

our land, ourselves

a practical guide to watershed management in india



GUY HONORE



भारत-जर्मन द्विपक्षीय परियोजना "जलग्रहण प्रबन्ध"
INDO-GERMAN BILATERAL PROJECT "WATERSHED MANAGEMENT"



German Technical Cooperation

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**INDO-GERMAN BILATERAL PROJECT "WATERSHED MANAGEMENT"
THE ORGANIZATIONAL SET UP**

The Indo-German Bilateral Project "Watershed Management" is a project of the Technical Cooperation between Government of India (Ministry of Agriculture, Soil and Water Conservation Division) and Government of Germany (Ministry for Economic Cooperation and Development). The project is implemented by RODECO Consulting on behalf of the German Technical Cooperation (GTZ).

The project is presently supporting watershed management activities in 9 Representative Watersheds (RWS) in six states viz: Rajasthan, Uttar Pradesh, Himachal Pradesh, Bihar, Tamil Nadu and Andhra Pradesh. The activities in each of the RWS are collaboratively being carried out by a State Government Department and a local Non-Governmental Organization.

The project is also monitoring hydrological parameters at 29 selected Silt Monitoring Stations (SMS) in 14 Project Regions in Rajasthan, Uttar Pradesh, Himachal Pradesh, Orissa, Maharashtra, Madhya Pradesh, Bihar, Tamil Nadu, Gujarat and Andhra Pradesh.

PREFACE

Watershed Management becomes increasingly important as a way to improve livelihood of people while conserving and regenerating their natural resources.

This book attempts to describe to a wider public the issues and concerns of watershed management projects and documents the experiences and lessons learned of the Indo-German Bilateral Project "Watershed Management".

The book consists of two parts: A more visual description of the opportunities and challenges which this project encountered and a second more technical part which describes in great detail the procedures, protocols and guidelines developed by this project.

The wheel cannot be reinvented. So, as for many books, I cannot claim that I am the sole author of its content. Many parts of this book are excerpts of reports prepared by various experts and officers of this project:

Dr. M.W. Bollom developed the Project Evaluation Protocol

Dr. Lim Y.H contributed the Guidelines for Hydrological Monitoring

Dr. Kasturi Basu and Ms. Aparna Kanungo described the Case Studies

Dr. Sandhya Chatterji wrote about the NGO's in the Indian Context

Mrs. Jaya Banerjee summarized many of our earlier publications

Furthermore, Mr. E.M. Tideman, Mr. S.Kumar, Mr. P.K. Das, Mr. S.K. Yadav, Ms. Aparna Kanungo and Dr. M.K. Maitra must be thanked for their continuous support and feedback.

Without Dr. Kasturi Basu and Ms. Elizabeth Verghese this book would never have seen the light. Both deserve my special thanks.

Mrs. Sreelatha G Nair, Mrs. Lekha G Nair and Mr. Arjun Swamy must be thanked for their assistance.

Finally my colleagues from the Government of India, Ministry of Agriculture, Soil and Water Conservation Division deserve a special thanks for their understanding and encouragement: Mr. C.M. Pandey (Deputy Commissioner), Mr. Shamsher Singh (Deputy Commissioner), Mr. Y.P. Yadav (Deputy Commissioner, Retd.), Dr. S. Subramanian (now Director, Dept. of Wasteland Development), Mr. Nageshwar Rao (Senior Technical Assistant).

Guy Honoré
New Delhi, August 1999

"We ourselves feel that what we are doing is just a drop in the ocean, but the ocean would be less because of that missing drop."

Mother Teresa

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India. The land of the Taj Mahal, the Himalayas and the mighty Ganga.

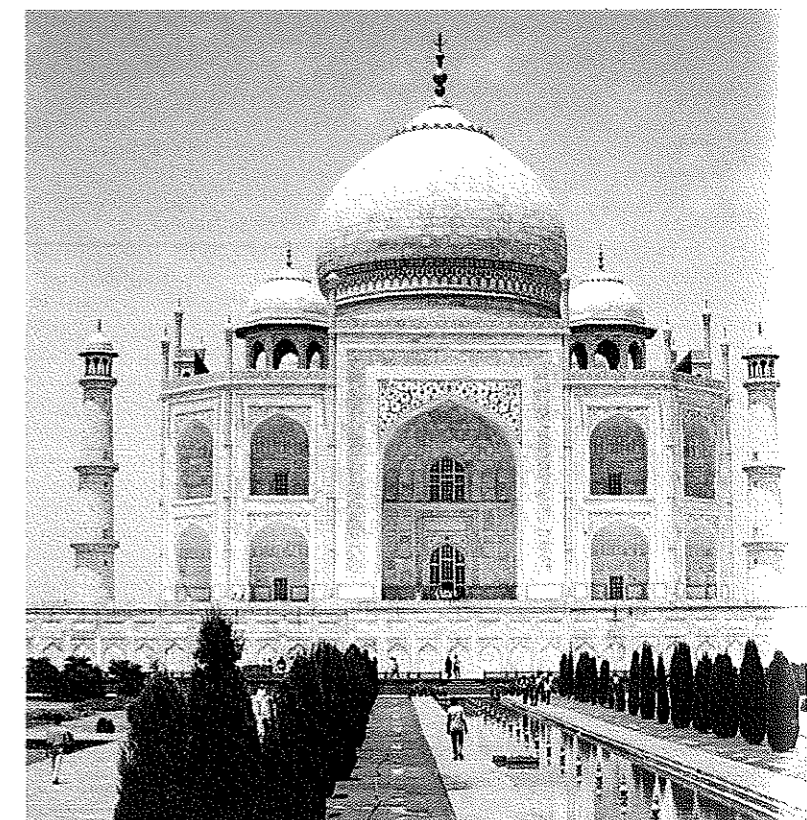
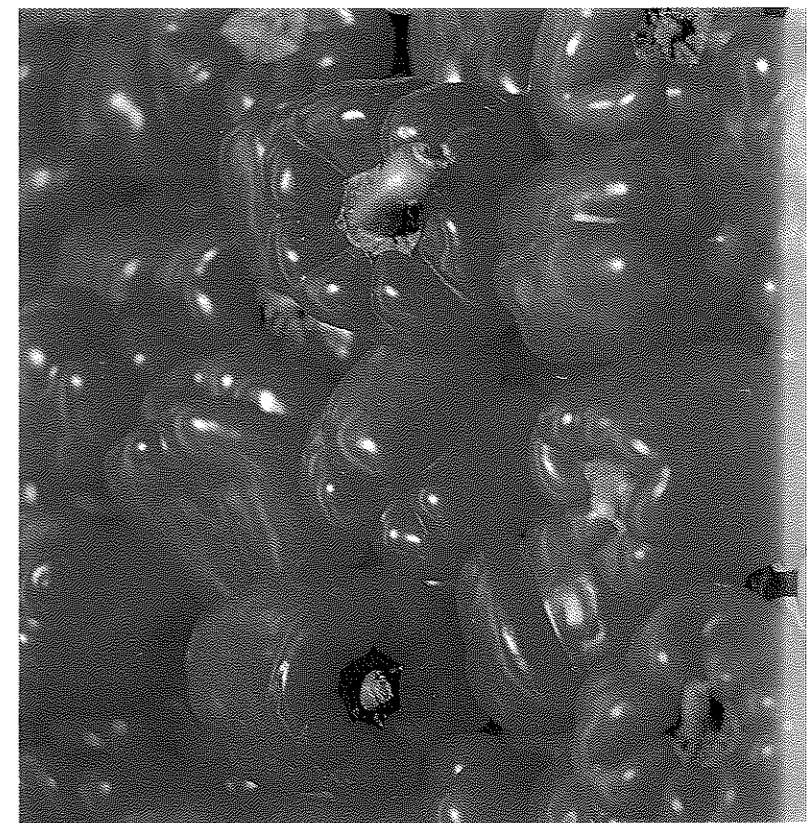
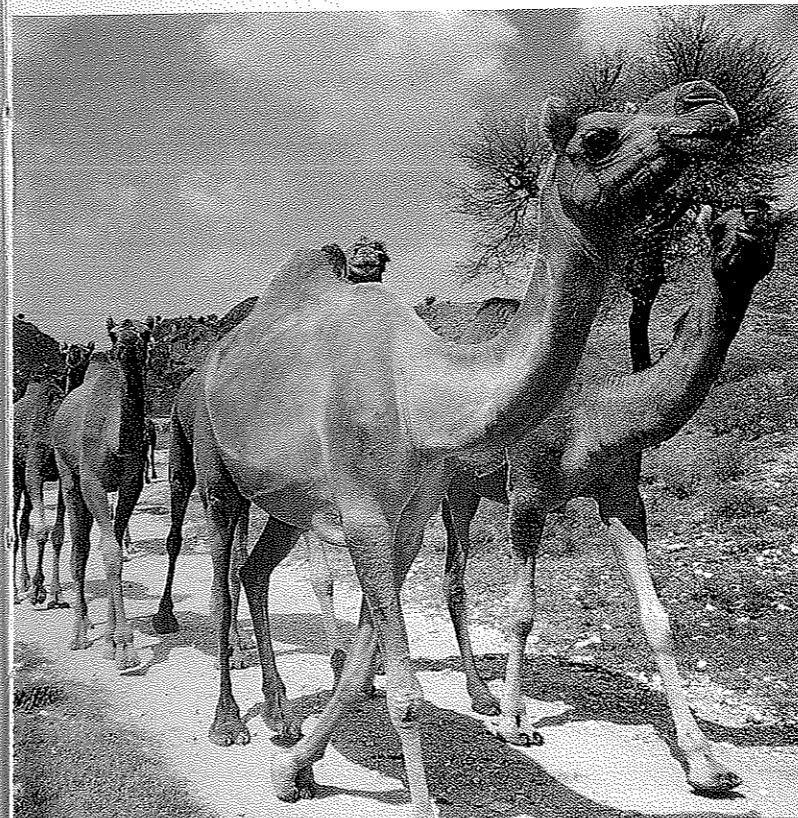
The land of lumbering elephants and spicy curries. The land where camels stare superciliously at women dressed in swathes of bold, bright clothes that billow in the hot summer winds. India, the land of smiling faces.

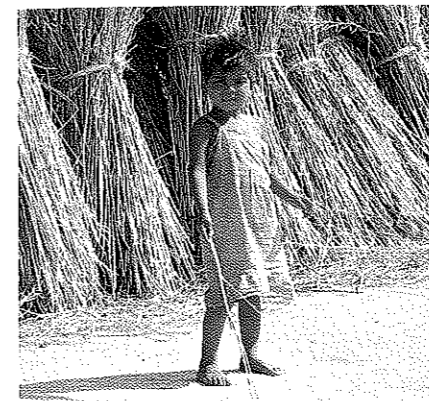
These images are what most people see as India, for information about this vast subcontinent is dispersed in the west via glossy holiday brochures and geography textbooks, both prone to stereotyping. The media on the other hand is intent on displaying India as the Third World, the land of natural calamities and social corruption. But there is more to India than meets the eye.

India has long been afflicted with a burgeoning population. At the end of this millennium, demographers predict the population of India will cross the one billion mark. One billion Indians will then be fighting for access to the limited resources available for survival. Of these, 40 per cent live in absolute poverty, where they cannot get one square meal a day. Life in rural areas, where 70 per cent of the people live off the land, is fast becoming unsustainable. Many are escaping from the disastrous poverty of the rural areas to urban areas in search of employment, livelihood and income. But resources and opportunities are even more limited in towns and cities and few find what they are looking for. They have jumped out of the frying pan into the fire.

The population explosion and its negative effect on India's ecology is a cause for grave concern. An increase in the number of people in a village sparks off a chain of events, which ends with the ultimate destruction of the surrounding land and vegetation and a drastic change in groundwater levels. Imagine this happening in many hundreds of villages at close proximity to each other. Soon the pockets of destruction join to form one huge area of arid, deforested land no longer capable of being farmed or of providing basic human needs like food, fuel, fodder, building materials or water.

It has been estimated that in 35-40 years the populations of India will need twice as many resources as it needs today. India and the world is headed for what has been called an "eco-catastrophe" of unbelievable proportions unless something is done, and done soon.





Soil and water are amongst the most important natural resources within the ecosystem.

They form the basis of all life — plant, animal and man. Yet, the exploitation of these precious resources without checks and balances and much thought for the future has led to their rapid degradation. The writing on the wall becomes clearer with each passing day — sooner than one imagines, will come a day, when there will be hardly anything left to live from at all.

Yet, any given land area and water comprises not only of its physical resources but has a living component as well. The vegetation, animals and man, all depend on this land and water for their food and livelihood. Population growth has put tremendous pressure on the land, denying it the natural inputs of time and space to regenerate. However, since this situation is practically irreversible, it would be prudent to accept it, and proceed from there. Which are the best means by which we can assure a better livelihood for the people without causing further damage to these valuable resources, is an issue that demands immediate attention. An optimal rather than a maximal utilization of resources, and adopting a strategy and approach that is sustainable is perhaps the best solution.

An understanding of the basic problems is of utmost importance to any scheme of planning and management. The issues that are likely to influence any watershed management project are:

SOIL

Plants and trees cannot grow, and men and animals will have no food if there is no soil or if it is not good enough, and yet, this precious commodity slips and slides away at an alarming rate under the action of wind and running water. This process which we call erosion, increases by leaps and bounds when the natural protection of the soil is lost due to such activities as the felling of trees, clearing lands for cultivation and uncontrolled grazing.

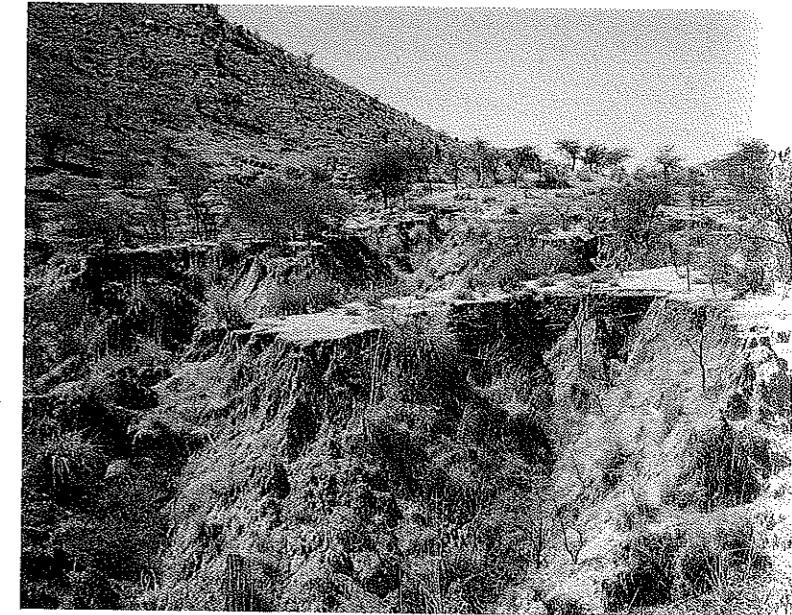
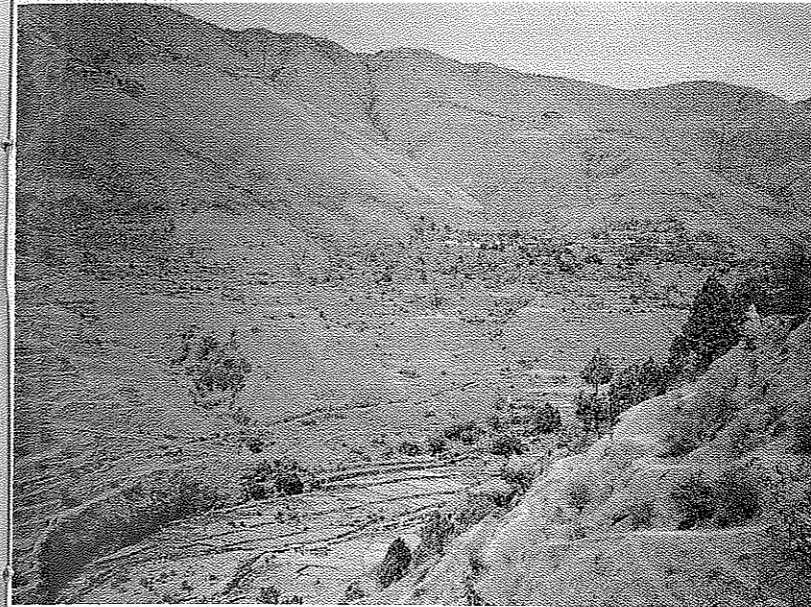
In India, nearly half the geographical area is subject to soil erosion. This has led to

several damaging consequences. Farmlands have been destroyed due to the loss of topsoil, and small rills have in no time been transformed into wide gullies and unreclaimable ravines. Soil erosion has been responsible for this in a major way. The causes of degradation are many — natural and as a result of human activity. Erosion due to wind and water, water logging, salinity, alkalinity, mining and improper farming practices are well known factors. The scale of loss is enormous. In India, the loss of soil through erosion caused by agricultural activities alone is around 16.75 to/ha/year or 1 cm every 10 years. The average soil loss from fallow land can be as high as 80.0 to/ha/year. In contrast is the average soil loss of only 0.1 to/ha/year from a well-managed dense forest.

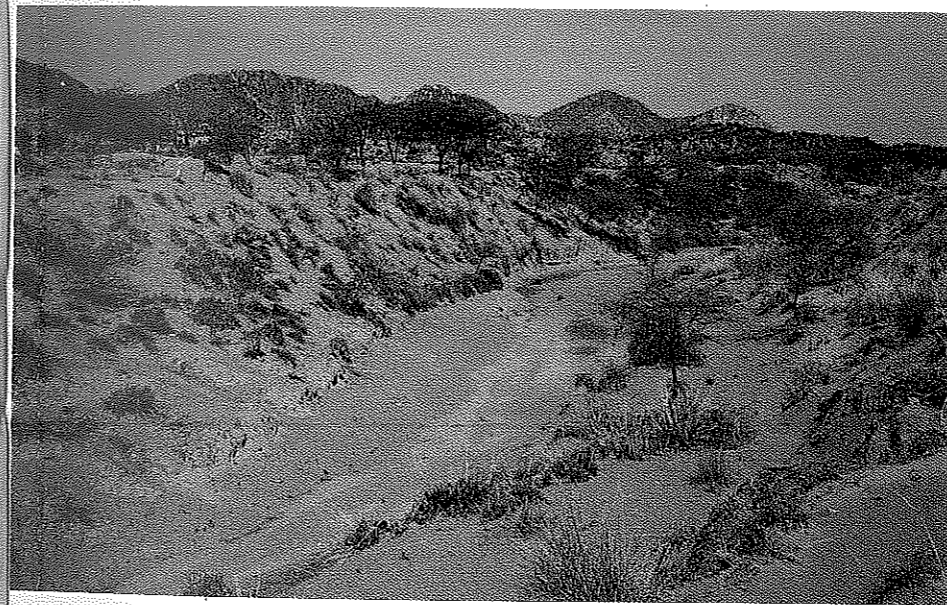
measuring soil loss

Erosion Tolerance Values, an indicator of acceptable yearly soil loss, were first developed in the US based on estimates of a surface soil formation of 1 inch in 50 years which is roughly 0.5 mm per year. In other words, this works out to 11 tons (to) per hectare (ha) per year and has been the basis for setting acceptable annual soil loss rates in the US.

In India, the average, soil loss rate has been calculated as 16.75 to/ha/year, which translates into approximately 1 mm each year. However, recent studies indicate a wide variation in these soil loss rates. It has been found to range from less than 1 to/ha/year in dense forests to more than 80 to/ha/year in the Shivalik Hills. Such areas have been classified under the "very high erosion" category and call for immediate soil conservation activities.



Few people have the foresight to judge the ultimate outcome of their present activities.

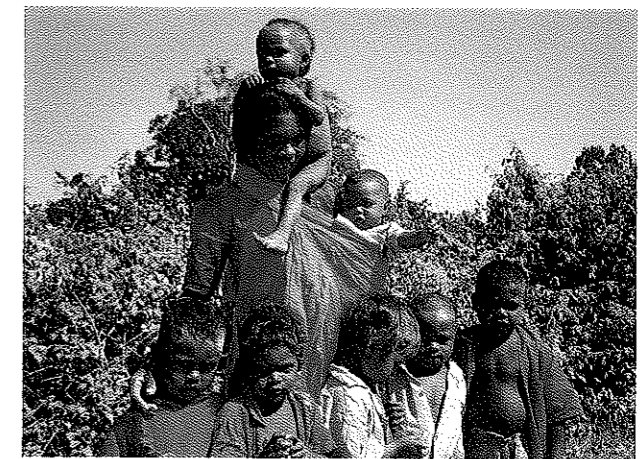


WATER

Erosion degrades not only the land, it has a direct bearing on the quality and quantity of the water as well. As the chief agent of erosion, water carries with it all the loose soil that later gets deposited in reservoirs and dams, reducing both their storage capacities and their life spans. The increased velocity of the water due to the absence of natural controls does not allow it enough time to infiltrate and recharge the groundwater reserves, and there is a gradual lowering of the water table. Thus, despite, adequate rainfall, a region is often found to be water deficient. Furthermore, dissolved and suspended impurities often make the water unfit for drinking.

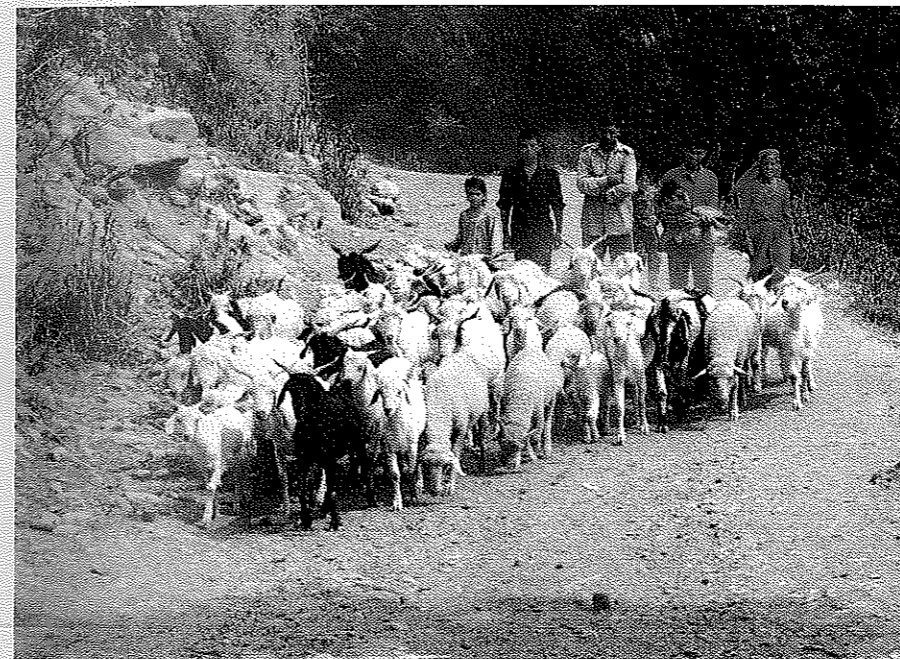


It has been estimated that about on an average 16.75 to/ha/year (or approximately 1 cm/10 years) of soil are lost through erosion every year in India.



MAN

While the agents of erosion are running water and wind, man is largely responsible for aggravating the process. The number of mouths to feed has gone up, resulting in a tremendous pressure on land and other resources. With an ever-increasing number of poor, hunger and scarcity have become the order of the day. In the mad scramble for scarce resources, nature, the silent sufferer, lays degraded and destroyed.

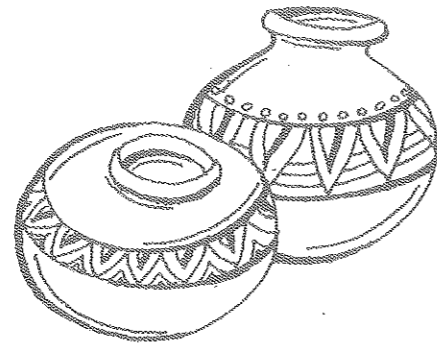


Lack of awareness is another aspect. Few people have the foresight to judge the ultimate outcome of their present activities. For example, clearing forests may today provide a few more tons of grain, but in the long run as soil gets washed away, the once green forests will turn into wasteland.

Erosion—a global problem that needs local solutions.

The world is losing agricultural land to erosion and urbanization twice as fast as new land is being gained for farming.

Deforestation is causing the progressive destruction of two-thirds of the world's storehouse of trees and is accelerating the degradation of soil, and further reducing its capacity to feed and employ people. Deforestation also encourages desertification. In India as much as 80 percent of the forests being cut are burnt as firewood. Wood is a poor fuel, but there is no suitable alternative affordable to the poor.



From 'soil and water conservation' to 'watershed management'.

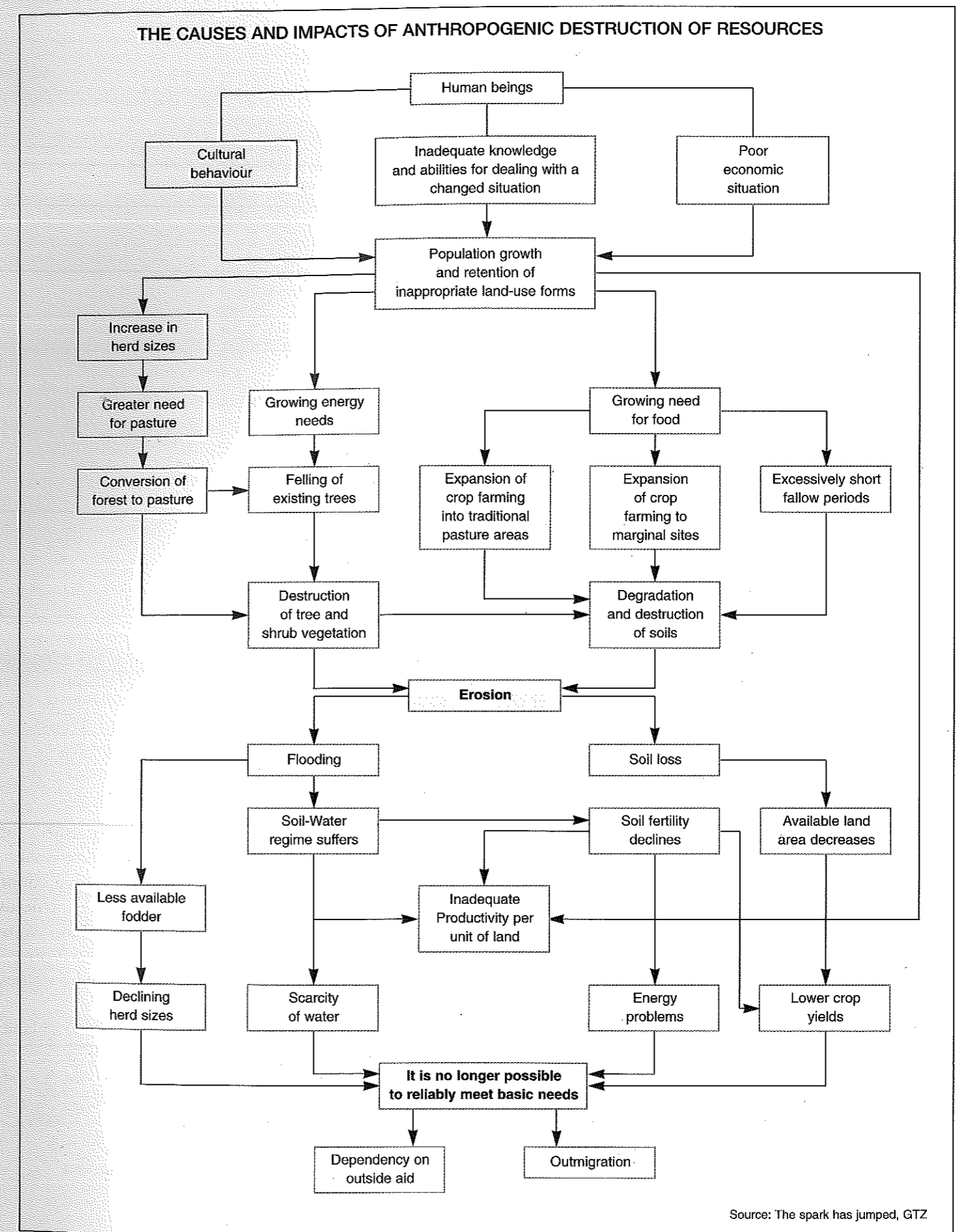
The seriousness of the problem and its inevitable outcome drew the attention of both planners and the concerned man as early as the 1950s. Some efforts were made to check the rapid pace of erosion and many schemes were started. However, they were neither very successful nor replicable on a large scale.

GOVERNMENT EFFORTS

In tackling the problem of land degradation, the Government of India's (GOI) approach has gradually moved from one of mere soil conservation to that of integrated land management. With a view to check erosion, the GOI as well as various state governments launched soil and water conservation programmes in the early 1950s. In the years that followed, the watershed which was a compact homogeneous unit became the obvious choice for the planning and management of natural resources.

The watershed concept got wide acceptance in the seventies, and more diversified programmes were initiated. Going beyond a physical soil conservation approach to a wider perspective, the demands of various sectors were taken into account to develop, conserve and manage land and water. Subsequently, identifying priority watersheds for development was taken up as a strategy for planning, and a national policy for watershed development was formulated to take into account the physical situation and availability of resources along with the needs of the people. In most programmes, afforestation and plantation crops play an important role. The interests of the poorest farmers and other disadvantaged groups are given priority in production-related activities.

While the potential of watershed management in optimally using land, water and plant resources to meet the needs of the people in a sustained manner has been proved beyond doubt, the success achieved was actually rather limited. Even as various nodal State Government Departments (SGDs) implemented several schemes with considerable financial investment, the results were neither commensurate nor visible. A major drawback was the failure to sensitize and involve local people in these activities.



Source: The spark has jumped, GTZ

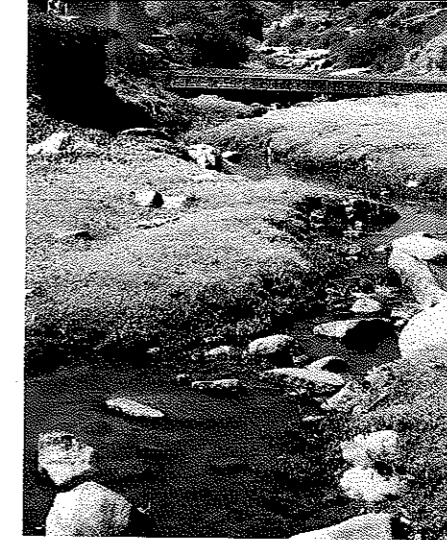


NGOs — A DIFFERENT APPROACH

From the 1980s, the role of Non-Governmental Organizations (NGOs) became increasingly important in the developmental sector in India. They have demonstrated the ability to bridge the gap between people's needs and available resources and services. Many projects implemented by NGOs have served as pilots for demonstrating new approaches and techniques in mobilising local economies. They have been credited with successfully adopting grassroot level participatory approaches and strengthening the willingness of the community to organise themselves through collectives, and practice self-help.

In a policy statement of the early nineties, the Government put forward its intention to involve NGOs as collaborating partners in various developmental programmes. Their role in providing services to the under-privileged population is expected to continue and grow well into the next millennium.

In the field of watershed management, however, very few NGOs have been successful. The success stories at Ralegan Siddhi and by the Social Centre in some of the villages of Maharashtra are often cited, but there are not too many such examples. Often the success achieved by NGOs is on a small scale in pilot studies, and it is not within their means or capacity to replicate it on a larger scale as is required in the country. At times, the work involves unrealistically large financial inputs. Moreover, with various NGOs possessing differing levels of skills and abilities, the success achieved by one can very rarely be replicated by another.



Challenges and opportunities.

If we want to overcome shortcoming of our past efforts, the following issues must be addressed in the future.

PEOPLE'S PARTICIPATION

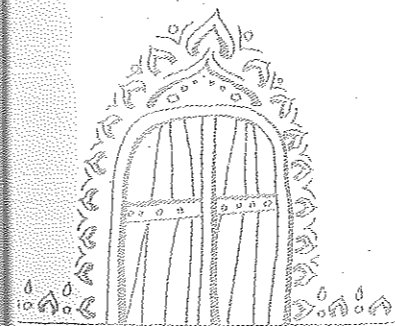
Though some of the SGDs have sufficient expertise in implementing soil and water conservation measures, they are largely from a technical perspective and involve work mainly with land and water. The activities are undertaken on government land, and do not involve people who are important players within the watershed, and whose activities have a significant impact. The people remain largely unaware of such activities and their objectives. They often lack sensitivity to the problem of soil erosion or the means to solve it. The desire to work collectively is lacking and in most cases, there is no further maintenance once the government hand is withdrawn. As a result, whatever benefits the programme can provide, are neutralized sooner or later. One of the major reasons for watershed management programmes not generating the desired results is the lack of involvement of the local community. Of late, even government planners have come to recognize the need for community participation, though often enough, the field level staff lack the expertise to initiate such processes.

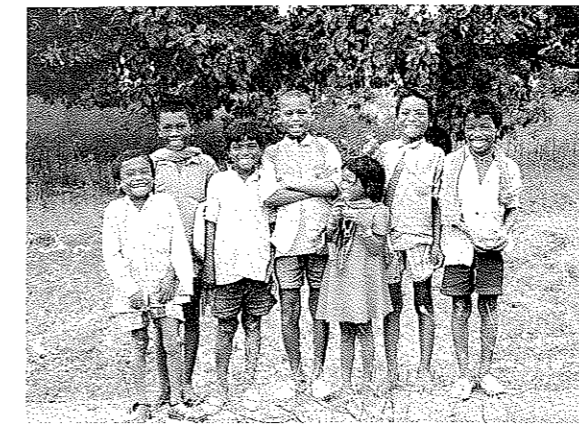
CAPACITY BUILDING

Field-level staff belonging both to government departments and NGOs, in most cases possess neither adequate comprehension of the magnitude of the task nor the technical and organisational expertise to see it through. Training, a priority area, had not received adequate attention. In many cases, due to the lack of knowledge and skills, the personnel responsible for implementation, cannot win the confidence of the local people and motivate them or pass on the necessary know-how.

MONITORING OF IMPACT

A major area of concern for any developmental activity is the monitoring of impact of the various programmes. In the area of watershed management too, facilities for the adequate monitoring of impact are lacking. Indicators for monitoring of socio-economic impact often follow a blueprint approach. These cannot be applied across a country characterised by diversity and rapid changes in its socio-cultural conditions.





the story of water

Most of India's land mass is subject to extremes of climate. When it rains it pours. When it's summer the heat is unbearable. In heavy rain, the fine topsoil particles clog the pores of the soil, reducing its capacity to let water infiltrate. In just a few minutes the rain exceeds the soil's infiltration capacity. As soon as it cannot absorb any more, the excess water begins to run off in rivulets taking most of the precious topsoil nutrients and minerals with it. This causes severe damage to the soil.

Mountain streams feed the great river Ganga and its tributaries, which keep the northern plains of India rich and fertile. New rock material from the young Himalayan range is washed down by the rivers to the plains where the alluvial soil is constantly being replenished, but at a cost — the topsoil of upstream watersheds is being eroded and washed downstream. Deforestation of the mountain slopes brings down more silt than the canals and rivers on the plains can contend with. The silt settles on canal and reservoir beds reducing the amount of water they can hold and can deliver to the fields from the irrigation systems. This pushes up the water levels of rivers causing them to flood every year or so; and increase salinity and water logging. As irrigation water evaporates, minerals are retained in the soil increasing its salinity and making it inhospitable to crops — 15% of land in India has been damaged in this way.

Effective means of collecting and analyzing basic data on sedimentation, hydrology and land-use patterns too are unsatisfactory.

Without proper feedback, there is not much scope for modification or improvement and thus the shortcomings get perpetuated.

FLEXIBILITY AND COORDINATION

The standardized, target-oriented blueprint approach of the government departments is often incompatible with a watershed management approach that calls for flexibility and innovation. Often a lack of coordination among the different government departments performing different specialized functions, complicates matters. It is well known that at the district level, a line department often pursues its own programmes, largely unaware of similar activities being carried out by other departments. This leads to duplication of efforts, resulting in wastage of time and precious resources.

SUSTAINABILITY AND REPLICABILITY

While it is obvious that both the Government and the NGOs gave some thoughts to improve the existing conditions, their efforts have not yet met with much success. The efforts are often sporadic or uni-directional while what is required is an integrated, comprehensive and multi-faceted approach. It calls for a coordinated effort among the different players with an eye to long-term sustainability. An overall understanding of the problems, the different means for their solution and the particular issues to be addressed by each group within a general consensual framework is of prime importance. The concerned government departments and the NGOs will have to pool in their efforts to obtain maximum benefits from the inputs. Sustainability of the programme through local participation must be ensured.

India is a country characterised by diversity in its agro-climatic, cultural and socio-economic spheres, and no rigid blueprint approach can be applied to the country as a whole. Yet, some degree of regional homogeneity exists and the need of the hour may be to implement field tested techniques and schemes on a regional basis. Micro watershed projects may provide solutions that are regionally replicable.