

# Desertification Looms Large in Bangladesh

by M Aminul Islam

**D**ESPITE their diversity, the western districts of Bangladesh form an undeniably homogeneous group with regard to moisture balance and population characteristics. All have a dry environment during the cool winter season and rainfall concentrated in the monsoon season.

Variation in the amount of rainfall throughout the region is another factor which contributes to the state of aridity. The degradation of the biological environment including human environment of the region has increased the risk of flooding, erosion, salinization and above all, desertization.

One prevailing belief in the region is that the progressive desiccation and the consequent expansion of sandy area have been due to recent changes in climate. The cause for concern is whether climate is becoming drier exacerbating the process of desertification. Rainfall variability study has shown that there is no distinctive downward trend in both the rainfall amounts and variability in rainfall.

Except for minor oscillations characterized by cycles of years of relatively high and relatively low rainfall, the climate has shown no great alteration since the first quarter of this century. Thus, although, there appears to be some evidence of increasing aridity in recent years owing largely to the changes in land forms (formation of Char lands and drying up of rivers) and vegetation (diminution of forest resources), the suggestion that this has been due to continuous negative variability in climate seems to have no basis since this has not been variable for a long time to conclude that it is progressively desiccating.

What is more important here is the fact that by our inadvertent manipulation of

the environment, by cutting and burning of woodlands, tree branches and shrubs among others, we have enhanced the processes of soil erosion and sand drift, including lowering of water table, reducing thereby the precipitation effectiveness. Eroded topsoil carried to rivers, canals and bays (marshy land) has reduced reservoir storage capacity and increased the incidence and severity of floods.

On the other hand, construction of barrages in the upstream of major rivers and withholding of freshwater during the leaner periods has caused intrusion of saline water deep into the moribund delta area during high tides, precipitating salt accumulation in the soil to a great extent, bringing in ecological imbalance in the area.

Three very important problems that have emerged from our use of and interaction with the natural environment highlight the close relationship and delicate balance between soils and vegetation in this part of Bangladesh. These are soil deterioration, soil desiccation and accelerated soil erosion. These problems are all precipitated by the removal of the soil vegetation cover by the users of land.

Vegetation clearance including forests, repeated crop cultivation, overgrazing and occasional bush burning expose the soil to intense insolation leading to increased rates of evaporation, decomposition and oxidation of soil organic matter; while the major nutrients and trace elements are rapidly exhausted from the soil through crop removal, leaching of bases and erosion.

The degradation of the soil has in turn impaired the sus-

tenance of the vegetation cover and lowered its resource value although the area was once rich in verdant resources in the near past. However, the nature of soil, and climatic regime makes vegetation regeneration particularly precarious and fortuitous.

The improper fertilization, intensive cropping, growing of HYV and soil exhausting cash crops in the absence of a proper organic matter management is deteriorating the soils to a minimum level of soil fertility.

Environmental studies on regions west of the Jamuna river confirm the suspicion that drying up of land in proceeding at a rapid pace there. For the region as a whole an increase in desert-like conditions as evidenced by the prevalence of improper winds, diminished and more erratic rainfall, degraded vegetation, impoverished soils and increasing salinity has been noted.

The ecological reality of the western districts of Bangladesh is characterized by variability and irregularity of rainfall. This variability increases where the rainfall decreases. An important fact is that this variation occurs in both time and space. Not only is the annual and monthly variation but also the micro-variation is of ecological significance.

Detailed studies of this kind for larger areas are necessary for a proper understanding of the functioning of the ecosystems. It is very difficult, however, to give a precise estimate of the population of this region who are at risk suffering from extreme aridity.

Approximately 80% of these people earn their living either

directly or indirectly from agriculture. It is thus clear that natural resources are under severe pressure from both human and animal populations and that rapid deterioration in the ecological balance may ensue, with an extension of aridification and a gradual decrease in productivity.

## The Task Ahead

The north-west and south-west regions of Bangladesh already show signs of environmental stress, including drought hazard. From the point of view of resource management, one of the objectives would be to review measures that must be undertaken to halt this process.

If we all view desertification as representing a long-term diminution of society's resource base, it should be theoretically possible to calculate its costs and losses over time, but no such comprehensive studies have been undertaken.

Priorities in measures for combating desertification should include our awareness of the drought hazard experienced in the region. We must be aware of the fact that years of drought will recur in the future. Drought adjustment processes need to be examined considering the local situation and the availability of technology.

Basic research aimed at the rational management of lands threatened by extreme aridity should be undertaken without much delay. The essential objective of the proposed research should be to understand the components of natural and human environments, and their interaction in order to indicate those measures

which might be undertaken to permit the long-term rational exploitation of natural resources.

The first step, therefore, is to carry out research, which

should cover the gamut of possible activities, from phyto-ecological inventories and the measurement of primary and secondary production to experimentation with techniques for improvement.

Research should particu-

larly be designed to develop methods of management of land, water and biological resources which are based on ecological principles. To provide a data-base for planning, particularly ecologically sound land use, reliable data on the natural and human resources of the areas concerned should be collected.

Without a reliable area inventories and surveys of human, livestock, land, water and vegetation resources, for instance, no rational land use planning is possible.

The plan of action to combat desertification, elaborately worked out and profoundly discussed at the United Nations Conference of Desertification in Nairobi in 1977, lays strong stress on rational land use planning, i.e., a reorganization of land use in the affected regions making it more compatible with the natural preconditions (ecosystem).

Desertification should therefore be tackled in the areas where it occurs by restoring the permanent plant cover so as to halt wind and water erosion. Thus, tree planting in ecologically suitable localities, together with other forms of vegetational improvement, is essential for combating desertification as well as for fulfilling present and future requirements of fire wood and fodder.

It is imperative that we established measures for the improvement of the quality of life of local populations by limiting and buffering the effects of climatic irregularities on production. Thus, assessment of the current situation should include analysis of the processes leading to desertization

as related to water availability and flow, to the effect of man and to fluctuations and long-term changes in climate.

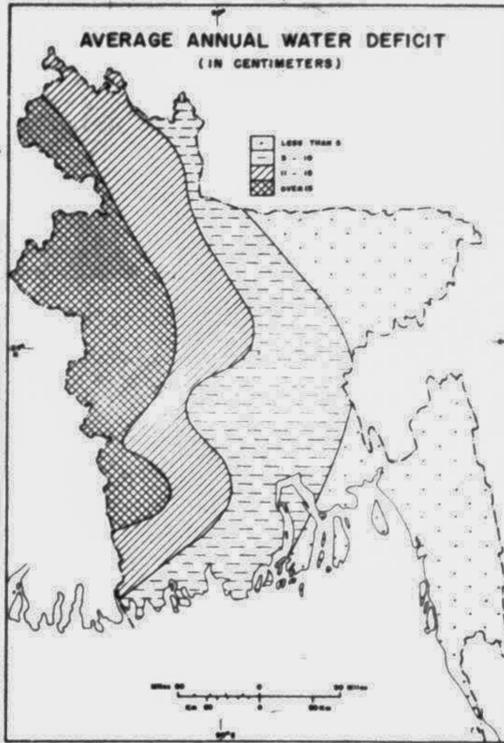
The aspects of demographic, social and behavioural dimensions of desertification should also be taken into consideration. A team of expertise drawn from geography, botany, anthropology, demography, economics, soil science, nutrition, and psychiatry is needed to examine the vulnerability of peoples and livelihood systems to desertification and the implications for actions.

The action programme should also include preparation of schemes for training, education, extension work and legislation vis-a-vis the processes of desertification. This is an area where geographers in particular can play a vital role, bringing in their expertise.

Whatever we intend to do to tackle the processes of desertification, we should better be aware of the fact that expensive methods are not practical solutions and halting of desertification and restoration of degraded land would require, among others, a strong political will and the power to implement necessary measures.

In essence, from the behavioural point of view the research questions would centre around: (a) assessing the extent of human occupancy of hazard zones, (b) identifying the full range of possible human adjustments to hazard, (c) studying human perception and estimation of hazard, (d) describing the process of adopting hazard adjustments and (e) estimating the optimal set of adjustments and their social consequences.

(A related feature by the writer was published last week)



## Saving Crops from Frost and Freeze

by K Kailasa Nathan

**S**MOKE screens, smudge pots, burning tyres, infra red heaters, hot caps, frost shields, wind machines, alarm systems — what may sound like a junkyard is, in reality, an armament to choose from to protect your orchards and vine yards from the deadly frost.

Each year, from December to February, India has to cope with the winter frost attacking its vine yards, tea and coffee plantations and wheat fields, each onslaught lasting from five to 20 days.

Two types of frost wreak

thick fumes which act as an artificial cloud and prevent radiation from escaping from the ground during night.

Chemical mists and artificial fogs have been used in the past, but have not proved to be too reliable. Also care should be taken that they are non-toxic and non-polluting. The effectiveness of protection depends on the size of the particles and the vertical density of the fog.

Smoke screens are also often created by using smudge

such a manner that each tree in the orchard can "see" a heater for effective frost protection.

In case of advection frost, the heaters should be concentrated mainly along the upwind border. In hill tracts, they should be concentrated in the valleys, as the heat produced moves upwards in the valleys. In fact, the use of orchard heaters should be considered as the best equipment to save crops from frost and freeze.

Hot caps are special non-

During daytime, the shield deflects radiation to the plant and soil. At night, the shield reduces radiation loss to the sky.

Aluminium foil increases the heat input to the soil at daytime but is less effective in conserving heat during night.

Bean plants can survive severe frost if shielded with either black plastic or black kraft paper, studies show.

Another novel way to manage frost is to mix the air by wind machines which try to bring the relatively warm air near the top of an inversion down to the surface.

The frost is disturbed by agitating and mixing the warm air above and cold air below. Citrus orchard owners use large tower-mounted engine-driven propellers and fans to drive warm air in the inversion layer.

Such propeller systems of air mixing in five acres of cheery orchards have been successful in maintaining about two hectares at a safe temperature during frosty nights. But the cost may be prohibitive for small and medium-scale farmers in developing countries.

In the United States, helicopters are used for turbulent mixing of the air over crops, but are not as popular as wind machines.

In northern India, flooding fields with water and sprinkler irrigation also protect wheat crops from frost attack. In-row sprinklers, under-tree micro sprinklers and different types of misters and drippers are the various water application aids.

Other techniques that have been found to mitigate and avoid frost include irrigating the soil before the frost attack and compacting the soil.

In Australian vineyards, frost damage is reduced by rolling the soil to keep it compact, which raises the temperature by 0.4 degrees Celsius, while rolling plus irrigation increase the temperature by 0.6 to 1 degree Celsius.

During sprinkler irrigation, a film of water is maintained continuously on the plants. Sprinkler irrigation is widely used for low-growing vegetable crops such as tomatoes, cucumbers, and strawberries, as well as in the apple, peach and citrus orchards.

An important precaution that should be taken is that the sprinklers and pumps must be able to operate for several hours at low temperatures.

Possibly the most basic care that can be taken is to identify potential "frost-risk" areas, based on climatological studies and statistical analysis, so that correct advice can be given to farmers on the choice of crop varieties, growing areas, and planting dates.

Simple frost alarm systems can also be fabricated to wake farmers and warn them as soon as the ground temperature goes below zero degrees Celsius. Already in the western countries, a medium range scale through model output statistical techniques (most) helps predict frost occurrence and severity.

— PTI Science Service



How green was our field

damage in Uttar Pradesh, Himachal Pradesh, Punjab, Jammu and Kashmir, parts of Bihar, Haryana, Rajasthan and the Nilgiri hills of south India.

The first, radiation frost, is more common on clear nights with low humidity and clam winds, when there is rapid heat loss from the ground.

The second, advection frost, occurs when there are strong winds, and distinct temperature inversions, when the air mass is carried from one region to another.

The frequency, intensity and sensitivity of the ground frost largely depend on the soil type, soil conditions, ground cover and topography.

Hence pre-requisites for frost management include detailed studies of the site contour map, drainage system, irrigation source and soil temperature profile.

Natural attempts at frost management include avoiding fence rows, wind breaks, earth fill or heavy vegetation which may block air drainage.

While cultivating in close valleys, a deserting of trees is often planted around the edges and slopes to avoid frost attack, and crops are not grown at the bottom of valleys.

But, with these natural methods proving to be inadequate, farmers are resorting to various gadgets to beat the frost.

Creating a smoke screen or water mist in the air is one such strategy. Farmers create

## When Baby Orang-Utans are Put Back in the Wild

by Stephen Carr

**D**EEP in the Indonesian forest, pizza-loving orang-utans are learning to be wild again.

The giant apes are a protected species in Indonesia. Where they live in the thick forests of Sumatra and Borneo, but they are in constant demand as pets. The going rate for a baby orang-utan in north Sumatra is \$350. As a baby, an orang-utan makes an endearing pet, with near human characteristics, a fondness for human food and an affectionate nature. As it grows bigger and stronger it becomes a great nuisance. Its powerful arms and legs, suited to swinging through the trees, can cause havoc in a confined space.

"After the age of five, they're not so cute any more," says Kris Warren, an Australian who works at the Bohorok Orang-utan Rehabilitation Centre in northern Sumatra. The centre takes in unwanted pets and tries to return them to the wild.

Some apes have been returned from abroad to centres like Bohorok and two similar ones in Borneo. There is a thriving international smuggling racket in orang-utans.

Last year, six baby orang-utans were found in a crate at Bangkok airport. A telex from Singapore instructed that the box, labelled "Live Birds," be transferred to a Yugoslav Airlines flight to Belgrade. The flight was delayed and the crate was moved to a storage area. It seemed suspiciously heavy for birds, so it was X-rayed.

Thai airport officials were shocked to see the upside-down images of what they took to be human babies. They thought they had stumbled on a child smuggling racket. The orang-utans were removed from the crate suffering from dehydration and diarrhoea and nearly dead.

To obtain these babies, their mothers were probably shot. Many more than the six are likely to have died on their way to the market where they were sold.

One of the worst offenders in providing a ready overseas market for the animals is Taiwan, where up to 1,000 orang-utans are kept as pets.

A popular Taiwanese television series features a cuddly orang-utan in the household, but the TV-fed fantasies of hundreds of Taiwanese families do not usually have happy endings.

Warren explains that the apes become ravenous around humans. They bite, defecate in unwelcome places, and catch and pass on diseases to which humans are susceptible. Orang-utans can live for 50 years, not so different from the human populations of Borneo and Sumatra. They grow to 1.9 metres tall and a large male can weigh 90 kilos. When the mischievous bundle of orange fur becomes

unmanageable and dangerous, it is either caged, where it may become diseased and die, or simply abandoned. Orang-utans have been found dumped on the streets of Taipei. Some are probably killed. Others may be eaten. The ape was a delicacy in former times.

"Some of them arrive here in a very bad state," says Warren. "Malnutrition is the main problem. They've been fed on things like pizza and

No one is sure how many orang-utans still live in the wild. They inhabit thick tangled forest, making aerial surveys and foot expeditions ineffective methods of counting them.

Their population is put at 10,000-20,000, guessed at by a 1978 estimate of one ape to one and a half square kilometers of jungle.

While in quarantine, the centre's apes are taught the

**Baby orang-utans make popular pets, with their near human characteristics and affectionate nature. They are also a protected species, smuggled around the world to satisfy demand. But when they start growing up, they become unmanageable and boisterous, and are often abandoned by their owners. Gemini News Service looks at a centre that is trying to return these orang-utans to the forests in which they belong.**

beer." The orang-utans are instead put into quarantine and given a boring diet of milk and bananas. "They don't usually like this diet," says Ralph Swan, an Australian veterinarian.

"It's a nutritious but deliberately monotonous diet, so that when we return them to the forest they're more likely to go off and forage for themselves."

The centre is in the middle of the 9,000 square kilometer Mount Leuser reserve, where 3,000 orang-utans live in the wild. Since 1973, the centre has released 179 into the forest. Another 35 have died at the centre and 23 are now being rehabilitated.

basics for survival in the forest: tree climbing, making nests for resting and sleeping and avoiding the ground. Unlike gorillas, orang-utans in their natural state stay off the forest floor, spending most of their lives in the trees.

When they are ready the apes are released on to a platform, high in the trees, on a steep hill rising above the centre. Milk and bananas are then provided twice a day on the platform. Tourists come to gaze and take photo graphs.

A half-dozen apes are usually present at the feeding sessions. They are fascinating to watch, using their weight to bend a branch 30 metres high, stretching a hand or foot languidly out to transfer their bulk onto the next tree.



At the centre: Australian vet Ralph Swan, ranger Hariadi and Australian student Kry Warren treat Ucif, a young male orang-utan