

FIG. 3. INSONA card of an endangered crocodylian. The reverse side indicates that 21 of 23 known species of crocodylians are now recognized as endangered. 'The trade in crocodylian products [having] helped cause a dramatic decline in their numbers.'

In the Caribbean, marine turtles are harpooned, and such pressures have caused their populations to collapse. In Surinam and elsewhere, the eggs of turtles are collected in the proximity of the ocean, and find such flourishing markets in tropical countries for their supposed aphrodisiac values that they fetch more money than hens' eggs.

The Hawksbill (*Eretmochelys imbricata*) is now one of the most endangered species of sea turtle because of the commercial demand for its 'tortoiseshell' and also for its stuffed entire juveniles which enter the US and Japanese markets illegally. In the absence of the Hawksbill, young Green Turtles (*Chelonia mydas*) become the targets of souvenir manufacturers, who capture them before they reproduce their species, killing them to cater to the needs of uninformed tourists.

#### Zebra and INSONA

The trade in Zebra (*Equus zebra*) skins has helped to cause a dramatic decline in their numbers. Grevy's Zebra (*Dolichohippus grevii*) is vulnerable, mostly because of illegal hunting, though it seems that stopping the trade in skins of these species can be the only hope for their survival.

It is much to be hoped that these modest attempts initiated through INSONA will not only meet with success at the local and national levels but also be most welcome in all the countries involved, as wildlife knows no geographical frontiers. Our activities to save threatened wildlife should also render service to the great general cause of saving The Biosphere for Man's and Nature's well-being.

The stickers and cards are available, against a donation, to serve the cause of our Asian efforts for the *World Campaign for The Biosphere*. Please extend your generous support through communicating with the undersigned General Secretary of INSONA who is also the Founding Editor of *Environmental Awareness*.

G.M. OZA, FLS,  
Oza Building, Salatwada,  
Baroda 390 001, India.

### Sukhomajri—An Example of Effective Conservation

'All our fertile farmlands were once here,' said Shri (Mr) Daulat Ram, a senior member of the village, pointing to one of the deep gullies running helter-skelter in that region (Fig. 1). Lying at the foothills of the Shivalik range of the Himalayas in Ambala district of Haryana (India), the little village of Sukhomajri has lost several hectares of its productive land over the years through the ravages of flash-floods. But now the village is self-sufficient and stands as a testimony of united efforts towards conservation. The Hindi word 'Sukhomajri' can mean either of two things: 'prosperous little village' or, with a slight change of inflection, 'dry little village'. The village of Sukhomajri has already lived as a dry little village, but now for the last decade has been a prosperous little village.

The original problem was the rapid sedimentation of Lake Sukhna in the administrative area of the model city of Chandigarh, capital at once of both Punjab State and Haryana Region. The Lake would have vanished in a few years had not the city fathers embarked on a costly dredging programme to save it. Shri P.R. Mishra, director of the Chandigarh Centre of the Central Soil and Water Research and Training Institute, recognized the ultimate cause of the problem and launched an ambitious project of watershed conservation in the catchment area of Lake Sukhna. Pursuing this programme, he systematically worked his way back from Chandigarh to the head of the watershed, some 15

kilometres away, and there he found Sukhomajri, where he noticed a particularly vicious little watershed that was flooding and destroying agricultural lands.

Mr Mishra was convinced that this was the right place to begin work. The village, he recalls, had been a model of disaster. In 1975, with support from the Ford Foundation, Sukhomajri had been singled out for special conservation efforts towards controlling the silting of the lake in Chandigarh. It was difficult to convince the villagers, but Daulat Ram somehow saw a ray of hope in Mr Mishra's contentions and between them they convinced the people about the conservation programme. Deciding to do something, he created a check-dam to stop downstream destruction. When the dam was in place, a sizeable body of water accumulated behind it. That this water could be used for irrigation was enough to gain the cooperation of the local villagers.

Sukhomajri village, spanning 100 hectares and housing about 70 families, had not a single tree worth the name nine years ago. It did not even have a well for meeting its drinking-water requirements. The nearly 450 villagers, mostly belonging to the Gujjar tribe, spent their energies in searching for better pastures for their cattle. Nearby hills were scoured by villagers in need of grass and firewood. All these activities resulted in the loss of some 900 tonnes of soil per hectare per year, which was the source of enough



FIG. 1. Denuded hills of Sukhomajri and, in centre, construction of a check-dam in progress. Human figures on the dam indicate the scale.

silt to raise the Lake-bottom from a depth of 14 metres to a mere four metres. On an average, about 2 centimetres of soil from the hills in the entire 16 kilometres of the catchment area of Lake Sukhna was flowing into the Lake every year.

Construction in the administrative area of the village of three earthen check-dams, each about 200–400 feet (*ca* 61–122 m) wide and holding back a reservoir (Fig. 2), has transformed the landscape of the village environs during the past 9 years. These reservoirs have greatly reduced the rate of erosion, such that it is now calculated to total only about 1 cm in 20,000 years. Moreover, due to these efforts, the village has yet to endure a drought: even when practically all of northern India was suffering drought in 1979–80, farmers in Sukhomajri continued to draw water from the reservoirs. The denuded slopes are now covered with vegetation, and not a single blade of grass is grazed by the cattle. The villagers of Sukhomajri understand that if they overgraze the watershed leading to their dam, it will soon fill with silt and so they now carefully control grazing and woodcutting. As Shri Mishra says, 'The hills are now socially and morally fenced' (Fig. 3).

The crop yields have increased many-fold, and some farmers now grow more than two crops a year. From a mere 25 tonnes in 1977, the wheat production in the village has shot up to 102 tonnes, wheat straw to 203 tonnes (from 50 tonnes), maize to 35 tonnes (from 19 tonnes), and the milk production to 440 tonnes from a meagre 220 tonnes. A

conservation project that cost less than US \$10,000 is thus now adding over \$70,000 *per year* by way of crop produce and forage!

The United States Agency for International Development plans to grant \$5 millions for extension of the Sukhomajri programme to 150 villages, while the Indian Government will contribute at least \$1.25 million to support further extension of the programme to about 400 villages over the next five years. Such has been the ecological impact of the project that the Forest Department is constructing similar reservoirs to provide shelter and drinking water for wildlife in this arid region, as well as additional fuel and fodder supplies to other villages.

Not alone has the conservation method yielded results, but the villagers have become aware of the potentials of the hills. They have grouped themselves into a society called 'Hill Resource Management Village Society', with each villager as a member. The society has taken a vow not to graze cattle in the catchment area, as a result of which all cattle without exception are fed on cut-grass. The water from the reservoirs is distributed among the villagers equally, irrespective of their land-holdings. Each *bona fide* family in the village is given a water coupon, entitling it to the same quantity of water. The family can trade, give away, or sell, the coupons as they may wish, but with the approval of the Water Users' Association. For example, one of the larger farmers has two small farmers working part of his land. They provide the labour and water, he

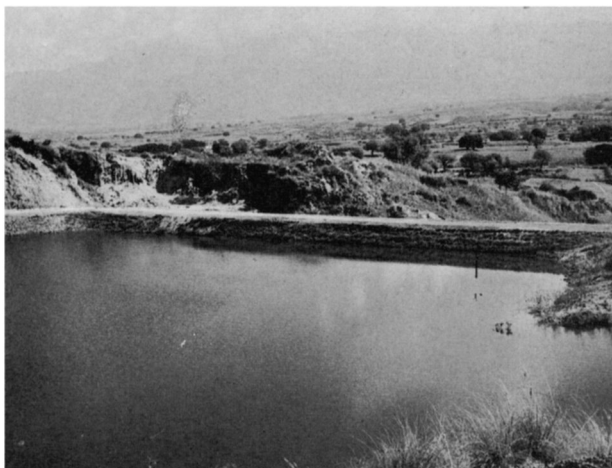


FIG. 2. One of the three Sukhomajri check-dams, showing in the background the green, cropped area below the dam.

provides the land, and they divide the crop equally with the larger farmer. Even the large landowners see that the coupon system is necessary to avoid the village tensions that would otherwise arise.

Employment opportunities have increased. The villagers have adopted rope-making as a cottage industry, using hemp. Due to the construction of the reservoirs, the microclimate of the area has changed, such that nurseries have sprung up in the village. Plants of several types, ranging from ornamentals to those producing fruits and vegetables,



FIG. 3. Another Sukhomajri check-dam reservoir with, behind, a revegetated hill that at one time was practically barren.

are being grown to meet the requirements of nearby city folk—whereby the village is earning a revenue of some \$6,000 yearly by selling its nursery products.

In modern India, which loses some 6,000 million tonnes of topsoil each year, such efforts at the 'grass-roots level' can be vastly significant. It has now become widely believed that educating people can solve problems better than enforcing laws and regulations.

SUDHIRENDAR SHARMA  
Centre for Policy Research  
Dharma Marg  
Chanakyapuri  
New Delhi 110021 India.

### New Report Links World Debt Repayment to Environmental Damage

In a recent report a group of environmentalists, leaders from the international financial community, and academics, cautioned that hard-won population and environmental protection advances in the Third World may be threatened by the stringent conditions that are being imposed by the International Monetary Fund in forcing basic structural adjustments in an attempt to resolve the debt crisis. Those structural adjustments are actually accelerating negative environmental trends and limiting the long-term economic development potential of many countries, thus undermining the very purpose of the population control and environmental protection programmes. Some measures, such as eliminating food subsidies for city dwellers, are quite specific; but governments still have some latitude in the way they implement reform, and the report urges that they balance their options very carefully.

The report highlights the fact that contributions of forests, soil, and water, to healthy ecosystems, are not typically included in standard economic accounting, but tend to be undervalued in the course of negotiating readjustment policies.

A potential conflict exists between the short-term measures that are taken to tighten spending and are generally favoured by the private banks, and long-term programmes that are designed to slow deforestation, desertification, pollution, and population expansion. Right now, the report states, 'In some countries, urgently-needed potable water projects are being put off because every penny of foreign exchange is going for debt repayment.' If critical social and environmental programmes are deferred until economic recovery takes hold, natural resource deterioration may have accelerated beyond a country's ability to recover!

This dilemma thrusts the World Bank and the other public lenders into a key role, as, in the absence of private-

bank lending, governments must turn to them. They, in turn, are compelled to take a long-term view of economic development and must also consider social and environmental programmes in their loan policy.

The report also states that, 'From an investment perspective, the stakes for long-term environmental stewardship are very high for large corporations and investors, since costs associated with unintended downstream environmental impacts could significantly reduce the ability of the operating company to meet debt repayments.'

The report is the third from a series of seminars initiated in 1983 as part of the Tufts University Talloires Program on International Environmental Issues, which explores interdisciplinary approaches to those critical problems. In addition to the seminars, Tufts University is emphasizing this interdisciplinary approach within its curricula. The recent seminar was co-sponsored by Tufts University and the International Earthcare Center, with funding from the EXXON Education Foundation, the United Nations Fund for Population Activities, and elsewhere.

J. GARY TAYLOR  
Scharlin-Taylor Associates, Inc.  
P.O. Box 1042  
Lenox Hill Station  
New York  
NY 10021, USA,

&  
ROBERT M. HOLLISTER  
Associate Professor and Chairman  
Department of Urban & Environmental Policy  
Tufts University  
Medford  
Massachusetts 02155, USA.