

Sand Extraction from Sub-soil Strata

Severe Ground Disaster Feared in Northern Areas

by Dr M Kamal Uddin



Crater formation on a plot after sand extraction and (inset) settlement trough formed under one borehole

A recently developed practice of extracting sand by pumping from underground sub-soil layers has been noticed at different areas in the northern districts of Bogra, Joypurhat, Nilphamari, Naogaon, Rajshahi, Natore, Rangpur, Sirajganj, Dinajpur, Kurigram, Gaibandha, etc. During a recent visit to Bogra district (at Chandan Baisha, Urdigram, Naruli, Sappgram, Sharikandi, Kalalu, Erulia, Mathailchapar, and Barachapar), it was observed by the author that numerous extractors were active in pumping out sand continuously from underground layers by adopting a simple device — using a shallow tubewell diesel engine, a pump and pipe accessories (without filter). Huge piles of sand are being extracted this way for commercial purpose. The extracted sands being one of the basic and prime construction materials are widely used for filling, blinding, plaster, mortar, concrete, sand bed and cushion preparation, and as sub-base and sub-grade material in the road construction. The extractors were found to have erected temporary sheds near extraction point for their workers to conduct operation round the clock. Thus continues the process of creating huge voids in the underground sub-soil strata. And as a result various types of terrific land disaster such as major crack in the underground as well as on the surface, ground subsidence leading to large crater or pond, etc., can occur; even slight earthquake can cause terrific devastation. In many cases, the extractions are being carried out near existing structures or sites where construction of buildings or other structures is in progress, thus leaving the structures at great risk.

The North Bengal area, in general, the landmass is comprised of sedimentary deposits, and the sub-soil profile consists of layers of various types, qualities and particles of sand. The area is a part of Bengal Basin of vast alluvial deposit flooded with sediments deposited by the country's master river systems and their numerous associated streams and tributaries. As sub-soil layers along the depth profile consist of fine to medium to coarse sands, various types of sands can be extracted according to need. Thus the withdrawal of sand in bulk quantity has become very much lucrative in the context of easy and simple extraction process, economy as well as in terms of quality. The extracted sands are fresh in quality, free from debris, foreign dirts, clay or silt fraction or organic materials. The quality is better than the sand extracted traditionally from river. This is one of the factors that people are choosing to extract sands from underground layers by pumping rather than by conventional process of digging river beds. The main factor lies in the fact that the profit in extraction of sand from sub-soil layers is higher than the underwater extraction from river by using boat and hand shovel. Another benefit factor is transportation cost which is saved when extraction is from near the construction site. The sand traders yield a continuous flow of income once they take contract/lease of a land for extraction. In general, the benefit

goes, in various degrees of course, to all the parties concerned namely, sand trader, workers, land owner, and consumers.

The sand traders take lease of the land from the land owner for a certain period (normally for 3 months). Boring are made generally in a grid pattern 10 to 12 ft apart laterally and longitudinally. Sometimes, two borings per decimal are made. Extraction of sand from all the boring points are completed one by one within the lease period. In this process, water and sand mixture is pumped out from the underground layer. Normally, for fine sand, pipe is installed at up to 40 or 50 ft. depth. Medium type sand is typically found at 50 to 60 ft. depth. At further depth coarse sand is available. Normally 4" dia pipe is installed up to the desired depth without any filter at the bottom. Drilling is done manually by conventional process. Shallow tubewell engine of 12 to 16 HP capacity and a pump of 4"x4" or 4"x5" size are generally installed. After continuously running for a period, when the engine pumps water only, it indicates completion of extraction as the sand is depleted in the source-layer at the boring point. Thus each boring can be used for one time only.

The production of sand and thereby its cost and profit vary from place to place and mainly depend on the source sub-soil layer of sand. The following citation in respect of Bogra district delineate the higher profitability of the underground extraction over the conventional process. From each boring, with a team of 4 to 5 workers working for 5 to 6 hours for drilling and extraction of sand, 3.5 to 4 trucks (each truck 250 cu ft approx.) i.e., 875 to 1000 cu ft sand in total is extracted. Sale price of fine sand on site is approx. Tk. 350 per truck. Price of coarse sand is higher. Total cost including lease price,

Tk. 300/- per truck of 250 cu ft. Continuously working for about 10 to 12 hours, 18 chowka (local measurement equal to 10 to 12 trucks) of sand can be extracted from one borehole from 45 to 60 ft. depth. With sale price of Tk. 350/- per truck, the operation yields a profit of Tk. 500/- to 600/- per borehole. In some sites, settlement trough of 10 to 15 ft. dia with average 5 to 6 ft. depth were found. In one case, crack propagated from the crater and extended up to nearby building. Such ground crack caused a vertical crack on an adjacent earthen wall building. In this area, it was noticed that serious land subsidence, ground crack development and crater or pond formation occurred during rainfall or monsoon and flood time. Rise in ground water table due to various reasons aggravates the situation in an accelerating manner and brings disaster.

The scenario for granular soil plain and cohesive soil area is different. In granular soil plain, immediate settlement occurs simultaneously while extraction process is in progress, afterwards settlement continues at slower rate and final settlement occurs during monsoon period and flood time. On the other hand, in the cohesive soil area, immediate settlement is minor; major settlement or catastrophic failure awaits and may occur finally in the monsoon, during rainfall, flood time or when groundwater table is raised for any reason.

Due to extraction of sands from underground layers, voids are created under each borehole. The pumping of underground sub-soil layers causes voids of various regular and irregular shapes. Tunnels of underground voids with many tributaries in different directions can be formed due to such pumping which imparts enormous uncertainty to the stability of sub-soil layers. The unseen voids will render serious instability

to the land owner.

problem for foundation of future structures in these areas.

With such configuration, the sub-soil layers can be compared to honeycomb structure. In honeycomb structure layers, under a load or when it is subjected to shear load, the structure breaks down, resulting in large settlement. So total and differential settlement, ground subsidence, landblock slippage, etc., is likely to occur under the boreholes and their surrounding areas. The plot is likely to be converted into a big marshy undulating land or pond. Extraction carried out adjacent to existing structure(s) may bring tilting, structure failure, overall settlement, de-structurization, collapse, etc. of the structure(s). It is necessary to establish an analytical method to describe properly the mechanical behaviour of the surrounding ground due to creation of underground void by carrying out simple model tests and a series of finite element analyses to simulate the test results.

Four different finite element analyses are required, namely, elastic element analysis, tension analysis, elasto-plastic element analysis and joint element analysis; their analytical results to be compared to establish (1) deflection of void peripheral, (2) extent of plastic region developed in the surrounding ground, (3) the shape of surface subsidence and (4) the ratio of the displacement at the void crown to the amount of surface subsidence. For elasto-plastic analysis, a plastic potential parameter which governs the dilatancy characteristics of ground material will have to be introduced.

Subsidence is caused mainly due to heavy precipitation and saturation during monsoon and consequent development of pore pressure in the layer. Presence of concealed void in the sub-soil layers becomes active during rainy season due to heavy infiltration, also causes development of pore pressure. Due to recharging rise of water table will enhance the ground crack propagation, ground subsidence and settlement. Similarly, heavy rainfall and flood will accelerate the disaster instantly. In another way, a mild earthquake with little ground vibration may break down the honeycomb structure and cause terrific land settlement, large crater or settlement trough formation, subsidence, earthblock collapse, etc., leading to a catastrophe and can create fierce environmental disaster. So it is strongly recommended that such activities of pumping out underground sub-soil layers should be stopped immediately.

It seems people are not aware of the fatal consequences that may occur. Initiatives should be taken from both government and private levels to grow awareness and disseminate cognizance of the technological aspects and consequences that may arise from extraction of sub-soil layers. Presently there is no law to restrain one from such devastating action. Considering the local conditions, environment and other factors, local laws are required to be formulated to curb such detrimental activities to save the area from terrific land disaster.

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MICROCREDIT

Not Gone with the Flood Waters

by Md Enamul Haque

In fact, it is not possible to overlook the threat of flood to microfinance. But we cannot keep ourselves idle in the situation as well. The calamities like flood, cyclone, drought, irregular rainfall and political unrest are normal phenomena in Bangladesh. Amidst these risks and uncertainty we have to do our jobs and work out collective strategies for the growth of microfinance.

After the longest devastating flood ('98) in Bangladesh, what will happen to five million families related to microcredit programme? Will more than 1000 microcredit supplying NGOs sustain? Will it be possible at all to realize the due installments because of this flood? All these questions were and are being discussed amongst the NGO communities, the development scientists and the economists both at home and abroad.

One of the most famous daily newspapers of USA, *New York Times*, commented some days ago under a big headline 'Grameen Dream Washed Away'. Recently, the Managing Director of ASA Md Shafiqul Haque Choudhury visited USA and India. He had to encounter a good number of questions from journalists on this matter. Around the world, a rumor was spread that the microcredit programmes of Bangladesh were going to be easily dimmed.

Just after the deluge, Credit and Development Forum (CDF) and South Asian Network for Microfinance Initiatives (SANMFI) jointly conducted a rapid assessment study on the impact of flood on microcredit.

The study revealed that 60 per cent realizable loan amount could not be recovered during the flood period. And the credit portfolio of BRAC, Proshika and Grameen Bank would be reduced to 20 per cent, 30 per cent and 50 per cent respectively. It is really alarming if all these information proved to be true.

For after-flood rehabilitation, Grameen Bank applied to the Bangladesh Bank and the International Finance Corporation (IFC) for 200 million USD. The government of Bangladesh also agreed to give 40 million USD to Grameen Bank, repayable within one year.

On the other hand, on a primary demand estimate, Tk 2000 million to Tk 2500 million was needed for rehabilitation of the members of NGOs. It is true that the big NGOs have more or less some donors. It seems that they would face no problem even if the government did not help them. But the Grameen Bank would certainly be at risk, if it did not get USD 200 million. However, there is no denying that the small and medium NGOs are in danger.

But they will be able to get some help as PKSF has taken some constructive and timely measures to rehabilitate them. These measures include rehabilitation fund raising of Tk 10 million, loan rescheduling, new loans to the affected borrowers, giving opportunity to the members for withdrawing their large portion of savings, etc.

Recently, CDF organized its experience sharing meeting (ESM) in Dhaka, where about 350 NGOs participated. The participants disclosed that just

after the recession of flood they had brought their groups in full credit discipline and have meanwhile started credit and rehabilitation programme successfully. So it is easily understood that due to flood microcredit supplying NGOs and their members did not become frustrated, neither they have started in full swing. In fact, programmes with strong base were not ruined; and the small and medium NGOs have amply proved it. So the rumor that microcredit would be ruined was just based on mere imagination or any other corners fabricated it to donors for more foreign donations or grants. Many examples can easily be found in Bangladesh in facing such types of calamities without any foreign help.

For instance, ASA, specialized in micro credit, has 750 branch/unit offices in 95 areas covering 61 out of 64 districts of the country, where more than 44 districts were affected by the recent flood. Out of 800 thousand borrowers, about 200 thousand families under 275 unit offices were affected. The amount of dropped installments (3 to 10) was Tk. 70 million. Tk 20 million saving was not deposited and Tk 70 million of loan target was not disbursed. How ASA has managed all these can be understood from the various steps it took as mentioned below.

Realization of pre-flood installments: ASA had no default loan before the flood. So there was no sudden large default which in fact made it easy to face the post-flood crisis.

Staying with the affected: Each and every staff and worker had stayed with the affected people during the crisis hour. The staff encouraged them, assessed their damages, visited them and also assured them of necessary rehabilitation.

Decision making transferred to the field level: The decision-making capacity by assessing the overall situation was assigned to the field level staff so that they can refund the members' savings during their bad times. Members were able to purchase essential commodities with their withdrawn savings. ASA has saved savings amounting to Tk 220 million to the poor during flood, because it believes that the members save for such crisis periods. But there are many NGOs, which did not do so.

Loan rescheduling: ASA had three to 10 dropped repayment installments during the flood. In consultation with the staff, the members decided to start repaying these installments after the end of the loan period; that is the dropped installments will be treated as realizable after the end of the current

loan term. For example, a member has taken a loan in January '98 then the loan term would end up in December '98. If this loanee has 8 dropped installments due to the flood, the repayment of eight installments starts from January '99 and will be completed in February '99.

Refinancing for rehabilitation: In consultation with the members, it was decided that each member would get a loan of Tk 1000 to Tk 2000 for house repairing, restarting of previous business, vegetable cultivation and other rehabilitation purposes, which would be repaid within one year. According to this decision, ASA started functioning immediately with available fund without any foreign help. Although almost all the amount of Tk 140 million received from PKSF was spent for this special loan programme where Tk 200 million was planned to be provided. One interesting thing is that 90 per cent members preferred to take loan instead of relief goods when they were offered some relief or a loan.

New loan: Many affected members were at the end of their repayment with only one to five installments due. These clients were provided with new loan and that at increased rate. For example, a loanee, who had a loan of Tk 6000 and had two installments due, received a new loan of Tk 8000 after repaying two due installments. Besides these loan facilities, the organization distributed oral saline and water purifying tablets free of cost by purchasing with its own fund. By implementing these programmes, it has faced the flood boldly and earned the credibility of the members. Not only that, it has taken a decision to raise a 'Disaster Management Fund' with all the surplus amount saved after each year to face such types of natural calamities. ASA thinks that at least Tk 20 million to 30 million will be accumulated in this fund every year.

In fact, it is not possible to overlook the threat of flood to microfinance. But we cannot keep ourselves idle in this situation as well. The calamities like flood, cyclone, drought, irregular rainfall and political unrest are normal phenomenon in Bangladesh. Amidst these risks and uncertainty we have to do our jobs and work out collective strategies for the growth of microfinance. No organization will have any problem to face disaster, if it attains capabilities and skill of its own. Organizations which will attempt to run their programmes by only depending on foreign assistance ignoring their own capability and efficiency are likely to face unfortunate possibilities of being ruined.

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Is Our Education Policy in Conformity with Demands of Time?

by Sikandar Rana

EDUCATION in Bangladesh is in a state of total anarchy. Students' violence, teachers' politics, mismanagement, unaccountability, inefficiency, discrimination, declining standard etc have made mess of the whole system. Those who really care about the country, cannot but worry about the condition of our educational institutions which are supposed to produce future leaders of the country. This situation is created over-night. Many years of indifference and negligence have given rise to what seems to be an unsurmountable difficulty now. The factor that seems most responsible for this gordian knot is the absence of a realistic, coherent and comprehensive education policy.

Drafting an education policy is the biggest single enterprise of a government. It encompasses whole lot of things ranging from ensuring individual right to education to intellectual enlightenment of a nation. The policy, therefore, must be scientific, balanced, systematic and up-to-date. An education policy should exhibit democratic spirit and uphold the interests of all sects and religions on an equal basis. The subjects prescribed for study should be helpful in inspiring patriotism among the learners and should not contain elements that may create division among them. More importantly, the policymakers have to take into consideration the demands and aspirations of the students.

Since early '60's the students of our country have been battling relentlessly to realise their demands. The Pakistani rulers faced stiffest resistance from the students as they ignored the 16-point demands of the students. Shortly after the independence the Kudrat-i-Khuda Commission was constituted for recasting the education system. Its recommendations could not, however, be implemented because of the political turn-up, sadly, the report of the commission did not reflect the aspirations of the students. Next time around, one or two Education Commissions were set-up but their reports also never saw the light of the day. After the exist of the military ruler in '90, a 10-point charter was drawn up in a meet-

ing of the All-party Students' Union at Dhaka University. But the subsequent government did not pay much heed to the demands. The basic principle of these demands made at different times was a universal, scientific, secular and democratic education system. The present ruling party, then in the opposition, sympathised with the 10 points. Now that the party is in office, it was generally expected that this government would give a careful thought over the students' demands. But this optimism crumbled once again as soon as the particulars of the new education policy were made public. In the announced policy, the long-cherished demands of the students have as well been relegated to the backyard. Only some cosmetic changes have been made keeping the basic structure intact.

Now what are there in the 10 points? Why are the successive governments trying to brush aside the demands?

The aim of the 10-point charter was to protect and promote the basic rights of the students. One of the most eloquent demands was for a uniform and one-channel education system.

At present there are three parallel channels of education — English medium or private education, general education and Madrasa education. There are unbridgeable gaps among these, three channels in terms of quality and contents. The students demand that these different systems must be brought under one system based on a unique syllabus and curriculum. Disparity and class discrimination at all levels of education have to be eliminated to ensure quality of opportunity. The new Commission has, however, given verdict in favour of maintaining the existing systems in fact turning a deaf ear to the demands. In fact, the very seeds of social discrimination are embedded in this pluralistic education system. Boys and girls are given different facilities are extremely inadequate. It has become almost impossible to provide basic education to learners, not to speak of quality education. The syllabuses and methodologies in our colleges and universities have seen little change since colonial. Moreover, in most cases, standard of education has only declined. The only option left for the middle class people is to swallow this bitter pill.

Madrasa education still remains at where it was. The sort of education imparted there has long outlived its use. Students passing out with little knowledge barely add to the tally of the unemployed youths.

Apart from discriminatory aspects, three distinct systems have some detrimental national implications. Syllabuses taught in English-medium schools are westernized ones

and private universities are enjoying some exclusive advantages in this respect. Politics has been kept outside the boundaries of these institutions. Consequently the atmosphere prevailing at such places is apparently education-friendly. English medium schools are far in advanced than general schools as far as academic standard is concerned. These schools follow regularly updated British or American syllabuses and thus keep the learners in touch with the latest information or scientific developments. After passing out the students can easily get themselves admitted to foreign universities. Hence the affluent families find it convenient to educate their children in these establishments. Again, English-medium education offers good job opportunities. Boys and girls passing out from there do not face much hurdle to clinch attractive jobs. English medium schools are generally confined to big cities and the ordinary middle class people cannot afford to purchase this costly education.

General education presents a pitiable picture. There seems no willingness to end political bloodshed in the campuses. One perceptible reason for this supreme unconcern is that the children of the privileged section are either studying abroad or in the substitute establishments made for their progeny. Academic facilities are extremely inadequate. It has become almost impossible to provide basic education to learners, not to speak of quality education. The syllabuses and methodologies in our colleges and universities have seen little change since colonial. Moreover, in most cases, standard of education has only declined. The only option left for the middle class people is to swallow this bitter pill.

Madrasa education still remains at where it was. The sort of education imparted there has long outlived its use. Students passing out with little knowledge barely add to the tally of the unemployed youths. The new Commission's report '96, the government expenditure per year on each cadet student is 46 thousand taka, while each university student gets a share of 24 thousand taka. Again this expenditure on each government and non-government college student is 2959 taka and 1089 taka respectively. This only gives us a peep into the abyss of discrimination. A poor economy like ours hardly can afford the luxury of expending such huge amount of money on a handful of cadet college students. Besides there are a good many expensive private institutions in the country, and it seems. The government, is not likely to incur the wrath of the elite people by meddling with these institutions.

When education in our plagued colleges and universities is plagued with violence, English schools

and talent should enjoy the right to higher education. But the new policy runs counter to such demands. It has been suggested that students willing to carry on higher education will have to financial capabilities. Again there are obvious suggestions to place limitation on higher education to downsize the number of educated youths to as many as can be accommodated in job sectors. This is unfortunate. The purpose of education is to create better humans. Through education one enlarges his/her inner sphere and attains maturity which immensely helps him/her in practical life. But in this case education has been shown barely as a job-hunting instrument.

The students demanded that education must be universal and open. The state has to ensure education for every body and every individual with taste and talent should enjoy the right to higher education. But the new policy runs counter to such demands. It has been suggested that students willing to carry on higher education will have to financial capabilities. Again there are obvious suggestions to place limitation on higher education to downsize the number of educated youths to as many as can be accommodated in job sectors. This is unfortunate. The purpose of education is to create better humans. Through education one enlarges his/her inner sphere and attains maturity which immensely helps him/her in practical life. But in this case education has been shown barely as a job-hunting instrument.

The students voiced their demand for a scientific and secular education system — a system which can not favour or

give preferential treatment to any group of citizens on the basis of their religious or other affiliations. Which endeavours to secure equality of right and opportunity to people of all faiths caste and creed. But their cries were lost in wilderness.

The new Commission has not only renewed the licence to madrasa education, but also advocated setting up of new madrasas for women. Moral issues have been brought forth in justifying madrasa education, but in reality, madrasas are also blamed for allowing ignorance, superstition and fanaticism to spread. They attach more importance to spiritual teachings and care less about teaching science. Living in an age of science one does not see any reason why such a system should be promoted any further. Mentionably in Turkey mad