

SMALL IRRIGATION

Enhancing food security, combating environmental degradation

Small irrigation by water resources development with construction of small dams and reservoirs, excavation of tanks/ponds in the abandoned dry rivers, or parched lands, use of depressions, canals, embankments, drainage of swampy lows, rainwater harvesting etc. should be included in the national food security programme.

PROF MUSTAFIZUR RAHMAN TARAFDAR

THE government (ministry of agriculture) has programme for national food security where the main sub-sectors/components of agriculture are covered. One important component is how to increase food production by small/minor irrigation in suitable topography and soils. This involves construction of small dams and reservoirs, excavation of canals, drainage of swamps for agricultural use, constructing embankments, tanks and ponds on river beds or abandoned rivers or dry areas for rainwater harvesting for use in lean period for irrigation as well as water supply in the water-hungry, parched lands particularly in SW and NW regions. Apart from food production, the projects will help combat drought and desertification and climate change impacts and create congenial environment with numerous water bodies formed by the projects.

Nigerian experience

In Nigeria, the Federal ministry of agriculture in cooperation with UN/FAO and the Govt. of China in South-South Cooperation ran a five year programme for national food

security. The ministry provided funds, lands, local manpower, logistics etc. FAO with its irrigation engineer and two consultants (one was the writer) and a Chinese engineer designed, supervised construction, administered and managed the projects. Nigerian officers helped in survey and supervised construction, administered and managed by FAO. FAO also provided advisers and visiting experts, and transports. Chinese government provided apex level experts (about 10) in Abuja and technicians (500) posted in the 31 states and 480 local government areas (LGAs, like our upzillas with similar population) in different agricultural disciplines.

The programme (water resources) was to execute about 500 projects in 31 states and 480 LGAs with small dams in suitable topography and soils with copious water availability and other small projects.

National food security programme

The writer knows there is nation-wide intensive activities by the government to help farmers produce boro and other crops in national food security programme undertaken by the Ministry of Agriculture (production) and

the Ministry of Food and Disaster Management (procurement, storage and distribution).

The writer expects implementation of a project, may be called BNFS (Bangladesh National Food Security Programme), like Nigeria's NSPFS (Nigerian National Special Programme for Food Security) which was undertaken in cooperation with FAO and China.

The Bangladesh programme will harness natural river water, water from reservoirs of the small dams, excavate tanks and ponds in dry river beds for rain water harvesting for use in dry season, dams in Chittagong and CHT and on border rivers in Mymensingh and Sylhet districts. The projects will add to national food security and be helpful in combating drought and desertification and climate change, creating congenial environment in the regions. Use of low lift pumps should be undertaken in large and flowing rivers, natural reservoirs, pond and haors.

Suggested project areas

NW region: The entire Rajshahi division is dry and hot with mostly small, moribund and ephemeral rivers and streams. Water-scarce barind area falls in this region. The region often records

lowest rainfall. The area adjoining the Ganges has also been severely affected due to Farakka. We need irrigation with small dams where topography is suitable and water can be stored during the monsoon in tanks and ponds, also holding water in the lows of rivers, using shallow and deep tubewells in good aquifers as well as low lift pumps along the rivers. Rain water may be harvested in dry channels and ponds and used during lean period. 150 such projects may be undertaken, which will help resolve 'manga' related problems. The projects will combat drought and desertification and climate change and will rejuvenate the degraded and polluted environment.

SW region: SW region is ravaged by upland water crisis and saline water intrusion from the sea as a result of withdrawal of Ganges water at Farakka. Khulna, Kustia and Jessore are severely affected as the Gorai and other distributaries have been depleted. Saline water has invaded Khulna and Sathkira seriously. Jessore with virtually no upland flow, its southern part is affected by saline water intrusion from the sea and the upper part with drought. Climate change is visibly discernible in this



region. Average temperature except only short winter months, is almost as high as in Rajshahi, hovering around 40°C. We need in this region small irrigation by dam reservoir tanks, shallow and deep tubewells, rain water harvesting particularly in abandoned dry river stretches and ponds, low lift pumps along the banks of the Padma and Gorai and other distributaries. We may build 150 small projects for the purposes.

Central region: Though the area is bounded by large rivers like the Brahmaputra, Jamuna, Padma and Meghna, mostly the interior, particularly the Mymensingh central and north, remains dry in the lean season. Tubewells may be installed in suitable areas. There could be small dams in the fringe of the north, low lift pumps by Brahmaputra, Padma, Meghna and distributaries like Kaliganga, Dhaleswari and Old Brahmaputra and Meghna, in

some stretches of natural reservoirs, and haors in Netrokona and Kishoreganj and rivers in Faridpur. Some 100 small projects need to be undertaken.

NE region: The whole region is relatively water-rich, comparatively cooler around the year with adequate flow of water in rivers, watercourses and haors and low natural topography there may exist potential for siting small earthen dams. Projects envisaged to be 100 in number.

SE region: Chars here may be used for small dams and reservoirs and excavation of tanks etc, so also shallow and deep tubewells and low lift pumps in some rivers like

Karnafuli and Sangu and around Kaptai lake, Meghna, Gumti and Padma estuaries. 50 projects may be undertaken in this area.

S Central region: Low lift pumps may be used in a large number of rivers for irrigation. Barisal has a maze of tidal rivers and rivulets, perhaps mostly free from salinity except in the area bordering the sea. 50 small projects are envisaged in this area.

Long term plans

We may undertake a 10-year plan to be executed in two phases, 600 projects under each phase. Each year 120 projects may be taken up, each covering 10 to 40 ha with an average of 25 ha. The coverage for each phase will be 15,000 ha with a total of 30,000 ha on completion of the second phase. One may calculate the total annual cost; it is expected that the benefit will outweigh the cost, making the project economically feasible and financially viable. Internal rate of return is expected to be high and acceptable. For a long term plan of 25 years, the area that will be covered under irrigation will be about 75,000ha with 3000 projects.

Executing organizations

BADC of the Ministry of Agriculture has nationwide infrastructure, staff and logistics. They have experience of executing small projects like low lift pumps and tubewells. With necessary increase in manpower and enhanced finance and logistics, BADC may be considered as the executing agency, for Bangladesh National Food

Security Programme's water resources components/sub sector for small scale irrigation for food production. Ministry of LGRD (LGED) may also be considered as an alternative. Even a separate agency may be created as deemed necessary by the government.

Concluding remarks

It is expected that an important component such as small irrigation by water resources development with construction of small dams and reservoirs, excavation of tanks/ponds in the abandoned dry rivers, or parched lands, use of depressions, canals, embankments, drainage of swampy lows, rainwater harvesting etc. should be included in the national food security programme.

Government's comprehensive plan of capital dredging of rivers and the proposed Ganges barrage, when implemented, will greatly restore and improve the severely affected economy and seriously degraded environment of SW and NW, in particular and of the country in general.

While the contribution of the small irrigation is manifest with substantial increase in food production which will help strengthen the country's national food security programme, it will combat drought, desertification, climate change and create congenial environment with cool microclimate all over the country in general and SW and NW regions, in particular.

The writer, a water resources specialist, is professor of civil engineering at World University of Bangladesh, Dhaka.

Beyond Copenhagen: How to cool the planet?

Fairly soon, public pressure for solutions will grow (Arctic melting, among other indicators, seems to suggest that the pace of warming is accelerating past rates expected in standard models). The political cost of inaction will eventually be prohibitive, although by then, a succession of so far undetectable tipping points may have been surpassed, with ruinous results.

PETER HEAP, BARRY CARIN, GORDON SMIT

MAJOR international meetings rarely result in acknowledgements of abject failure. If the prospects for success look bleak, the job of senior officials and ministers is to reframe objectives, lower expectations, devise productive "next stages" or "roadmaps," and generate hopeful if non-substantive declarations of intent.

In the worst case, meetings can be postponed, or, exceptionally, cancelled. The organisers of the United Nations Climate Change Conference, scheduled for December 7 to 18 in Copenhagen, do not have the luxury of cancellation or postponement. Yet it is necessary to consider alternatives if the conference indeed concludes fruitlessly.

This 15th Conference of the Parties (COP) to the UN Framework Convention on Climate Change (UNFCCC) will take place, whether or not the outcomes are likely to be useful. And absent a significant breakthrough in the next five weeks, on December 19

the global community will not have advanced materially toward the overarching goal of checking or reversing the increased levels of greenhouse gases in the atmosphere.

Reflecting the dedication and professionalism of the COP 15 delegates, the meeting will produce a range of agreements to keep talking about a collection of subjects too technical for most outsiders to understand. So the several days of talk will not have been entirely in vain.

With luck, the areas of disagreement will have been further defined and some of the "low hanging fruit" will have been picked. The shape of future agreements may be more evident, but it seems doubtful whether meaningful, binding commitments directly affecting the levels of greenhouse gases in the atmosphere will have been made, to say nothing of major financial arrangements to fund adaptation, prevent de-forestation and encourage technology transfer.

Current expert assessments of the state of play agree that too much technical work remains to be done for a definitive, comprehensive success

agreement to the Kyoto Accord to emerge from Copenhagen. The emphasis is on accomplishing enough to keep the negotiating round alive past the COP 15 meeting.

The alternatives at that point will be fairly clear -- continue with a flawed process or seek a new way forward.

The first option is ill-advised, given the evidence of accelerating climate change and the demonstrable inability of 192 parties to reach agreement on highly technical, multi-sectoral, rapidly evolving global issues. If significant changes to the current approach are to be adopted, however, they must be grounded in the recognition that the decisions required are quintessentially political in nature.

After fourteen meetings, it is clear that climate change can only be dealt with through a package deal. If the need for a package is generally recognised, however, the elements are still in major dispute (as is their sequencing).

The nub of the problem is easy enough to state. Developing countries are

totally unwilling to accept greenhouse gas caps unless developed countries pay for the impact this would have. The "southern" view is that developed countries caused the problem in the first place, and they must pay for solving it.

Developing countries refuse to cripple their own economic development and thereby hamstringing their efforts to reduce grinding poverty simply to pull developed countries' irons out of the fire.

At the same time, if developed countries are to act to meet the conditions laid down by developing countries for participating in a climate change deal, significant impacts will be felt in western economies, which remain fragile in the wake of the recent financial crisis.

Lifestyle changes would need to be contemplated at a time when western electorates feel especially vulnerable. And even if developed country leaders make major concessions, the level of mutual distrust is such that developing country leaders will be hard-pressed for domestic

political reasons of their own to come on board.

Baldly stated, to achieve change on this scale, a major exercise of political will affecting national positions across a range of sectors will be needed. This sort of multi-dimensional commitment can only be made by government leaders, not by ministers or senior bureaucrats.

Substantively, in order to generate enough "wins" for all sides, the existing putative climate change package is already very large, extending beyond traditional environmental concerns to encompass key issues in fields as disparate as energy security, international financial flows, technology transfer, research and development, management of the nuclear fuel cycle, trade, and development assistance.

To obtain ultimate success, additional issues of more local or national interest might have to be added to the mix to bring specific countries onside and to generate enough "winners" to make any climate change package broadly acceptable.

So, what existing body has the capability of breaking this deadlock, which is closely related to so many other non-algebraic areas? The players in this game will need to be government leaders, since the decisions required will be both broad and extremely political.

The body will need to be both representative of the developing and developed worlds but limited in number to keep the numerous trade-offs feasible. The obvious candidate is the G20.

Called into existence only in November 2008 to respond to the international financial and economic crisis, the G20 has so far managed that emergency reasonably well. The group is developing useful habits of cooperation and coordination, and has passed the acid test of utility -- it continues to be called together. In particular, the idea that the major developing economies must be fully involved in global decision-making seems firmly entrenched.

As the signatories of the Pittsburgh Communiqué stated: "We designated the G-20 to be the premier forum for our international economic cooperation."

Of course, others, and notably the Secretary-General of the United Nations, Ban Ki-moon, are very wary of any self-appointed group of countries taking on a role which existing international bodies should be undertaking. Ban himself, however, has recognised the critical need to generate political momentum in advance of Copenhagen, and to that end convened a September 22 "Climate Summit" in New York.



That said, one would not need to be a terminal cynic to question the likelihood of major progress from four hours worth of "interactive roundtables" involving 192 or so heads of government.

In the absence of breakthroughs at the UN, the alternatives to full engagement in climate change by the G20 are grim, especially for vulnerable developing countries. The weight of climate change will fall earliest and disproportionately on poor countries, precisely those less resilient and less prepared. Adaptation to global warming will be expensive, even for developed countries.

Fairly soon, public pressure for solutions will grow (Arctic melting, among other indicators, seems to suggest that the pace of warming is accelerating past rates expected in

standard models). The political cost of inaction will eventually be prohibitive, although by then, a succession of so far undetectable tipping points may have been surpassed, with ruinous results.

There are, of course, no guarantees that engaging the G20 directly in the climate change negotiations will produce immediate results. Not involving a small group of leaders, however, seems to doom the attempt to devise a successor to the Kyoto Accord to a lingering death, as the oceans of the world continue to rise steadily about our feet.

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GLOBAL WARMING MITIGATION

Opting for clean energy

Utilisation of more efficient technologies for generation, transmission and consumption of electricity and other energy sources can also reduce the load of energy demand. Clean technologies and incorporation of the renewable energy sources in electricity generation can be a safeguard for environment against pollution.

MAHFUJUR RAHMAN

BURNING of fossil fuels is one of the fundamental causes, if not the only cause, of various environmental disturbances world wide including the most disturbing 'Global Warming and Climate Change'. The burning of fossil fuel brings back the locked carbon in the atmosphere as carbon dioxide, the most significant greenhouse gas. We might have stopped burning fossil fuels if we could. But the lifestyle of millions and millions of people is directly linked to the use of fossil fuels. Transportation, production of industrial goods and our wellbeing in apartments, all need energy derived from fossil fuels. But our dependency on fossil fuels is gradually becoming the cause of decline of the planet earth itself.

So we need to be frugal and judicious in energy use and selection. There are, of course, options other than fossil fuels available now.

Green electricity

Electricity is technologically most convenient and popular form of energy. It is readily transformable to any other energy such as light, heat and sound that any

economically important for lighting home, cooking and heating room and activate warning and address systems. Electricity also is a form of energy that can be easily distributed to the users at minimum cost and with maximum safety if minimal cautionary measures are maintained. Distribution and utilization of electricity even pose the least environmental threats. So, what is the problem? The problem, however, lies at its source.

Now more than 60% of electricity consumed worldwide is produced from different types of fossil fuels such as coal, petroleum and natural gas. Power industries produce electricity burning these fossil fuels. Various types of pollutants are generated at different stages of obtaining electricity.

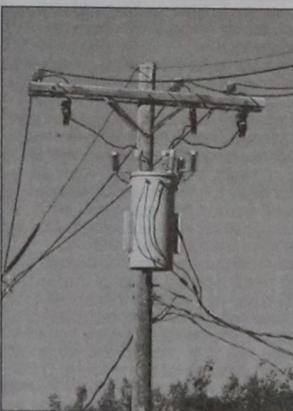
That smokes created over burning of fossil fuels contain CO₂ as major part. Burning of fossil fuel in huge quantity at global scale is mostly responsible for global warming. Even more problems mess up when the fossil fuel contains impurities like sulfur (S). Burning of fossil fuel then produces SO₂, which is one of the responsible agents for acid rain. Under these circumstances, it is apprehended that electricity can be a sustainable solution for energy needs only when it is

produced from renewable sources; only then we can call it green electricity or green energy.

Finding solution

An environmental scientist can find out better energy option(s) in terms of environmental safety and economic benefits to cope with the energy crisis and meet the growing energy demand in a sustainable manner since he is supposed to possess wide range of knowledge varying from natural sciences to social sciences. It is very prudent to form a panel of experts from various backgrounds including energy technologists, economists, environmental scientists and anthropologists for policy making regarding sustainable energy.

Some principles: Using least harmful fossil fuel: We must try to use good quality fossil fuel which contains fewer pollutants. The major three types of fossil fuels are coal, oil and natural gas. The latter two are derived from petroleum and coal is mined from coal seams. Coal is the most compact fossil fuel containing most harmful substances among all the three types. It contains many other substances as impurity besides carbon, its major component. Smoke created by coal burning contains sulfur dioxide, nitrogen



dioxide, mercury, carbon dioxide and various types of particulate matters. Mineral oil is less polluting than coal. Yet it produces volatile organic compounds and other pollutants. Natural gas is the least harmful or safest among fossil fuels in environmental consideration.

Choosing energy sources: the renewable energy technologies are also not completely harmless to environment unless they are installed and maintained as per environmentally sound mechanism. But all renewable energy technologies are not equally injurious to the environment. The best option among renewable energy sources is the solar energy because it is

the manmade imitation of natural process of photosynthesis and in this case we use the first stage of energy conversion from the sun. Biomass is produced by photosynthesis capturing the solar energy. Biomass is the completion of carbon cycle and when burnt virtually does no harm to the environment. Hydropower harnessing sometimes harm aquatic life in the dam or river. Wind energy harnessing can pose threat for birds although it is least harmful from environmental perspective. Capturing tidal power in the coastal region can harm the coastal ecosystems to a great extent if environmental impact of RET projects are not assessed and mitigated.

Maximising use of renewable energy: Harnessing, processing and burning of different types of fossil fuels are the major cause of environmental pollution and degradation. So, sustainable energy aims at lowering the amount of fossil fuel use while increasing the share of renewable energy sources for electricity production and if possible having total energy budget based on renewable energy sources.

"Fusion and fission are safer than fossil fuels": Proponents, such as environmentalists James Lovelock, Patrick Moore (Greenpeace co-founder), Stewart Brand (creator of The Whole Earth Catalog), and Norris McDonald (president of the AAEA), claim that nuclear power is at least as environmentally friendly as traditional sources of renewable energy, making it the best future solution to global warming and the world's growing need for energy. They note that nuclear power plants produce little carbon dioxide emissions

and claim that the radioactive waste produced is minimal and well-contained, especially compared to fossil fuels.

Deploying most efficient and clean technology: Catalytic converter for gasoline driven internal combustion engines and fluidized bed burner and use of coal gasification technology can reduce NOX and SOX emissions from the process of fossil fuel burning. Methyl tertiary Butyl ether (MTBE) can be used as aiding agent to burn hydrocarbon completely in internal combustion engines. There are also many new interventions in pollution control technologies world wide. We should invent and utilize as much as possible efficient and pollution free technologies.

Concluding remarks

Widespread promotion of sustainable energy use can save our environment from the over exploitation maladies posed by the traditional energy system. Utilisation of more efficient technologies for generation, transmission and consumption of electricity and other energy sources can also reduce the load of energy demand. Clean technologies and incorporation of the renewable energy sources in electricity generation can be a safeguard for environment against pollution. Using less and less fossil fuel is fundamental to reduction of global greenhouse gas emissions. And this is the way to containing global warming as well as climate change.

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