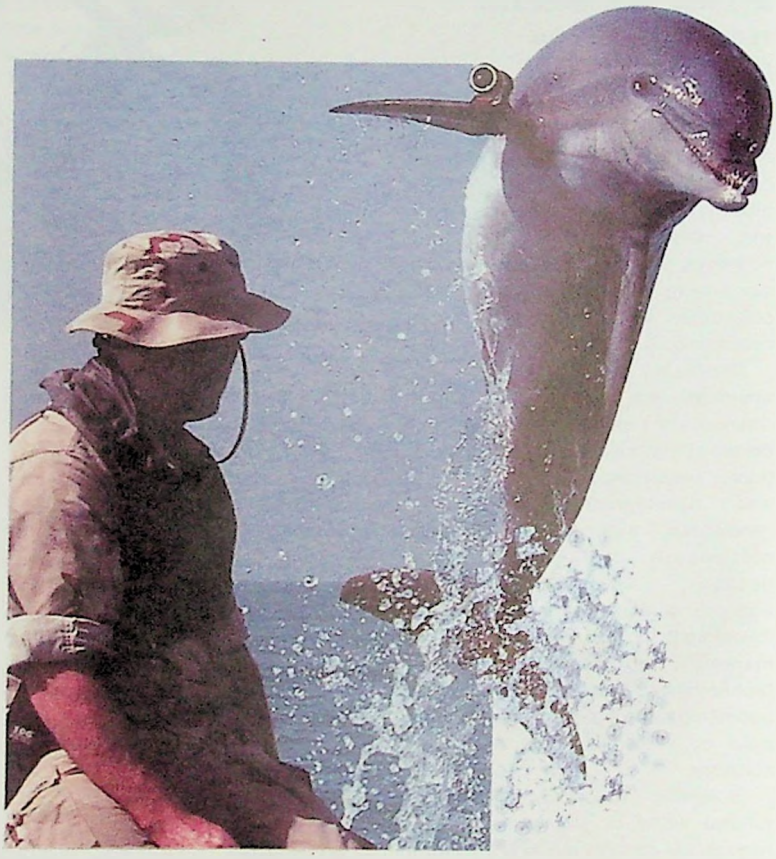
[Courtesy: Policy, Research Report from Economic Commission for Africa, Harnessing Technologies for Sustainable Development]

USA

Mine, Nerve gas, Dolphins and Pigeons

Various animals are being used in the war. The US military used dolphins in Iraq war. These dolphins were used to clear off the mines laid on sea. The dolphins trained by the US army did not come into direct contact with the mines. They would push other things towards the mines from a distance to blast them off.

The US Navy informed that the organic systems of the dolphins to feel the sound wave is much more improved than that of any electronic system made by human beings. So the dolphins are at a lesser risk. The dolphins were helped by some sea-lions. These sea-lions are marine animals that the US Navy had trained. The sea lions have the power of hearing under water. Besides, the sea-lions can also see through less light. Hundreds and hundreds of pigeons are supplied to the US Military and Navy. These pigeons are used for checking whether there is any nerve-gas. Pigeons die faster then human beings in nerve or any other gases. Thus it can be understood by the death of pigeons that there are nerve gases.



The lawsuit against McDonald's

Recently, some lawyers of US filed a lawsuit against McDonald's, the fast food company. Their allegation was that the food value of the foods that McDonald's claims is misleading. The allegation is a second one. The main complain came from the parents of two girls earlier. It was mentioned in the complaint that, McDonald's does not state properly the ingredients of the food and the reaction it has. The second allegation stated that McDonald's cheats in food processing and selling.

The victory of solar power users

The solar energy users in California will not have to pay an extra fee. Earlier it was said that the neighbouring states, who will produce solar power themselves bypassing the California grid, will have to pay an extra fee. Later on, the Public Utilities Commission of California nullified it. It is noteable that many people from California implemented the system for producing electricity, using solar energy, electricity and other fuels.

BRAZIL

The GM crops

The farmers of Rio in Brazil, have protested against the GM crops recently. Though it is prohibited by the government in Brazil to cultivate the GM crops commercially, 80% of the produced soya crops are from the GM

seeds which is marketed illegally in Rio. These seeds are being smuggled from Argentina. The small farmers who use the usual soya seeds gathered and protested in front of the local office of Monsanto Company of

the capital. The farmers alleged that the Monsanto Company and a government organization created the black-market of GM seeds. They claimed compensation for this.

INDIA

The lifting of the underground water led to depression of surface

Due to lifting of water from underground in a random process, the earth sank in some districts of Uttar Pradesh in India. The districts include Fatehpur, Farukhabad, Kanauj and Urao. The current incident of depression of surface occurred in two villages of Fatehpur. The first incident occurred in some villages of Kanauj and Farukhabad in the middle of 1995. The districts are plain areas and the Ganga and some other rivers flow through them.

Planning for interlinking rivers— 5 new members in task force

The Prime Minister of India, Atal Bihari Vajpayee, appointed 5 more members in the task force who are responsible for planning the interlinking of the rivers in India. The 5 members are R K Pachuri, The Director of Tata Energy Research Institute, K Kasturi Rangan, The Chairperson of Indian Space Research Centre, K V Kamath, the Chief Executive of a bank, Dipak Dasgupta, Former Chairperson of National Highway Authority of India, and G C Sandu, the former Chief Engineer of Orissa Government.

Iran, Pakistan and India

Gas

Ram Nayek, the Minister for Petroleum and Natural Gas of India, announced that the gas pipeline from Iran to India will be set up through the deep sea instead of via Pakistan. Later, Shakur Khan, the Petroleum Minister of Pakistan sent an invitation to India for joining the "Turkmenistan – Afghanistan – Pakistan Gas Pipeline Project," proposed by him. But no response has been shown by India yet. The fuel analysts and the government officials in New Delhi informed that no oil company yet showed any interest in any of the proposed two projects. It has been seen in the previous survey that if the pipeline is channelled through deep sea from Iran to India, the cost of gas will be 2 to 10 times more than that of bringing it through land. Many people doubt whether there is a full-proof technology available to set up pipeline in deep sea.

Meanwhile, Iran is trying very hard for setting up this gas pipeline. For this, Mohammad Khatami, the President of Iran, made a visit to India. Iran described it as a "pipeline for peace". It will cost 65 million dollars for setting the pipeline through Pakistan. Pakistan proposed for implementing the pipeline through land and that it will ensure its safety in exchange of money. India has rejected the proposal on grounds of safety. On the other hand discussions are being held to set up gas pipelines from Daulatabad of Turkmenistan up to Pakistan. A decision has been taken to invite India for joining the project, stating that it will benefit all if the pipeline extends up to India. The Asian Development Bank promised to give 10 lakh dollar for survey of the proposed pipeline.

Argument over the water of River Sindh

There is going to be a long debate between India and Pakistan regarding the water of river Sindh. Accepting the proposal, the legislative assembly of Jammu and Kashmir invited the central government of India to review the 'Sindh Water' agreement for the interest of common people. It is stated in the proposal that it will compensate Jammu and Kashmir for their loss due to this agreement. An estimate states that the amount of loss is 6 thousand 5 hundred crore of rupees in a year. According to the Sind water agreement, India left its claim upon river Sindh and its two tributaries. The two rivers are Jhilam and Chenub. In exchange, India got control over three rivers. Those are Sutlej, Ravi and Bias or Bipasha. The agreement had been signed in May 1960 between India and Pakistan with arbitration of World Bank. Australia, Canada, Germany, New Zealand, US and UK.

The specialists believe that if the agreement gets suspended, the economic condition of Pakistan will suffer very much. It is assumed that 14 lakhs of people will be staying without food if 1% of water flow is reduced in river Sind and its tributaries. These people are dependent on the water of these rivers.

Meanwhile, the relation between India and Pakistan may become critical due to the building a hydro-electricity project on river Chenub in Jammu and Kashmir. A meeting was held in Islamabad, capital of Pakistan, regarding this matter in last February. But it was not fruitful. Pakistan now is trying to engage a neutral expert with the initiative of the World Bank and permission of India. The officials of Pakistan said that they are trying for arbitration through World Bank and if India does not agree with it, they will go to the International Court.

An official in India said that no clause of the agreement has been violated. The implementation will be done, according to the agreement and specified time. There is an apprehension that though the "Sindh Water Treaty" was unaffected in spite of the war and diplomatic disagreement of the two countries, now it may not be so any more.

HYDROGEN FUEL : ENORMOUS POSSIBILITY—PROBLEMS AS WELL

The US President, George Bush in his State of the Union speech last January said, "I am proposing a budget of 1.2 billion dollars for an experiment so that America can lead the world in inventing the eco-friendly vehicles driven by hydrogen."

The announcement of President Bush confirms one of the endeavours to develop economy based on hydrogen fuel instead of oil. The automobile industry is in the forefront of this research endeavour. The automobile industry spent at least 2 billion dollars in the last few years studying on hydrogen fuel cells. But the improvement of the so-called big oil companies with the research of hydrogen fuel draws attention. The shell company formed two companies, namely Shell Renewable in 1997 and Shell Hydrogen in 2000. The other largest oil company in the world BP/AMOCO will invest 500 million dollars in renewables over the next 3 years. The Chevron Texaco Oil Company had bought 20% of Energy Conversion Device from Detroit Photovoltyck Battery and the Fuel Cell Company of US. Another oil company Exxon announced that they will invest 100 million dollars jointly with the car manufacturers General Motors and Toyota for a similar kind of research. There is a debate about, for how long the oil can be lifted at a minimum cost from the oil wells in the world. Some leading geologists dealing with petroleum said that the oil production will reduce in the world within lesser time than what it was estimated earlier.

Recently, the European Union announced that they are investing 3.56 billion dollars in the project, targeted towards reducing the dependence on oil of the European countries. Though the big automobile manufacturers said that the market will be captured by the hydrogen fuel cell driven cars by the end of this decade, nevertheless there is still considerable uncertainty regarding when the hydrogen economy will take off. Regarding this, Phil Watts, Chairperson, Royal Dutch/Shell said, "To tell you the truth, I do not know the answer". It has been seen in a calculation that 25% improvement will be made around 2050. This is an optimistic assumption. But the petroleum and gas will be required for 50 more years.

Seth Dunn, Research Assistant, World Watch Institute, USA said, "Just as the aggressive tapping of oil enabled the US to become the economic and political power of the 20th century, nations that move first to harness hydrogen could potentially erode US competitiveness."

It is assumed that the fuel cell market of Europe will be 55 billion dollars by 2040. The way it is proceeding at present, Iceland may be the first country in Europe to be free from oil dependence. In a joint report, made by Worldwide Fund for Nature and Iceland Nature Conservation Association said that around 2020, 40% of cars and trollers will be driven by hydrogen and within 35 years it will be 100%. This eco-friendly gas will be produced from water. For this process, the hydrogen electricity and wind power will be used.

Canada, Japan, Singapore and China have already been investing a huge amount of money in this work. Moreover, the oil rich countries like Dubai and Saudi Arabia are investing in production and research for a long time. There are many complications in producing hydrogen. There are various methods for producing this. The natural gas is used in one of the methods. It has been proved that the method where natural gases are used is the cheapest one. The highest quality of gas will be produced in the world between 2020-2030. After that, it is suspected the energy crisis will arise for the second time. It can also arise just after the scarcity of oil.

Meanwhile, protesting the plan of producing hydrogen by the US, the environment workers said, "This is a dirty energy plan." Their is a doubt regarding one of the methods, where coal and atomic power are used in producing hydrogen. Dun Beeker, the Chief of Ciera Club Global Warming and Energy programme, US, criticized the programmes of George Bush and said, "The whole thing's a fraud. He's going to try to snatch defeat from the jaws of victory by creating hydrogen out of coal, nuclear (power) and gasoilne."

Japan is trying to produce hydrogen using seawater and wind power like Iceland. This is the most eco-friendly method.

But it is the most expensive one. Japan has decided to produce hydrogen from wastages too. One of the big obstacles in producing hydrogen fuel is the massive expenditure. In an oil driven engine it costs 20 dollars per kilo watt. The cost of the hydrogen driven engine is 800 dollars. But the specialists say that since the demand is so less, it does cost much more. It is being tried to bring down the cost. One specialist said that the developing countries will actually be benefited by hydrogen economy. Those countries, which do not have the oil wells, will be benefited as well. But the editor of the periodical environment magazine "E" Jim Motavali cautioned, "A fair question to ask is whether the hydrogen future will be driven by big energy companies or reached over their dead bodies,"

Jason Mark, the Director of Union of Concerned Scientists said, "We don't want to wake up in the middle of the night and find that our dream of a clean hydrogen revolution has become a nightmare." [DTE]

Genetically Modified Food Help Refused by India

The genetic Engineering Approval Committee (GENC) in India discarded the proposal of importing the genetically modified Soya-crops in India for the second time within 5 months. Two organizations of the North proposed for importing 23 thousand tons of genetically modified Soya-crops into India. The two organizations were Care International and Catholic Relief Service. Care, Catholic Relief Service and the International Development Organization of US submitted their proposals in New Delhi, the capital of India. The GEAC told them to produce a certificate, giving guarantee that the imported crops will not contain the crops of 'Starlink' brand. But the importers could not show the certificate. It is to be noted that in USA, the crops of 'Starlink' brand has been declared as an inappropriate food for human beings.

The International Development Organization is funding for the food relief project of Care and Catholic Relief Service. This food was planned to be distributed under the project titled Coordinate Child Development Service. A company called "Aventis SA" is producing the Starlink type crops. The Environment Protection Association of USA, gave the consent for using this food as cattle feed in 1998. In September 2000, all the foods were withdrawn from the outlets from entire USA, after knowing that the Starlink food had entered into food distribution. Then the 'Starlink' became the news headlines.

To save the environment

The environmental activists Erin Brockovich and her companion, Ed Masri has started their fight again, this time against the environmental pollution in USA. Now their targets are the three oil companies. Their allegation is that these companies are polluting the roads of Beverly Hills, which may create cancer.

Erin Brockovich and Ed Masri hinted that they will file lawsuit against the three companies Auxidental Petroleum, Chevron Texaco and Venoco on behalf of the 80 cancer patients. Their allegation is that the poisonous gas getting out from the oil well in the field of Beverly Hills High School may cause cancer and those three companies are avoiding the issue. The sample of air from the school field has been tested and it was found that a poisonous gas is oozing out from one place.

Brockovich and Ed Masri have gained fame internationally for the movie 'Erin Brockovich'. In this movie, the struggle against the Pacific Gas and Electric Company has been highlighted. They filed a lawsuit and the company compensated 3.33 billion dollars to the city of Hinckley in California for the damage caused by water pollution. In this movie Julia Roberts acted as Brockovich. She received the best actress Oscar Award for her brilliant performance.

Many birds will not exist

The birds are getting lost. The rate in which the various species of birds are getting extinct, it did not happen to any other animals in the world after the dinosaur were extinct around 6 crores of years ago. It has been stated in a report by the research institute in USA, World Watch Institute. It has been suspected in the report that 9800 species of birds can get extinct by the pressure of more than 620 crores of people in the world.

The things that are causing harm to the birds are—the damaging of birds nest, deforestation, destroying of marsh lands and pasture grounds and the various improvement work mainly construction of the roads. Only in USA, around 40 million birds die every year due to building of communication towers. It has also been said that various species of snakes, mice, cats, insects and trees are also the cause for extinction of 25% endangered birds of various species. Till now 22 species of birds became extinct due to animals, insects and trees. These animals and insects kill 10 million birds only in USA. It has been said in the report that change of weather is also troubling the birds.

Flexible participatory system required for sanitation programme

The Village Education Resource Centre (VERC) is working for sanitation in the rural areas of Bangladesh. A discussion was held regarding various VERC programmes at their office in Savar. Ecofile interviewed Yaqub Hossain, Deputy Director, VERC and Project coordinator WATSAN, Mohammad Masud Hassan, Assistant Coordinator, WATSAN and Technical Department of VERC, and Mohammad Kamrul Islam, Manager, Hygiene Promotion, VERC. The highlights of the interview are as follows :

(EF)–What are the characteristics of VERC's sanitary programme?

Yaqub Hossain (YH)–VERC thinks that in case of sanitation, it is mainly community work. We engage common people in the programme to achieve the ultimate goal. In the areas where work goes on, we make the local people understand about the sanitary condition of that locality, the diseases and the socio economic impact, and then VERC offers the technical help to build latrines. The people select the technology for constructing latrines. VERC assists them in doing the work smoothly.

Mohammad Kamrul Islam (MKI)–The speciality in the programme of VERC is to establish public ownership. People will choose the technology for constructing their latrines and VERC will do it for them according to their choice. People give their opinions freely and take the decision on their own. VERC does not pressurize for any specific thing.

Mohammad Masud Hassan (MMH)–The speciality of the project of VERC is that people do the total work, from planning to evaluation.

(YH)–We were not getting any results from the method we used to follow three years ago. Like others, we used to approach the village people following a specific method, and offered them the technology. We could not fulfil 100% target. The old method was not effective for every place. Sometimes it did not even suit the geographical condition. Suppose we advise to use bamboo on the roof; but it was seen in some places that bamboo was not available very easily. May be we gave the rings and slabs for the latrines and the villagers build

Yaqub Hossain

the latrines, but it was found that the latrines were not hygienic or they were stinking. Hence they did not use the latrines. Then we readjusted our method. We try to learn from the ordinary people.

(MMH)–VERC applies the method of overall approach in implementing its sanitation programme. Due to this method, the villagers themselves could invent technologies for building latrines. They use this opportunity according to their abilities. If today a villager spends Tk 17 or less for a latrine, later with the improvement of his financial condition, he spends more for a better quality latrine.

(YH)–While implementing the sanitation programme, we saw the villagers themselves invented different technologies for the latrines. We call these inventors the "Rural Sanitation Engineers". They also feel proud and honoured, getting the recognition as a rural engineer.

(MKI)–The VERC method of working can easily be followed by others to implement programme anywhere. This is also a speciality of VERC's method. VERC tries to inspire the villagers, hence the villagers come forward to turn the programme into reality.

(MMH)–The way VERC works is, we start a small project somewhere and later it gradually spreads and grows into a big project. We do not put burden on anyone. We try that the demand should get created by the people.

(YH)–The people should take as much as they can afford and VERC works in that way.

(MMH)- We give priority to both quantitative and qualitative aspects while fulfilling the target. The programme does not only depend on technologies but also tries to assemble the people and identify their needs.

(EF)– What problems does VERC face in implementing the sanitation programme?

(YH)–VERC did not face any problem while working with the government officials. They have a very positive mentality.

(MKI)–One of the problems is that the other organizations, who are involved in sanitation programme, follow the old and conventional methods. They think supplying the rings and slabs to the villagers is sufficient for building latrines, which actually is not true.

(MMH)–Various organizations are constructing latrines in villages by giving subsidies. VERC does not do so. VERC had to face some problems in some places in the beginning where the people used to get subsidy from others.

(YH)–VERC does not provide subsidy in building latrines.

(MKI)–Another problem is the local condition. The way a latrine has to be build in a place where water logging may happen because of rains will not be the same as places like hilly or coastal areas. A lot of people do not concentrate on this issue. This is also a problem.

(YH)–The flexible method in providing latrine or sanitation is not accepted by a number of funding organizations yet.
(MKI)–There were one or two persons in every locality who opposed the

Mohmmad Masood Hasan

programme at the beginning. Later on, they themselves become active supporters and workers.
(EF)–What are the main successes of VERC sanitation programme ?
(YH)–The way VERC works, the method itself is a success. We adopted this method on the basis of our previous experience. The method is flexible and it says "learn from the people"– that is the principle.
(MMH)–One of our successes is while building the latrine rather than sticking to one technology, we introduced a number of appropriate technologies to the people. We plan and execute the work from bottom to top and that is another success.
(MKI)–Participation of the villagers may be mentioned as a success as well.
(EF)–What are the future challenges?
(YH)–The method followed by VERC needs the support and patronization for its expansion which we did not get yet. There are limitations of the fund for VERC.
(MKI)–To bring the necessary changes in moral ethics is a big challenge for us. Another challenge is

Mohammad Kamrul Islam

to bring changes in the practice and habit in terms of sanitation and to review the methods followed by other organizations who are involved in sanitation.
(EF)–What conditions should be fulfilled to expand sanitation work in other places?
(YH)–First of all, we have to change the attitude as well as the structural pattern of the organizations who are involved in this kind of work. It needs flexible and participatory organizational structure as well as the participation of people.
(MMH)–We have to adopt such a method whereby the programme planners can take their own decisions.
(MKI)— It is not only the supply of technology that works in sanitation.
(MMH)—The creativity of the society should be respected. It is not only providing the sanitary latrines — the habits relating to sanitation should be scrutinized and changed at the same time.
To expand sanitation programme, the required basics are —
* Flexibility and ensuring participation of the people.
* Effective campaign for appropriate technologies suitable for geographical and socio-economic background— (with 3 conditions to fulfill the technical aspect).
1. Mosquito, flies, insects and duck or hen will not come in contact with latrines.
2. There will be no bad smell.
3. The environment will not be polluted.
* Bottom up planning and implementation.
* Full coverage.
* To empower people in terms of technology rather then making them dependent on external funds.

DEFINITIONS

* **Access to an improved water source** refers to the percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, or rainwater collection. Unimproved sources include vendors, tanker trucks, and unprotected wells and springs. Reasonable access to an adequate amount is defined as the availability of at least 20 liters a person a day from a source within one kilometer of the dwelling. (World Health Organization; the data are for 2000).
* **Access to sanitation** is the share of population with access to at least adequate excreta disposal facilities (Private or shared, but not public) that can effectively prevent human, animal, and insect contact with excreta. Improved facilities range from simple but protected pit latrines to flush toilets with a sewerage connection. To be effective, facilities must be correctly constructed and properly maintained. (World Health Organization; the data are for 2000).
* **Annual deforestation** refers to the permanent conversion of natural forest area to other uses, including shifting cultivation, permanent agriculture, ranching, settlements, and infrastructure development. Deforested areas do not include areas logged but intended for regeneration or areas degraded by fuelwood gathering, acid precipitation, or forest fires. Negative numbers indicate an increase in forest areas. (Food and Agriculture Organization; the data are for the period 1990-2000).
* **Bird species (threatened)** are the number of birds classified by the World Conservation Union (IUCN) as endangered, vulnerable, rare, indeterminate, out of danger, or insufficiently known. (World Conservation Monitoring Center, IUCN; the data are for 2002).
* **Freshwater resources** refer to total renewable resources, which include flows of rivers and groundwater from rainfall in the country, and river flows from other countries. Freshwater resources per capita are calculated using the World Bank's population estimates. (The World Resources Institute; the estimates are for 2000).
* **Net forest depletion** is calculated as the product of unit resource rents and the excess of roundwood harvest over natural growth. If growth exceeds harvest, this figure is zero. (FAO, World Bank estimates of natural growth; the data are for 2001).

Global campaign must to compel them to compensate for pollution

Minister for Environment and Forest Shajahan Siraj on July 20 2003 called for seizing the opportunity of global environmental campaign to compel the developed countries to compensate for the pollution they were causing by massive emissions of Green House Gases (GHG).

Addressing a workshop on "Opportunities under Clean Development Mechanism (CDM) in Bangladesh" he said that the mechanisms evolved from the 1992 Kyoto Protocol created an opportunity for the developing countries like Bangladesh to boost their economy and protect environment with increased investments from the developed countries.

"CDM appeared to be a great opportunity for us to boost our economy and protect our environment," he said in the workshop joined by business leaders, environmental activists, officials, development practitioners and economic analysts and representatives of development partners.

Waste Concern, a leading environmental consultant group, organized the day-long workshop in collaboration with the Ministry of Environment and Forest and United Nations Development Programme (UNDP). Secretary for the Ministry of Environment and Forest Sabihuddin Ahmed chaired the workshop.

Executive Director of Waste Concern A.H. Mohammad Maksud Sinha delivered the welcome address.

Industries in 39 developed countries are legally obliged to extend financial support towards the environment-friendly units to help them reduce GHG emissions in line with the Kyoto Protocol, as part of the carbon trading process under the Clean Development Mechanism (CDM), the workshop participants were informed.

State Minister for Environment and Forest Jafrul Islam Chowdhury, who joined the discourse as the special guest, laid emphasis on creation of a "congenial atmosphere" in the country to attract foreign investments under the CDM.

It was said that most of the CDM funds were currently directed to Latin American and African countries while the neighbouring India already began to allure investments in Asia under the carbon trading process of the mechanism.

According to an estimate, it will cost US dollar 15 for an industrial unit to reduce one tonne of GHG emission in a developed country, whereas the expenditure will be only US dollar five in a developing country.

Carbon trading is an economic tool which, in essence, allows for several parties to meet emission limits. If one party can reduce emissions at a lower cost than a second party, the first party could maximize emission reductions and sell any surplus reductions to the second party to help meet its reduction requirements the speakers said.

According to the Kyoto protocol, industries in the developed countries are legally bound to reduce the GHG emission by 50 per cent in their own countries and 50 per cent globally to bring the emission level back to the 1990 level.

President of Federation of Bangladesh Chambers of Commerce and Industries (FBCCI) Yusuf Abdullah Harun termed the CDM compelling the 39 industrial nations to reduce GHG emissions globally as the most important outcome of the Kyoto Protocol.

"Bangladesh, also a signatory to the Kyoto Protocol, must take full advantage of the CDM for its environment as well as economy against the backdrop of poverty and lack of resources," he said.

Sabihuddin Ahmed affirmed that a process was underway to form a "designated national authority" to attract and regulate foreign investments under the CDM process involving all stakeholders.

He laid emphasis on developing a partnership between the government and the private sector to enhance the "receiving capacity" under the CDM process to ensure "economic development locally and environmental promotion globally".

Deputy Resident Representative of UNDP Larry Maramis lauded Bangladesh's effort towards environmental protection but stressed the need for undertaking prompt actions to attract the CDM funds for its industrialization with clean technology.

Director of Waste Concern Iftekhar Enayetullah and Director, Department of Environment, Reazuddin Ahmed explained the Bangladesh prospects in tapping the CDM funds identifying energy, forestry and waste management as major sectors.

The speakers said industries in the developing countries can be technologically upgraded and made environment-friendly through the CDM projects contributing to the global climate protection as well as promotion of sustainable development in the host country.

Impact of Global Warming in Bangladesh

Bangladesh is a low carbon dioxide emitting country. For instance, the per

capita carbon dioxide emission is estimated at 0.2 ton/year, while the average for developing countries is 1.6 ton/year. In USA the per capita emission is 20 ton/year.

The low GHG emission status however provides no relief from the effects of Global Warming because 1.5 meter rise in sea level would inundate an area of 22,000 sq. km of Bangladesh, affecting 17 million people. Obviously Bangladesh is likely to be one of the worst suffers of Global Warming. The other impacts of global warming would be on:

- Agriculture
- Bio diversity and Forestry
- Human Health
- Drainage
- Fisheries
- Fresh water

Global Warming Potential (GWP) of Key GHG

Green House Gas	Global Warming Potential
Carbon dioxide (Co_2)	1
Methane (CH_4)	21
Nitrous Oxide (N_2O)	310
Hydroflurocarbons (HFC's)	140-11,700
Perflorocarbons (PFC's)	7,000-9,200
Sulphur Hexafluorides (SF_6)	23,900

What is Green House Gas (GHG)

Many gases present in the atmosphere are known as green house gases (GHG) because these prevent heat from escaping from the earth . The gases are : carbon dioxide, methane, nitrous oxide, hydroflurocarbons, perfluorocarbons and Sulphur hexaflouride. If the amount of these gases increase in the atmosphere earth's temperature will increase Scientists have named this phenomenon "Global Warming" and the associated changes to the atmosphere is known as Climate Change.

In the rate of increase of GHGs in the atmosphere can be lessened then the process of "global warming" can also be lessened. A variety of measures like switching from coal to natural gas, using, more efficient devices in industries and commercial units, using renewable energy, preventing release of methane gas from landfill, etc. are some examples of what constitute GHG reduction.

Example of Green House Gas Reduction at a Landfill

Methane generated in landfills is considered to come from decomposition of organic biomass. The collection and combustion of landfill gas can be considered to reduce green house gas emissions by 100%. To calculate the amount of GHG reductions in a landfill:

- Meter the Gas Collected and Combusted
- Determine the Quantity of Methane in the Gas (landfill gas is typically 60% methane)
- Convert the Volume of Gas in Tons of Methane
- Multiply the Tons of Methane By Global Warming Potential to Get the Amount of GHG Reduction in Tons Equivalent of Carbon Dioxide (eCO_2)

A hypothetical example of green house gas reductions in landfill is given below:

- Landfill gas flow: 81562 cubic meter/day of landfill gas
- Methane Concentration @60% = 48937 cubic meter/day of methane
- 48937 cubic meter/day of methane X 0.717 kg/cubic meter 35088 kg of methane/day = 35.08 metric tons of methane per day
- 35.08 tons of methane/day X 21 (Global Warming Potential of Methane) = 737 tons of eCO2 per day or 269005 tons of eCO2 per year

How CDM Can Help Private Sector in Bangladesh

Developing countries including Bangladesh in the process of achieving fast economic growth often have to settle for inferior technologies. These technologies more often than not consume more energy than state-of-the-art or advanced technologies. CDM allows a more energy efficient (or less GHG emitting) technology to be installed. Through CDM therefore an entrepreneur can

- Opt for a better technology resulting in cost savings;
- Be able to comply easily with the Department of Environment's regulations;
- Have a safer and cleaner plant; and
- Contribute to national sustainable development and to global environmental protection.

Companies of Annex-B countries participating in the CDM project will obtain the CERs to meet their domestic emission reduction targets in an economically efficient manner. However, companies from Annex-B countries that have no requirement to reduce GHG emissions may also choose to gain ownership of CERs through the CDM at a low price to sell in the international market at a future date.

A Company or Annex-B country participating in the CDM project can finance a project in a developing country (Non-Annex-B) like Bangladesh using anyone of the following options:

- **Full or Partial Equity** : A company finances all or co-finances part of a CDM project in return for full or shared financial returns and CERs.
- **Financial Contribution** : A company financially contributes towards the cost of a CDM project equal to some portion of the incremental cost of the project over and above the baseline technology, or finances the removal of market barriers, in return for the CERs.
- **Loan** : A company provides loan or lease at financing at concessional rates in return for CERs.
- **CER Purchase Agreement** : A company agrees to buy CERs as they are produced by the project.

Source : Booklet on CDM and its Opportunities in Bangladesh, WASTE CONCERN

Motorcycle runs for 60 km Tk 8
No smoke no sound

One can go up to 60 km by a scooter just spending Tk 8. Plus you get a smokeless travel with hardly any sound—no pollution. These battery driven scooters with mind-boggling colours were exhibited in the Environment Fair. The scooter has 2 batteries of 12 volts each, which run a DC motor of 24 volts. With only this, it will run at a speed of 40 kms per hour. The sellers in the fair informed that the maintenance cost of this motorcycle is half than other 2-stroke motorcycles. There were also solar power system to use for lights, televisions and fans for domestic purpose. It costs Tk 14,000, Tk 16,000, Tk 22,000, Tk 24,000 and Tk 40,000. These environment savvy items were brought to the fair which was held at Dhaka. The Minister for Environment and Forest Shajahan Siraj inaugurated the fair on 3rd June at the Osmani Memorial Auditorium. This Environment Fair was organized till 5th June on the occasion of International Environment Day celebration.

More than 50 governmental and non-governmental organizations and private companies participated in the fair. Among the governmental organizations, Department of Environment, LGED, Department of Forest, National Herbarium, Rupantarito National Gas Company, and Jute Research Institute were important.

Among the non-governmental organizations, BRAC, BELA, Forum of Environmental Journalists of Bangladesh, Centre for Sustainable Development, Waste Concern, Mass Literacy Programme, BCAS, BAPA, ESDO, Girl's Guide Association, Bangladesh Scout, CNRS, CEGIS, NGO Forum for water supply and sanitation and Probartana exhibited their works. Apart from them the Environment and Science Association of Jahangirnagar University, Green Club, the Earth Club of North South University and various other organizations and business firms also participated in the environment fair. Various information regarding water were on display in the stall of Unnayan Shamannay. The leaflets regarding environmental laws were distributed in 'BELA' stall. Apart from other issues, the information regarding atmospheric pollution and monitoring of air quality were displayed in the Department of Environment's stall. Data of various kinds of trees, plants, shrubs and herbs in our country were displayed in the National Herbarium stall. Amongst them, according to the staff of 'Herbarium', there were plants free from arsenic.

A worker of Rupantarito National Gas Company informed that the campaign for the use of CNG as a substitute to petrol is getting affected mainly due to the scarcity of CNG pump station.

Various paper and paper bags for shopping were displayed in 12 stalls comprising members of the organization for manufacturing eco-friendly shopping bags. It was informed by the jute manufacturing organizations that the gunny bags can be used for packaging of salt and cement and thus increasing the usage of gunny.

Water and climate

3rd June 2003 was the first day of the programme on the occasion of International Environment Day. The subject of the open discussion was water and climate. The discussion was organized jointly by FEJB and IUCN of Bangladesh. The chief guest was the Minister for Water Resources, Hafizuddin Ahmed Bir Bikram. The main speaker was the country representative of IUCN, Bangladesh, Dr Ainun Nishat. The chief editor of English weekly, 'Holiday', A Z M Enayetullah Khan and the Joint Secretary, Ministry of Environment and Forest, Dr Mahfuzul Haque also took part in the discussion amongst others. This meeting organized under Sustainable Environment Management Programme, sponsored by Ministry of Environment and Forest and United Nations Development Programme, was chaired by Quamrul Islam Chowdhury, the Chairman of FEJB. Manjur Hasan Khan, Elahi Newaz Khan and Dr Ferdousi Begum also participated in the open discussion held at Osmani Memorial Auditorium.

Water and bio-diversity

On the same day in the afternoon, an open discussion was organized by UBINIG and Dhaka Community Hospital at Osmani Memorial Auditorium. The subject of the discussion was water and bio-diversity. The chief guest was the State Minister for Agriculture, Mirza Fakhrul Islam Alamgir. Under the Charimanship of Dr Kazi Quamruzzaman, the Chairman of Dhaka Community Hospital, the main speaker was Dr Farida Akhter, Managing Director, UBINIG.

Rights to use of water

With the joint initiative of Bangladesh Environment Lawyers' Association (BELA) and Bangladesh Paribesh Andolon (BAPA), an open discussion titled, "Rights to use of water" was organized at Osmani Memorial Auditorium on June 4. The Chairman

of the meeting was renowned economist Professor Wahiduddin Mahmud. In the presence of Syeda Rizwana Hasan, Director of BELA and Abu Naser Khan, General Secretary of BAPA, Engineer Masroor-ul-Haque Siddiqui Bir Uttam, opened the discussion. His topic was : Rights to water: Bangladesh perspective. Halima Niyamat, the Assistant Programme Officer of IUCN-Bangladesh and Taslima Islam, Senior Staff Lawyer, discussed about international and national laws. Sharmin Murshid, Chief Executive, 'Broti', discussed on "Legal fight against arsenic pollution". At the end the problems of using water and the solution was discussed by Dr M Fazlul Bari, Professor of Water Resources, BUET, Dhaka. Concluding the discussion, Professor Wahiduddin Mahmud said that highly contrasting features are there in the field of water problem in Bangladesh.

–RAHELA RABBANI

The slide and photography show Exhibition on environment

On the occasion of International Environment Day 2003, Unnayan Shamannay initiated a programme to disseminate information regarding environment among the students, teachers and the housewives. It organized 9 slideshows in 5 schools in Dhaka, sponsored by SEMP. About one thousand students and teachers viewed the slide shows. The shows were also watched by the housewives in East-Rampura and Paribagh slums. The slide shows were organized between 16-18 April.

There was a photography exhibition on environment, exhibited in 10 schools in Dhaka. They were exhibited between 18 May–1 June. Seeing the photographs on environment, the students and the teachers expressed their anxiousness at deterioration of environment. They also showed their intent desire in taking active roll to protect the environment.

–TAHMINA SULTANA

Seminar–Discussion

A discussion was held on the 3rd International Water Forum in the National Press Club on 6th April. It was organized by Media Network for Sustainable Development. The chief guest was Advocate Gautam Chakrabarty, State Minister for Water Resources.

It was discussed in the meeting that everybody has a right to international river system. Every country has a right to get the water of these rivers. An understanding is required at the international level to resolve the problem of water resurce sharing. India's unilateral plans will have a negative affect upon the water resources of Nepal and Bangladesh.

A seminar on Aerial Spray of Pesticides was organized by BAPA and UBINIG on 8th April at the National Press Club. Sadek Hossain Khoka, Mayor, Dhaka City Corporation was the chief guest. The mayor said that the 'aerial' spray will be suspended if found to be affecting public health.

• A round table conference was held on housing and other problems of citizens organized by Bangladesh Consumers Society on 9th April at CIRDUP Auditorium. Minister for Food Abdullah-Al-Noman was the chief guest. The speakers said that the ever-growing pressure of the population created problems for housing in the Dhaka City.

• A seminar on "Census of the aquatic birds in Bangladesh" was organized by Bangladesh Bird's Club on 10th April at the National Press Club. CNRS helped in organizing this seminar. The speakers said that the lakes require protection from pollution for the sake of bio-diversity. Census of the aquatic birds is mainly a preparation work for preserving bio-diversity.

• An advisory seminar was held on "Forest and its related subjects" on 3rd May at WVA Auditorium. The organizers were Society for Environment and Human Development and UBINIG. It was commented that if we do not stop deforestation, the agriculture system in Bangladesh will get collapsed.

• The students of Urban and Regional Planning, BUET, organized, "Planning Week 2003" on 7th May. The chief guest was the Minister for Land, Shamsul Islam. The speakers said that a concerted city planning is needed.

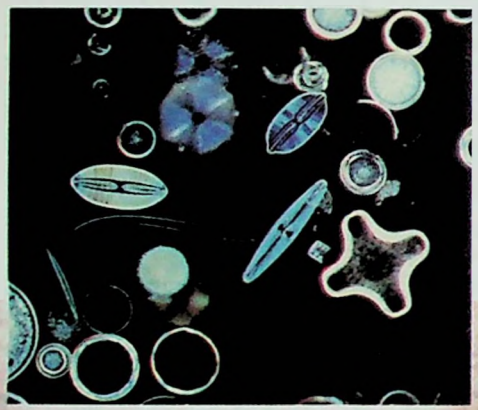
• Forum of Environmental Journalists of Bangladesh (FEJB) and World Water Forum for Journalists (WWFJ) jointly organized a briefing session on the CSD-11 and implementing of Johannesburg plan on 25th May at FEJB office. The discussants said that more investment is needed to develop water resources.

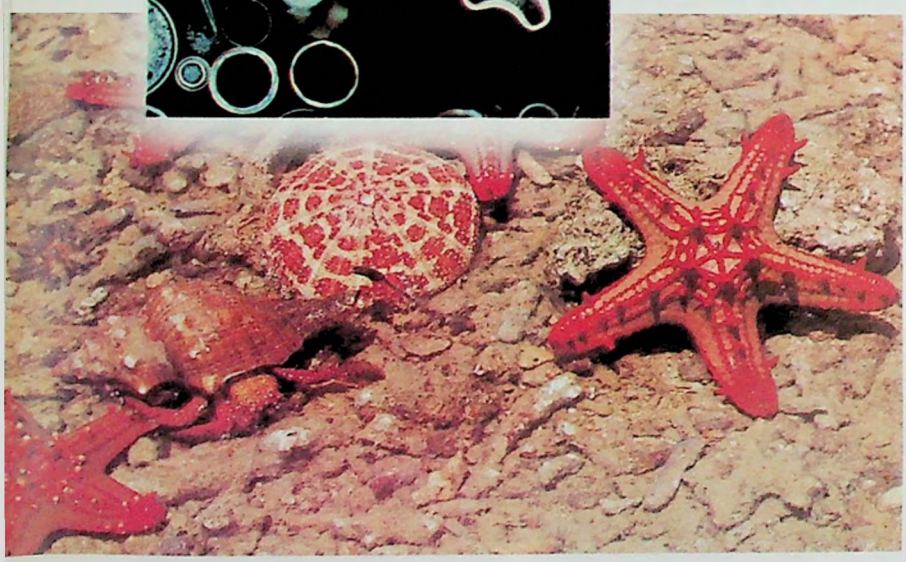
Evolution of nature : marine life

Rupa Sinha

Earth is probably the most unique planet in the solar system. Photographs taken from outer space show that the basic colour of the earth is blue. About sevententh of the earth's surface is covered by ocean.

The depth of the ocean differs greatly. In places the continental land masses continue for miles under the surface, then slopes gradually and drops sharply into depths. The average depth of the sea is about 13,000 feet. The deepest part of the Pacific Ocean is about six miles. The surface and the upper level of the ocean are always moving. There is enough oxygen and carbon dioxide dissolved in the water to keep the animals and plants alive. About two-thirds of the earth's crust is





sea-bed. It does possess mountain ranges, chasms, volcanoes and the equivalent of vast sandy deserts.

The abyssal plains are inhabited by fishes, worms and molluscs. In places, particle of manganese lie scattered over the ocean bed. The oceans contain large amounts of dissolved salts.

The sea heats and cools more gradually than the land. Though the tropical seas are warmer at the surface than polar oceans, they all help to regulate earth's weather and climate. Sea water evaporates and condenses as fresh water in the atmosphere, falling again as rain or snow. If it were not for the oceans, life would be impossible.

Life in the sea is based on floating plants called phytoplankton. They need sunlight to develop, so they float a few hundred feet below the surface. A tiny animal called zooplankton live on these plant. Larger sea animals— worms, shrimps, molluscs and the like, feed on both forms of plankton and are themselves eaten by small species of fish, which are in turn hunted by larger fish.

Fish is the main food for the sea birds as well as marine-mammals such as dolphins, seals and whales. When sea animals die, minerals in their decaying bodies serve to nourish other animals and plants which are the mainstay of the life cycle.

It is hoped that there may be enough food in the sea to help solve the world's hunger problems. But ocean pollution which poisons marine plants and animals is arousing grave concern.

Did you know it?

Alga (Plural algae)

An alga is a simple plant, which grows mostly in the water. There are about 25,000 species of alga. They grow in all parts of the world, especially in the sea, in lakes and in ponds. Seaweeds are algae, but many algae are tiny and can only be seen well with a microscope. The largest algae of all are kelp, which are found in shallow seas and can grow to hundreds of metres long. The algae appeared very early, as long ago as the Precambrian period.

Allodesmus

Allodesmus was a marine mammal. It was related to fur seals. Allodemus lived in the Miocene Epoch. Like the fur seals, the male Allodesmus was much larger than the female. They probably lived in colonies.

Ammonite

An ammonite is an extinct kind of mollusc, related to squids and octopuses. Ammonites first appeared in the seas about 380 million years ago. They became extinct about 65 million years ago. Ammonites had a hard, chalky, spiral shell. These shells are preserved in some rocks as fossils.

Amphibious

Amphibious is an animal which lives in and out of the water. Many prehistoric animals were amphibious, as well as the amphibians themselves. An amphibious reptile was Nothosaurus.

Aquatic

Aquatic is a plant or animal which lives in the water. The earliest forms of animal life were aquatic. Aquatic animals and plants began to evolve into land-living forms in the Devonian and carboniferous periods.

GEOMETREE OF NATURE

Welcome to a mathematical language of the clouds, mountains and rivers

The compexity of fractal shapes corresponds very well with our experience of nature

Have you ever looked at all the perfect geometric shapes in your textbook and wondered to your self, "Hey, I've hardly seen such perfect shapes in nature. Isn't there some geometry that describes them?"

Someone did. Benoit Mandelbrot, a French mathematician, made the famous observation, "Most of nature is very, very complicated. How could one describe a cloud? A cloud is not a sphere... It is like a ball but very irregular. A mountain? A mountain is not a cone... If you want to speak of clouds, of mountains, or rivers, of lightning, the geometric language of school is inadequate."

So what did he do? He went ahead and created a brand new science called fractal geometry. Trees, clouds, river deltas and the coastlines–they all can be explained by it. A fractal is a complex geometric object whose component parts seen from up close resemble the entire structure from far away, meaning it is "self-similar".

Today, fractals help classify and analyse order in natural phenomena, such as the branching of blood vessels, the turbulence in fluids, and the distribution of galaxies in space. Mandelbrot himself says that fractal geometry deals with an aspect of nature that almost everybody had been aware but nobody was able to describe in formal mathematical terms.

Fractal comes from the Latin fractus, meaning broken apart and it was explained in detail by Mandelbrot's brilliant book *The Fractal Geometry of Nature* in 1975.

Here's a fractal teaser. How long is a coast? There is no clear answer if you use this new science. Mandelbrot showed that, since the measured length of a coast can be extended indefinitely by going into smaller and smaller scales, there is no clear-cut answer to the question. But he defined a number between 1 and 2 that characterized the jaggedness of the coast, where 1 is the space taken up by a straight line and 2 is the space taken up by a plane. A jagged line will take up a number in between. This means smoother the line, the more close to 1 it'll be. More jagged the line, the more close to 2 it'll be. He found this figure to be 1.58 for the British coastline and 1.7 for the much rougher Norwegian coast

The concept of a fractal dimension, which was at first a purely mathematical idea, has become a very powerful tool for analyzing the complexity of fractal shapes, because it corresponds very well with our experience of nature.

In so doing Mandelbrot has in a way gone beyond Albert Einstein (who said that time was the fourth dimension) to discover that his fourth dimension includes not only the first three dimensions, but also the gaps or intervals between them, the fractal dimensions. The geometry of the fourth dimension–fractal geometry–is now recognized as the true Geometry of Nature.

Former American Vice President Al Gore has found fractals useful in the way he views the world. He once said, "The ideas in the fractals, both as a body of knowledge and as a metaphor are an incredibly important way of looking at the world... it often allows us to look at social and political matters and find ways to connect the dots that haven't made sense before."

WILL BARISAL AND KHULNA BECOME SEA-GIRT? JESSORE AND FARIDPUR TURN INTO COASTS?

Rise in the sea level will engulf several parts of Bangladesh. Barisal and Khulna will become sea-girt, and the coastline of Bay of Bengal will reach as far as Jessore, Faridpur and Chandpur. The low lying areas of Faridpur will turn into sea. In fact, the southern part of Dhaka, Comilla and the quagmires of Sylhet-Sunamganj-Kishorganj- Netrokona will be submerged too.

Dr. Sahidullah Mridha shares the above facts in his book 'SAMUDRAVIGYAN' (OCEANOLOGY). The book is printed in 3 volumes under the main title 'BANGAPOSAGAR' (The Bay of Bengal) and has been published by Bangla Academy.

The author says in his first volume that though Bay of Bengal is termed as a bay of gulf according to geographical connotation, it is one of the largest oceans in the world. The reason being— as the author describes— the Bay of Bengal is the "largest sedimentary fill geosyseline. Compared to any of the existing ones, this sub aerial delta (Bengal Deep Sea Fen) is the largest and the deepest of all. As a matter of fact, the Bay of Bengal can engulf the whole of 'La-Zola' the Californian sub aerial delta in her unfathomable fen."

We get to know from the book, that the total spread of Bay of Bengal is 8,49,425 sq miles or 21,72,000 sq kms. According to the statistics of International Marine Line Science Bureau, the Bay of Bengal is spread out till the tip of Daudra in Srilanka and the northern part of the Sumatra Island. It is unrestrained till the middle of Indian Ocean. The width will be around 1000 miles or 2,560 kms and the depth at an average is more than 2,600 feet. The deepest part measures to 14,764 feet or 2.75 miles.

The book contains more facts like this. The 1st volume of this book has 5 sections / chapters and 2 appendices. The volume consists features relating to elementary oceanology. The second volume informs us about life and the under water resources. The 3rd volume deals with the historical evidence of sociology. The 3rd volume with 10 sections in it highlights the involvement of the sea in mythology, politics, literature, marine rules and rights.

Regarding the metamorphosis of the Bay of Bengal, volume one says that it started some 20 (twenty) crore years

back when Gondwanaland started eroding. Himalaya was formed in the 'Eocene' period (55 million years back). Tibet from the southern pacific side collided with the Indian plate. At that point of time, except the elevated land of Rangpur, more or less, the entire part of present Bangladesh was under the sea. There were two bays in Bangladesh__ namely Sylhet Bay and Bogra Bay. Later, the areas like Barendra, Madhupur and Lalmai came into existence and were included to the geological area of Bangladesh. During the Oligocene period (38 million years ago), due to the movement in the earth's surface, the sea moved away far south from Assam and its adjoining areas. Again during the beginning of the Miocene period (24.5 million years ago), the ocean gulped the entire of Bangladesh barring the 'Rangpur slope'. The river Brahamaputra got herself linked to the Bay of Bengal around this Miocene period. It is said that after the creek of Garo Rajmahal was formed, the Brahmaputra rushed towards the Bay of Bengal depositing huge quantity of sediments. Most of the flow was from the west to south and south east. As per the geological evidence, it may be assumed that once the entire east starting from Rajmahal Hills till Shillong Valley in the north was completely surrounded by the ocean. The Bangladesh, as we see today, was full of rivers from the Pleistocene period (2 million years ago). The history of geology says that the Bay of Bengal often extended towards north and again receded to the south.

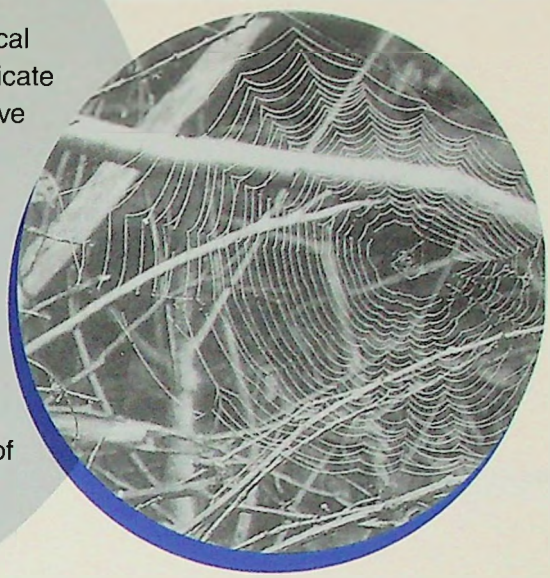
In the 3rd volume, many verses, where ocean is referred to are quoted from the Holy Quran. Regarding the sea, it is said in the Holy Quran, "The ocean is kept under Allah's control, so that you can get fresh fishes to eat, can get treasures like gems and corals, with which you can beautify yourself. You watch and also sail on the sea. For these you must be grateful and also feel the grace." [SURA NAHAL AYAT (16:14).] This particular book by Sahidullah Mridha is very much attributive and alluring with facts, statistics, maps, illustrations and photographs. These not only make reading interesting, but help to make it much easy for the readers to understand.

BANGAPOSAGAR : SAMUDRAVIGYAN (THE BAY OF BENGAL OCEANOGRAPHY)

BANGAPOSAGAR : MANUSH O SAMUDRA (THE BAY OF BENGAL : MAN AND OCEAN), Shaidullah Mridha, Bangla Academy, Dhaka.

THE WEB OF LIFE

One of the basic principles of ecology is interdependence. All members of an ecological community are interconnected in a vast and intricate network of relationships, the web of life. They derive their essential properties and, in fact, their very existence from their relationships to other things. Interdependence – the mutual dependence of all life processes on one another – is the nature of all ecological relationships. The behaviour of every living member of the ecosystem depends on the behaviour of many others. The success of the whole community depends on the success of its individual members, while the success of each member depends on the success of the community as a whole.



There is no waste in nature

Principles of Ecology

• Networks

At all scales of nature, we find living systems nesting within other living systems – networks within networks. Their boundaries are not boundaries of seperation but boundaries of identity. All living systems communicate with one another and share resources across boundaries.

• Cycles

All living organisms must feed on continual flows of matter and energy from their environment to stay alive, and all living organisms continually produce waste. However, an ecosystem generates no net waste, one species' waste is another species' food. Thus matter cycles continually through the web of life.

• Solar Energy

Solar energy, transformed into chemical energy by the photosynthesis of green plants, drives the ecological cycles.

• Partnership

The exchanges of energy and resources in an ecosystem are sustained by pervasive co-operation. Life did not take over the planet by competition but by co-operation, partnership, and networking.

• Diversity

Ecosystems achieve stability and resilience through the richness and complexity of their ecological webs. The greater their biodiversity, the more resilient they will be.

• Dynamic Balance

A ecosystem is a flexible, ever-fluctuating network. Its flexibility is a consequence of multiple feedback loops that keep the system in a state of dynamic balance. No single variable is maximized; all variables fluctuate around their optimal values.

Illegally cut row of *garan* trees
are disappearing from
the Sunderbans.
Are we going to continue
stripping off our forests ?

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